

Hillsborough County,
Florida

Solid Waste Energy Recovery Facility — Application for Power Plant Site Certification

**Volume I —
Application**

Hillsborough County, Florida

Solid Waste Energy Recovery Facility — Application for Power Plant Site Certification Volume I — Application

Submitted By
The Hillsborough County
Board of County Commissioners



Rodney Colson, Chairman
Matt Jetton, Vice Chairman
E. L. Bing
John Paulk
Jan K. Platt

Norman W. Hickey,
County Administrator

August, 1984

Prepared by
Camp Dresser & McKee Inc.

Hillsborough County, Florida

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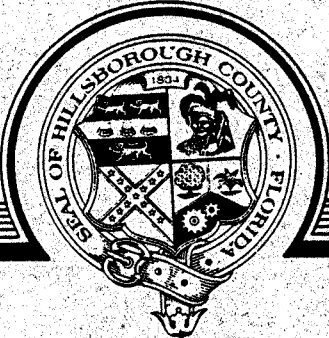
Norman W. Hickey,
County Administrator

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COUNTY OF HILLSBOROUGH

P.O. BOX 1110 TAMPA, FLORIDA 33601



NORMAN W. HICKEY, COUNTY ADMINISTRATOR

August 1, 1984

State of Florida
Department of Environmental Regulation
Division of Environmental Permitting
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301
Attn: Mr. Hamilton Oven, P.E.
Power Plant Siting Section

Re: Application for Power Plant Site Certification-Hillsborough
County Solid Waste Energy Recovery Facility

Gentlemen:

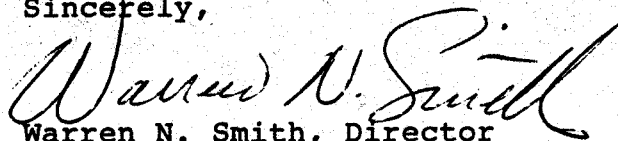
Transmitted herewith is Hillsborough County's Application for an Electrical Power Plant Siting Certification which is submitted in accordance with Rules of the Florida Department of Environmental Regulation, Chapter 17-17 F.A.C.

Hillsborough County welcomes the opportunity to work with the Department of Environmental Regulation and other agencies involved in reviewing this application for site certification.

We anticipate that the information contained herein provides all that is necessary to permit a thorough evaluation of our application. However, if you find that additional data or clarification is required, please contact me at your earliest convenience.

Also enclosed is our check for \$25,000.00 to cover the application fee.

Sincerely,



Warren N. Smith, Director
Department of Solid Waste

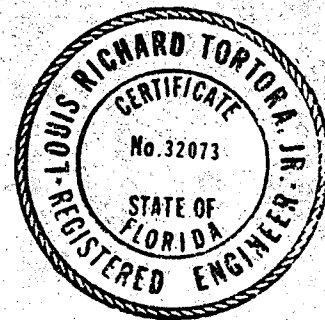
WNS/pd
Enclosures

State of Florida
Dept. of Environmental Regulation
Page Two
8/1/84

Engineer Submitting Application:

[Signature] 7/24/84

Florida Registration Number: 32073



BOARD OF COUNTY COMMISSIONERS
Hillsborough County, Florida

WARRANT NUMBER 63-26
631

0 65529

FIRST NATIONAL BANK OF FLORIDA
TAMPA, FLORIDA

DATE

AMOUNT

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*****25,000.00

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ORDER OF FLA DEPT ENVIRONMENTAL
REGULATION

32031

AUTHORIZED IN OPEN SESSION



[Signature]
CHAIRMAN
[Signature]
CLERK

APPLICANT INFORMATION

Applicant's Official Name: Hillsborough County

Address: Hillsborough County Courthouse
419 Pierce Street
Tampa, Florida 33602

Business Entity: County Government

Name and Title of Business Head: Rodney Colson, Chairman of
Board of County Commissioners

Name, Title and Address of
Representative Responsible
for Obtaining Certification: Warren N. Smith, Director
Department of Solid Waste
P.O. Box 1110
925 East Twiggs Street
Tampa, Florida 33601
(813) 272-6674

Site Location: County - Hillsborough

Nearest Incorporated City - Tampa

Latitude and Longitude: 27°57'14" N
82°40'22" W

UTMs Northerly - 30/92/700m.N.
Easterly - 03/68/220m.E.

Township and Range: T29S, R20E;
Sections 18 and 19

Location of Any Directly
Associated Transmission
Facilities: Hillsborough County - Adjacent
to the Site

Nameplate Generating Capacity
of Proposed Facility: 29 megawatts

Ultimate Site Capacity for
Certification: 39 megawatts

REMARKS: The sole purpose of the proposed energy recovery facility is to dispose of solid waste and recover energy and possibly materials. This proposed facility will afford Hillsborough County a method of solid waste disposal which will substitute for the present landfilling operations. Hillsborough County does not operate, maintain or construct facilities for the purpose of electric generation. Neither does Hillsborough County distribute electrical energy generated at facilities operated by others.

Hillsborough County, Florida
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
agl	- Above grade level
AQCR	- Air Quality Control Region
AQS	- Air quality standards
BACT	- Best available control technology
BOCC	- Hillsborough County Board of County Commissioners
CDM	- Camp Dresser & McKee Inc.
CEC	- Cation exchange capacity
CUPS	- Consumptive Use Permits
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
DO	- Dissolved Oxygen
DRI	- Development of Regional Impact
EPA	- United States Environmental Protection Agency
EPC	- Hillsborough County Environmental Protection Commission
ESP	- Electrostatic precipitator
FAA	- Federal Aviation Administration
FAAQs	- Florida Ambient Air Quality Standards
FAC	- Florida Administrative Code
FDER	- Florida Department of Environmental Regulation
FEMA	- Federal Emergency Management Agency
FIRM	- Flood Insurance Rate Map
FLUCCS	- Florida Land Use and Cover Classification System
gpd	- Gallons per day
gpm	- Gallons per minute
gr/dscf	- Grains per dry standard cubic foot
HCBocc	- Hillsborough County Board of County Commissioners
HCCPC	- Hillsborough County City-County Planning Commission
HCEPC	- Hillsborough County Environmental Protection Commission
HSR	- Highest Second Highest Concentration
Hz	- Hertz
ISC	- Industrial Source Complex Dispersion Model
JTU	- Jackson Turbidity Units
kips	- Kilopounds (1000 pounds)
km	- Kilometers
kV	- Kilovolt
kw	- Kilowatt
LAER	- Lowest Available Emission Rate
Ldn	- Day-Night Energy Equivalent Noise Level
Leq	- Energy Equivalent Noise Level
LQS	- Level Of Service
M ³	- Cubic meter
MCL	- Maximum Contaminant Level
mgd	- Million gallons per day

mps	- Meters per second
MSL	- Mean Sea Level
MSW	- Municipal Solid Waste
mw	- Megawatts
NAAQS	- National Ambient Air Quality Standards
NGVD	- National Geodetic Vertical Datum
NHPA	- National Historic Preservation Act
NPDES	- National Pollutant Discharge Elimination System
NSPS	- New Source Performance Standards
NWI	- National Wetlands Inventory
PFU	- Plaque Forming Units
ppm	- parts per million
PSD	- Prevention of Significant Deterioration
psi	- pounds per square inch
P.U.D.	- Planned Unit Development
PURPA	- Public Utility Regulatory Policies Act
RCRA	- Resource Conservation & Recovery Act
RFP	- Requests For Proposals
SCS	- Soil Conservation Service
SHPO	- State Historic Preservation Officer
SIA	- Significant Impact Area
SIL	- Significant Impact Level
SIP	- State Implementation Plan
SR	- State Road
SSR	- Seaboard System Railroad
SWFWMD	- Southwest Florida Water Management District
TECO	- Tampa Electric Company
tpd	- Tons per day
TSP	- Total Suspended Particulates
USEPA	- United States Environmental Protection Agency
USFWS	- United States Fish and Wildlife Service
vpd	- Vehicles per day
Vph	- Vehicles per hour
WWTP	- Wastewater Treatment Plant

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

INTRODUCTION

In Hillsborough County, there has been an increased interest in solid waste disposal with emphasis on the concept of resource recovery. This has been stimulated by a greater awareness of the environmental and siting problems associated with landfill disposal methods, and by the potential for recovering energy and recyclable materials from solid waste. Landfilling, while suitable in other locations, has become increasingly difficult as a primary disposal method in Hillsborough County. Areas which are environmentally and economically suitable for sanitary landfilling in this rapidly urbanizing County are quickly diminishing. Hillsborough County can no longer rely on conventional landfilling as its only method of solid waste disposal and is, therefore, developing an alternative primary disposal method - a mass-burn, resource recovery system.

The County's decision to build a solid waste energy recovery facility is the culmination of nearly seven years of dedicated solid waste management planning. Since 1977, the Hillsborough County Board of County Commissioners has been working to find a long-term alternative to sanitary landfilling. The County started its effort shortly after the State of Florida enacted legislation (Chapter 403.706 Florida Statutes) requiring heavily populated counties like Hillsborough to submit resource recovery and management plans. Numerous studies, commissioned by the County since 1977, have concluded that resource recovery is the prudent long-term solution to the County's refuse disposal needs. By using the energy obtainable from solid waste to generate electricity, resource recovery makes the most sense economically and environmentally.

SITE LOCATION

Pursuant to Section 403.505, Florida Statutes, Hillsborough County is applying for certification of a solid waste energy recovery facility at a 50.4 acre site west of Faulkenburg Road and approximately 0.6 miles north of U.S. Highway 60 on land owned by the County. The site is centrally located in the unincorporated County and adjacent to an existing 230KV Tampa Electric Company (TECO) transmission line.

PURPOSE OF THE PROPOSED FACILITY

The primary purpose of the facility is to dispose of the municipal solid waste generated within the unincorporated areas of the County. Non-combustibles and inert ash residue resulting from the plant's combustion process will be landfilled at the Southeast County Sanitary Landfill, currently under construction. The derived power from the combustion of the refuse is an additional benefit. Its sale to Tampa Electric Company will help offset the overall cost of operating the facility. The proposed project has previously received an affirmative determination of need from the Florida Public Service Commission.

Hillsborough County will contract with a full-service vendor to design, construct, and operate the plant for 20 years. The County will own the facility.

The proposed project is designed to help achieve the State's goal of enhancing environmental quality and preserving natural resources. To protect its groundwater and surface water resources, Hillsborough County is striving to limit sanitary landfilling of solid waste and wants to utilize the environmentally sound and economically advantageous method of solid waste disposal-resource recovery.

FACILITY DESCRIPTION

The proposed project will be a mass-burn resource recovery facility with an initial continuous design rated processing capacity of 1,200 tons per day of municipal solid waste and a gross electrical generating capacity of approximately 29 megawatts. In anticipation of future disposal needs, Hillsborough County is seeking certification for ultimate site electrical generating capacity of approximately 39 megawatts (gross), using 1,600 tons per day of municipal 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), F.A.C. (Instruction Guide for Certification Applications: Electrical Power Plant Site, Associated Facilities, and Associated Transmission Lines).

The application consists of three (3) volumes:

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

Volume II (Appendices) - contains the appendices of the application (Chapter 10). In addition to those appendices specifically required in the DER Instruction Guide, included are ten (10) additional appendices which are more appropriately included in Volume II than in the application text of Volume I.

Volume III (Air Quality) - contains DER Form 17-1.202(1) Application to Operate/Construct Air Pollution Sources; the specific requirements of the Prevention of Significant Deterioration (PSD) review; the New Source Review (NSR) for non-attainment areas; and a technical stack height analysis. The principal components of the PSD/NSR include: projecting facility emissions; performing a Best Available Control Technology (BACT) and Lowest Achievable Emission Rate (LAER) analysis; and an air quality impact analysis.

As required by Rule 17-17.121(3)(a), F.A.C. also submitted are three (3) copies of materials which show the procedures taken to accomplish

compliance of the site with existing land use plans and zoning ordinances. This compilation of information is referred to as the "Compliance Document".

PRINCIPAL FINDINGS

The proposed facility will be designed and operated to meet all applicable Federal, State and County Standards. As planned, the facility will have a minimal impact on the surrounding environment. The analysis presented in the application supports this conclusion:

- Air Quality - As discussed in Volume III - 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 an ESP designed to meet an outlet grain loading of 0.025 gr/dscf @12% CO₂;
 - 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 equal to approximately 2.2 percent of the Florida Ambient Air Quality Standard for TSP;
 - As discussed in Chapter 3, the tipping area and refuse bunker will be enclosed and under negative air pressure. Thus, odors will not be able to leave 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 an adverse effect on surrounding soils, vegetation or visibility.
- Land Use and Zoning - A series of advertised formal public hearings have been conducted concerning site rezoning and a Land Use Plan Amendment. At those hearings, public input, testimony, and documents were entered into the record as land use and zoning issues were evaluated. As noted in Section 2.2.2, the Hillsborough County-City/County Planning Commission and its staff, the Hillsborough County Department of Development Coordination, the Zoning Hearing Master, and the Board of County Commissioners each concluded that the

proposed solid waste energy recovery project is consistent with all portions of the Hillsborough County Horizon 2000 Comprehensive Plan; and compatible with land use and zoning patterns in the area. Accordingly, the Board of County Commissioners amended the local Comprehensive Plan and rezoned the site.

- Noise - As discussed in Section 5.7, during operation of the resource recovery facility noise levels at the closest residence would increase by only 0.5 to 1.0 dBA above existing and modeled data. This increase is not perceptible to the human ear.
- Traffic - As discussed in Section 5.9.4, the solid waste energy recovery facility and Brandon Subregional Wastewater Treatment Plant (WWTP) will increase daily traffic by approximately 5 percent on Faulkenburg Road and less than 1 percent on State Road 60. The analysis shows that there will be no capacity problems with this additional traffic.
- Surface Water and Groundwater - As discussed in Section 4.2 and 4.3, all plant process water will be drawn from the co-located WWTP and all wastewater discharged from the solid waste energy recovery facility will go directly to this wastewater treatment plant. Potable water will be used in small quantities in the personnel areas of the plant. All plant water will be recycled, with no discharge to surface or groundwater. 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. As discussed in Section 4.3, there will be no influence on groundwater quality as a result of the planned construction dewatering activity.
- 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.
- 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. While the site and adjacent areas provide habitats for a variety of terrestrial and aquatic organisms, it is not anticipated that the proposed project will have any significant effects on area ecology.
- Aesthetics - As discussed in Section 3.2.2, there will be a visual height impact associated with the facility. The facility will be designed to be aesthetically pleasing and architecturally compatible with the surrounding area.
- 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 not impact any historic or prehistoric cultural resources.

PROJECT STATUS

The Hillsborough County solid waste energy recovery facility will be designed, constructed and operated by a full-service vendor under a 20-year contract to the County. The procurement process for the facility is currently underway with selection of the contractor expected by October, 1984. The selected contractor will have to guarantee compliance with the terms and all conditions of the site certification and rezoning conditions. As currently envisioned, construction of the facility will begin in the spring or summer of 1985 with startup expected in the spring of 1988.

The co-located WWTP is currently undergoing final design. The final design will be completed by January, 1985, at which time the construction permit application will be submitted to DER. The WWTP should be operational by September, 1986.

Need for Power and the Proposed Facilities

CHAPTER 1

NEED FOR POWER AND THE PROPOSED FACILITIES

The primary objective of the proposed resource recovery facility is to dispose of solid waste generated within the unincorporated areas of Hillsborough County. The County's decision to build a resource recovery facility comes after several years of investigation by the Board of County Commissioners into alternative methods of resolving the growing solid waste disposal problem in Hillsborough County. Generation of electricity from the combustion of solid waste represents the most feasible alternative to sanitary landfilling for the County, although the derived power is a secondary benefit.

In Chapter 84-198, Laws of Florida (1984), the Florida Legislature has declared that "it is critical to encourage energy conservation in order to protect the health, prosperity, and general welfare of this State and its citizens". The Legislature has further declared 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 in this State".

Under Section 403.501, Florida Statutes, the Florida Electrical Power Plant Siting Act, the Legislature has charged the Florida Public Service Commission with the responsibility of determining whether construction of a proposed electrical generating facility is necessary to meet the present or expected need for electricity in peninsular Florida as a whole. Certification under the Act must be obtained for the construction of any generating facility greater than 50 MW, and may be obtained for a small facility under Section 403.503, Florida Statutes and Chapter 83-415, Laws of Florida ("The Hillsborough County Solid Waste Disposal and Resource Recovery Act").

Hillsborough County elected to seek certification of its proposed 39 MW small power production facility, by a petition filed with the Public Service Commission on August 30, 1983. A copy of the petition is included in Appendix 10.4.1. The Commission's report to the Florida Department of Environmental Regulation, as required by Section 403.507(1)(b) of the Florida Electrical Power Plant Siting Act, found in part, that the proposed facility will, "increase electrical system reliability and integrity and will maintain the supply of adequate electricity at a reasonable cost while reducing our dependence on fossil fuel". In addition, the report noted that the "construction of the plant is a conservation measure which we have encouraged precisely because it may mitigate the need for additional construction by electric utilities". This affirmative determination of need became effective and final on November 4, 1983 (Order No. 12610), through a Florida Public Service Commission Consumating Order No. 12678 on November 14, 1983. Copies of Florida Public Service Commission's final report and consummating order are included in Appendix 10.4.1.

On August 29, 1983, Hillsborough County filed an application with the Federal Energy Regulatory Commission (FERC) for certification of its proposed resource recovery facility as a qualifying small power production facility pursuant to Section 201 of the Public Utility Regulatory Policies Act of 1978 (PURPA) and rules promulgated by FERC. Notice of the application was published in the Federal Register on September 20, 1983. On November 16, 1983, the FERC granted the County's application for certification of its resource recovery project as a qualifying small power production facility. A copy of the final order is included in Appendix 10.1.7.

Site and Vicinity Characterization

CHAPTER 2

SITE AND VICINITY CHARACTERIZATION

2.1 SITE AND ASSOCIATED FACILITIES DELINEATION

2.1.1 Site Delineation and Ownership

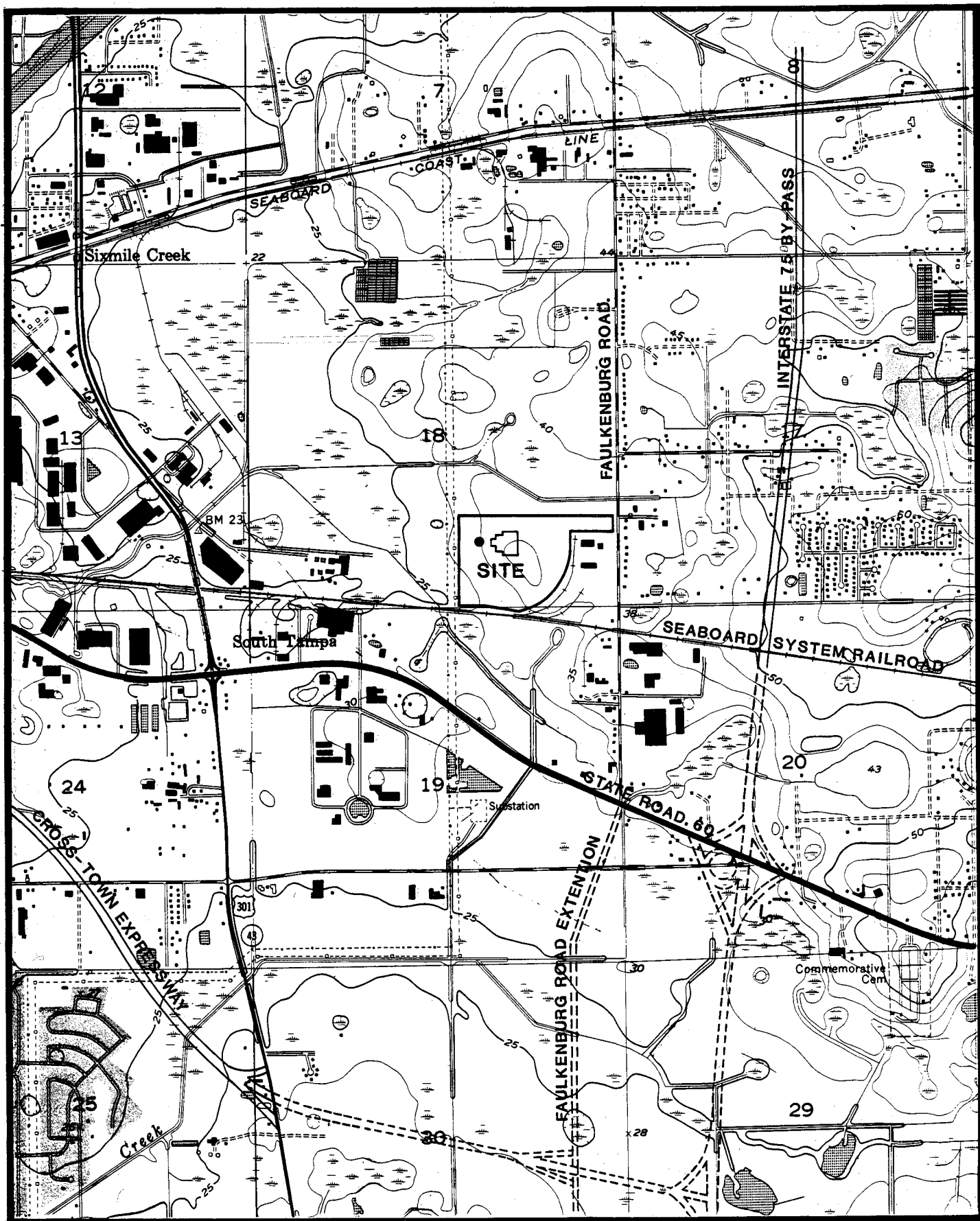
The 50.4-acre site is located in the southern portion of a 353-acre tract of land purchased by Hillsborough County, Florida from Seaboard System Railroad on June 1, 1984. The site is bounded on the south by the Seaboard System Railroad; on the west by a Tampa Electric Company (TECO) 230 kV transmission line easement; on the north by vacant improved pasture land owned by Hillsborough County; and on the east by Faulkenburg Road and the L.B. Foster Pipe Company (located on land leased from the County). Figure 2.1 shows the delineation of the site boundaries. The boundary survey and deed of the entire 353-acre tract is included in Appendix 10.6. A boundary survey, legal description, and topographic survey of the site boundaries are included as Figure 2.2.

Abutting and adjacent properties are delineated on Figure 2.3. All of the land abutting the site to the south is owned by the Seaboard System Railroad. North and east of the site is land currently owned by Hillsborough County. A 225 foot portion of the eastern boundary of the site abuts the Faulkenburg Road right-of-way. Abutting the site to the west is a 200-foot wide easement of the Tampa Electric Company. The southern boundary of the site abuts the right-of-way of the Seaboard System Railroad line.

A complete list of property owners within 150 feet of the site and subdivisions within 250 feet of the site and the property assessment map are included in Appendix 10.6. The nearest private homes to the site are those located east of Faulkenburg Road near the access road to the site.

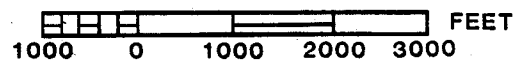
Image Quality

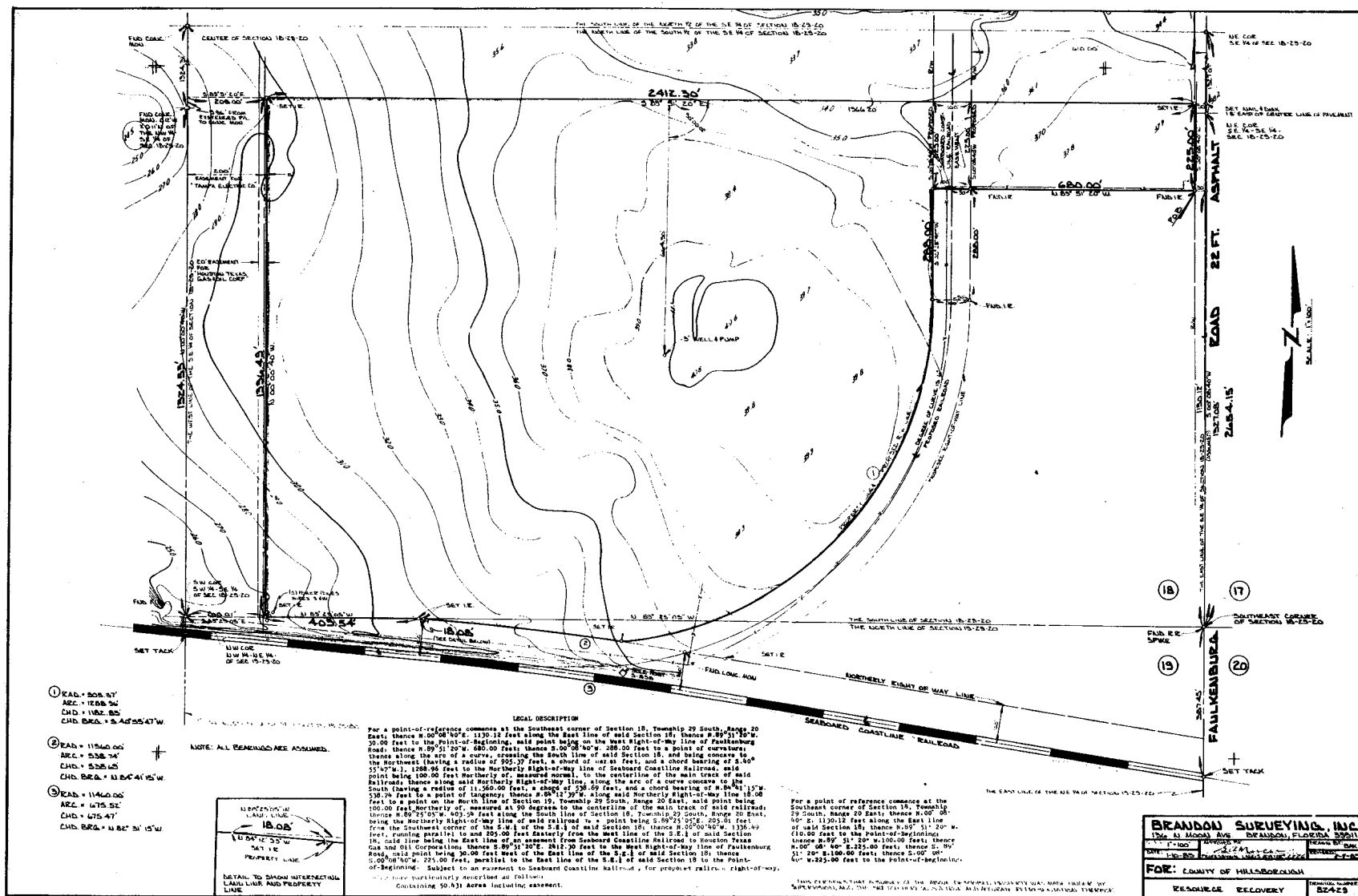
As you review the next group of images, Please note that the original documents were of poor quality.



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

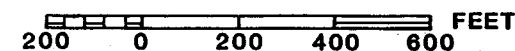
FIGURE 2.1
SITE BOUNDARIES





HILLSBOROUGH COUNTY ENERGY RECOVERY PROJECT

FIGURE 2.2
BOUNDARY SURVEY AND LEGAL DESCRIPTION

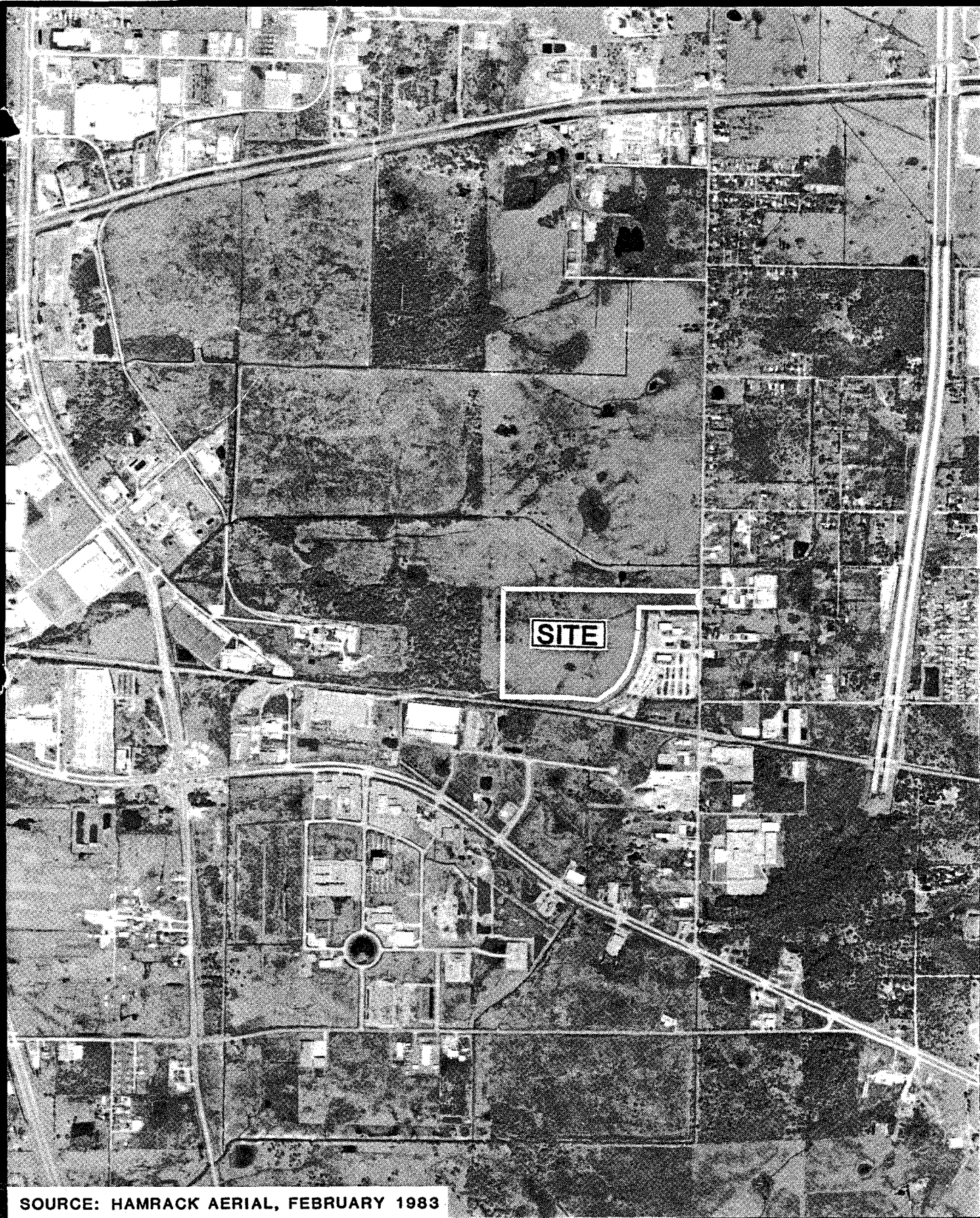


2.1.2 Existing and Proposed Site Uses

Existing land use at the site is improved pasture land. Much of the site is used for cattle grazing. The majority of the site consists of level grassy land with scattered live oaks and pines in the northwest portion of the site. Located in the south central portion of the tract is a small depression that contains standing water periodically but it is not a well-defined, viable wetland. One building, a small farm shed, is located on the property. There is also a small stockade and fencing onsite. These structures will be removed upon development of the site. The 3-inch well on site will be abandoned and permanently plugged in accordance with the rules of the Southwest Florida Water Management District. Figure 2.4 illustrates the existing land use of the site and surrounding area.

As presented in the General Site Development Plan, Figure 2.5, the resource recovery facility has been situated in the northwestern portion of the site allowing good traffic circulation within the site and providing open space between the facility and L.B. Foster Pipe Company. The layout of the facility on the site indicates that about 7 percent of the site will be occupied by resource recovery structures, and about 12 percent of the site will be occupied by roadways and parking. A complete summary of existing and proposed land uses as well as the acreage devoted to those uses is presented in Table 2.1.

Although the total site is 50.4 acres, about 28 percent of the area, 14.1 acres, is scheduled to be developed by the County for the Northwest Brandon Subregional Wastewater Treatment Plant. The wastewater treatment plant is expected to be operational (beneficial occupancy) by September 1986 while the resource recovery facility is being constructed. No portion of the site is located in the 100-year flood zone as defined by the Federal Emergency Management Agency (FEMA). The 100-year flood zone in the vicinity of the site is shown in Figure 2.6.

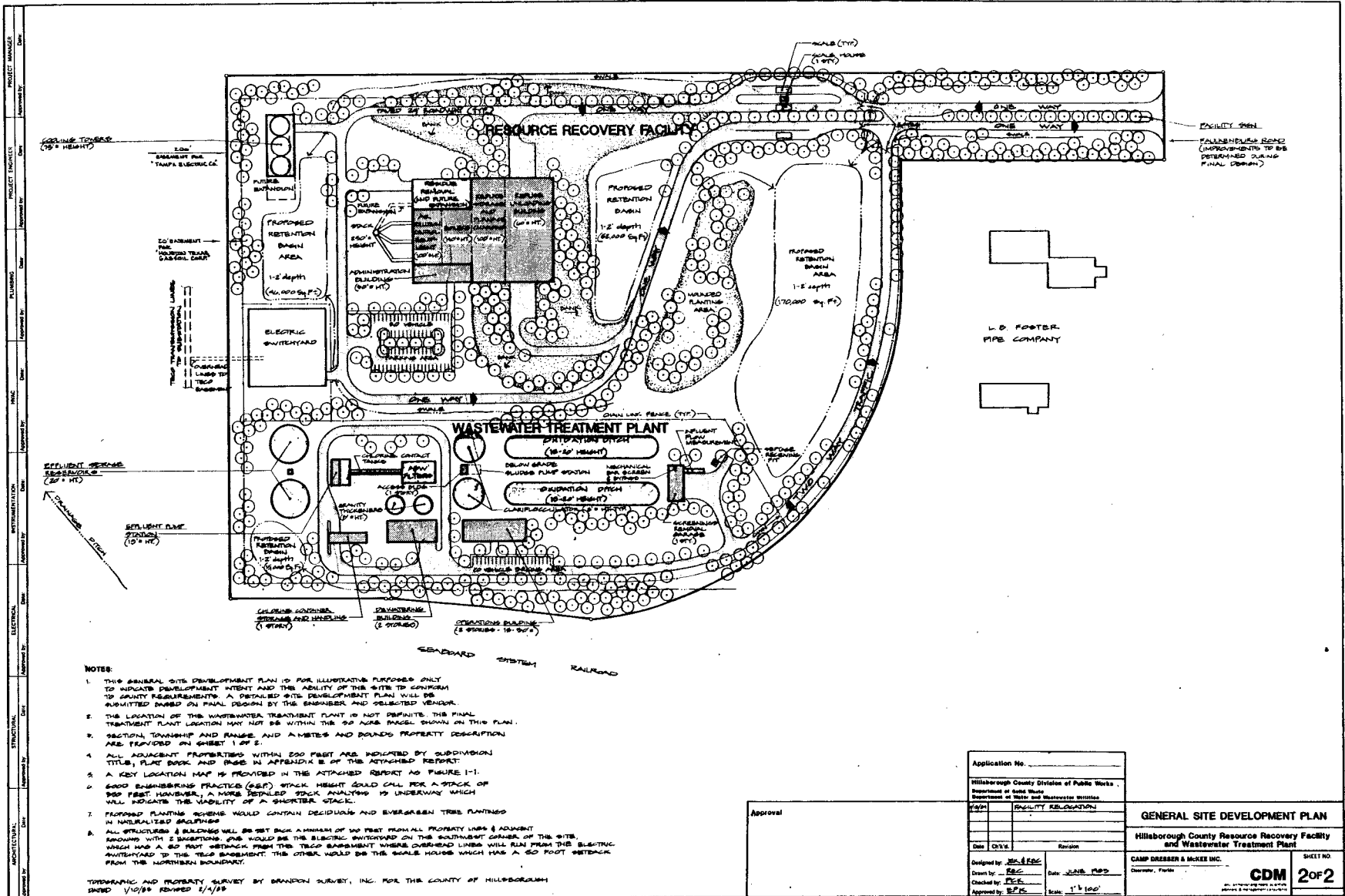


SOURCE: HAMRACK AERIAL, FEBRUARY 1983

HILLSBOROUGH COUNTY
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FIGURE 2.4
AERIAL PHOTOGRAPH OF SITE

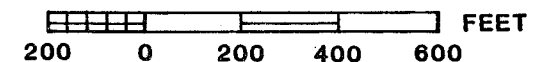
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HILLSBOROUGH COUNTY ENERGY RECOVERY PROJECT

Note: The map pocket that follows this figure contains a copy of the General Site Development Plan Certified by the Hillsborough County Board of County Commissioners.

FIGURE 2.5
GENERAL SITE DEVELOPMENT PLAN

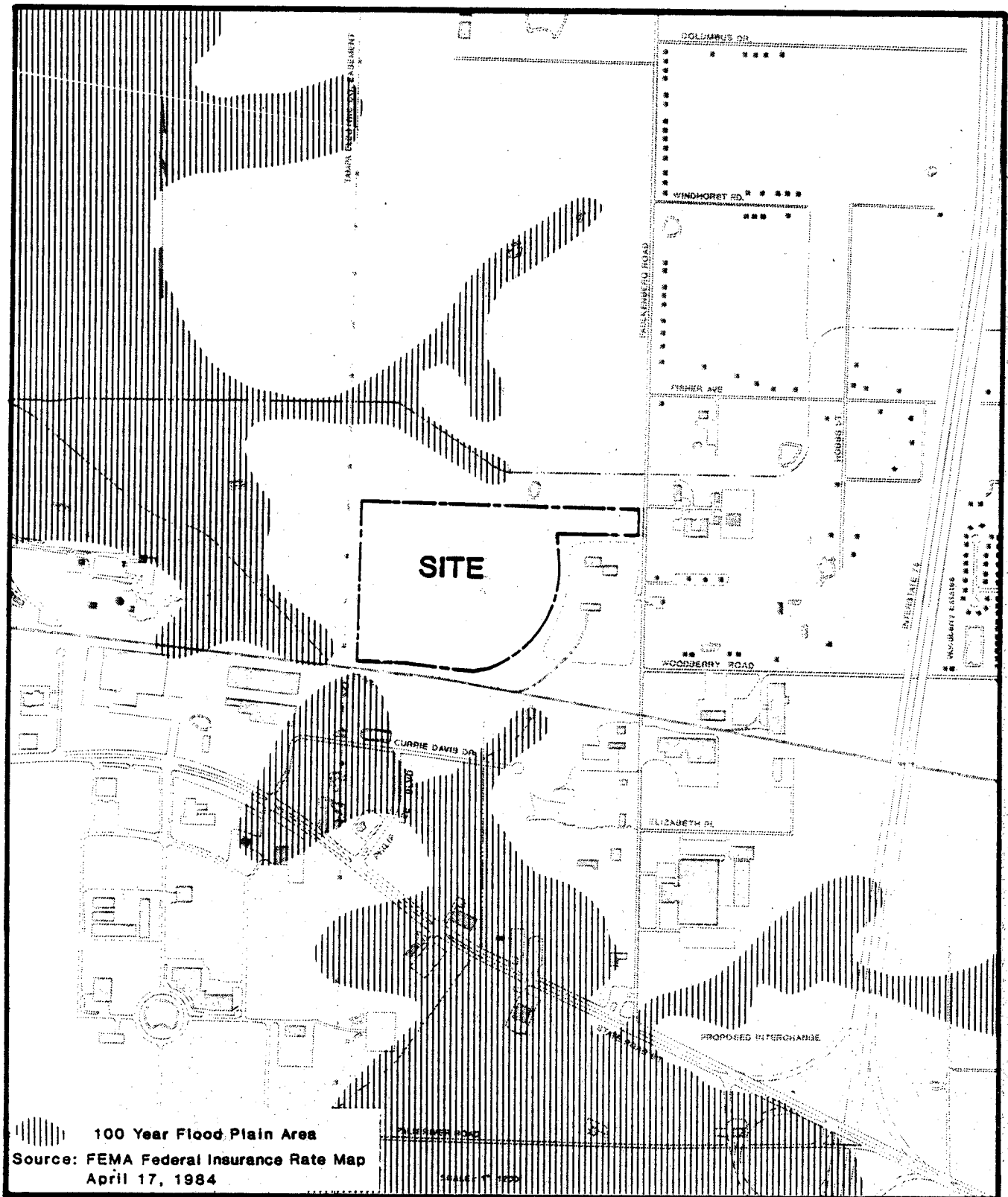


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TABLE 2.1 ACREAGE OF EXISTING AND PROPOSED SITE USE

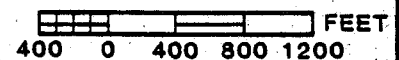
	EXISTING USE		PROPOSED USE					
	IMPROVED PASTURE ¹		WASTEWATER TREATMENT PLANT (1985)		RESOURCE RECOVERY FACILITY		TOTAL PROPOSED USE	
	ACRES	% OF SITE	ACRES	% OF SITE	ACRES	% OF SITE	ACRES	% OF SITE
STRUCTURES	0.0	0.0	2.3	4.6	3.5	6.9	5.8	11.5
ROADWAYS & PARKING	0.0	0.0	1.7	3.4	6.1	12.0	7.8	15.5
OPEN AREAS & LANDSCAPING	50.4	100.0	9.7	19.3	20.6	40.8	30.3	60.1
RETENTION BASINS	0.0	0.0	0.3	0.7	6.2	12.2	6.5	12.9
TOTAL AREA	50.4	100.0	14.1	28.0	36.3	72.0	50.4	100.0

¹ THE ENTIRE SITE CAN BE CONSIDERED IMPROVED PASTURE AS SHOWN ON FIGURE 2.4, THE SITE CONTAINS A SMALL (20' X 40') FARM SHED, FENCING, AND AN UNIMPROVED (DIRT) ACCESS ROAD. THE SPECIFIC VEGETATIVE CHARACTERISTICS OF THE SITE ARE PRESENTED IN SECTION 2.3.6.



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**FIGURE 2.6
FLOOD HAZARD AREAS**



2.2 SOC IO-POLITICAL ENVIRONMENT

2.2.1 Governmental Jurisdictions

Most of the area within a five-mile radius of the proposed facility is within the unincorporated portion of Hillsborough County. As shown on Figure 2.7 portions of the City of Tampa and the City of Temple Terrace are within five miles of the site. The City of Tampa extends to the Tampa Bypass Canal approximately 1.7 miles west of the site.

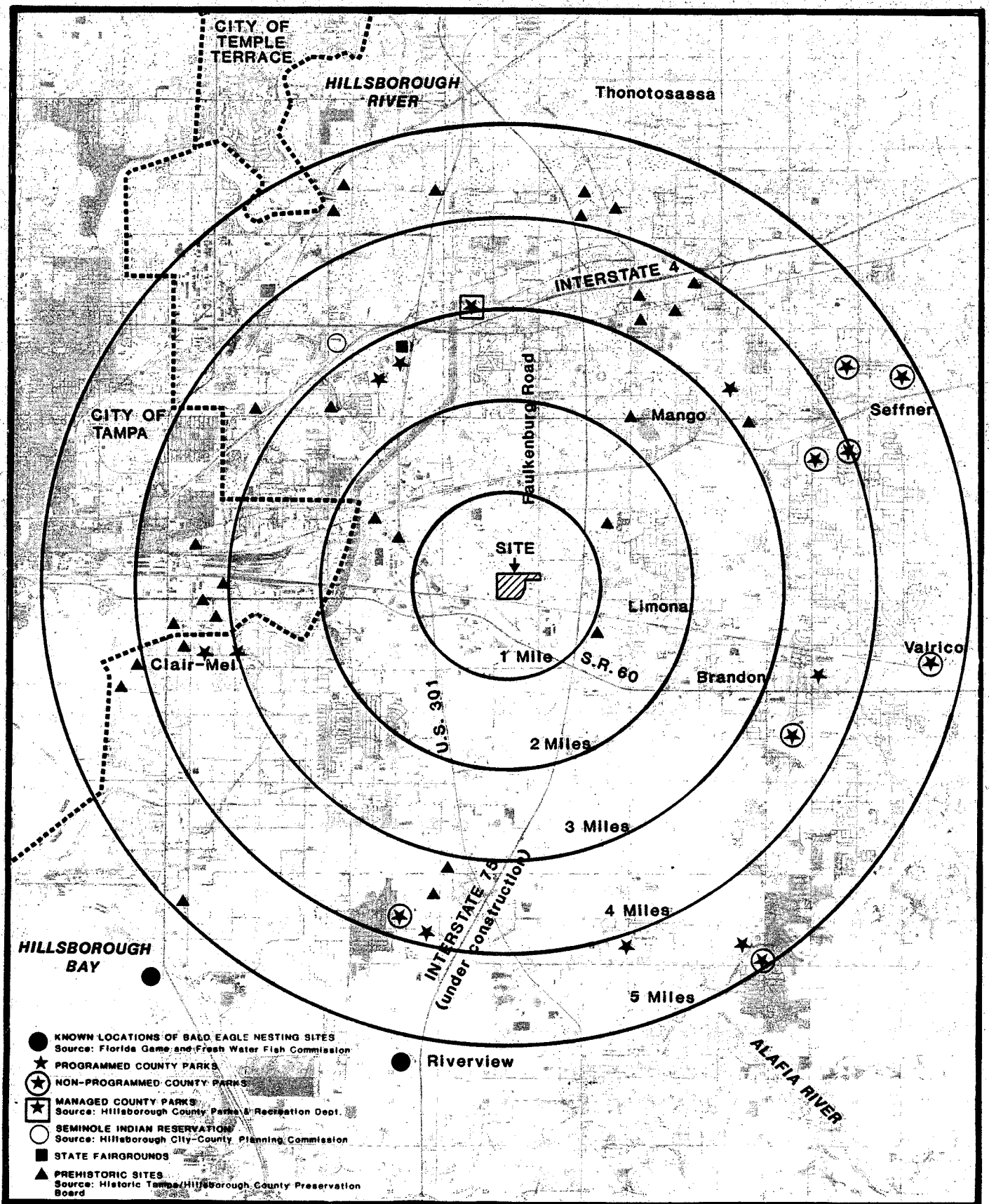
In order to identify local, regional, state and federal areas stipulated under 2.2.1 of the Certification Application Guide, agencies listed in Table 2.2 were contacted. Information provided by each agency is also summarized in this table. Copies of correspondence are found in Appendix 10.7.

Of the areas stipulated in the Certification Application Guide, the following were found to exist within the five-mile area of interest:

- County Parks
- State Fairground
- Seminole Indian Reservation

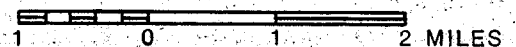
These sites are shown on Figure 2.7.

The U.S. Fish and Wildlife Service (USFWS) has indicated that it is not aware of the presence of any federally-designated wildlife refuges or critical habitats of endangered species within five miles of the site. However, the five-mile radius includes portions of the ranges of four federally-listed endangered and threatened species. These include the wood stork, bald eagle, and arctic peregrine falcon (all endangered) and the American alligator (threatened). As shown on Figure 2.7, two eagle nests have been found just outside the five-mile study area, although these nests are not defined as critical habitats. In fact, critical habitats have not been defined for any of the four listed species. Therefore, with the exception of the two identified eagle nests, it is not possible to illustrate



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**FIGURE 2.7
GOVERNMENTAL JURISDICTIONS MAP**



GOVERNMENTAL JURISDICTIONS INFORMATION SOURCES

2-5

species occurrence on a map. The USFWS has indicated that the proposed project will not create conflicts with any of the above species (See Appendix 10.7 Correspondence from D. Wesley, USFWS).

According to a document entitled, "The Cultural Resources of Hillsborough County: An Assessment of Prehistoric Resources" (Historic Tampa/Hillsborough County Preservation Board, September 1980), there may be as many as 30 recorded prehistoric sites in the five-mile study area. These sites are shown on Figure 2.7. However, according to the Bureau of Historic Preservation Division of Archives, History and Records Management, no significant cultural resources would be affected by the proposed project. Copies of correspondence from the Florida Division of Archives, History and Records Management pertaining to this project are presented in Appendix 10.8.

Nationally registered historic landmarks in Hillsborough County area also presented as supplemental information in Appendix 10.8. According to the Historic Tampa/Hillsborough County Preservation Board, none of the National Register entries are located within the five-mile radius.

Other than county parks, the State Fairground and Seminole Indian Reservation, there are no federal, state, regional or local areas stipulated under Section 2.2.1 within five miles of the project site.

Correspondence from pertinent agencies is provided in Appendix 10.7. Because a 1:24,000 scale map would cover only a one-mile radius and all areas identified in DER Form 17-1.211(1) are outside this one-mile radius, the 1:24,000 scale map has been omitted from this application.

2.2.2 Zoning and Land Use Plans

As required by FAC Rule 17-17.121(3)(1), three copies of supplemental material specifying the procedures taken to accomplish compliance of the site with existing land use plans and zoning ordinances have been submitted to FDER along with this application for site certification. Hereinafter, throughout this application, the "compilation of information" will be referred to as the

Compliance Document. The following text summarizes and expands upon the Compliance Document in light of zoning and land use regulation as they apply to the project.

Under the Comprehensive Planning Act of 1975, Hillsborough County adopted the Horizon 2000 Comprehensive Plan. The Plan established a comprehensive growth management plan for Hillsborough County. The Land Use Element of the Plan established land use categories which serve as a guide for coordinating the development of both privately owned lands and public facilities.

The County also established a Zoning Code to provide specific control over allowable land uses and permitted activities.

In proposing such a major development as the solid waste energy recovery project, the Hillsborough County Board of County Commissioners (BOCC) must provide full public notification of the project. This notification included a reclassifying of the 50.4-acre site for "Public/Semi-Public" (Major) uses under the adopted land use plan. This classification is used to give notice on the Land Use Plan Map that a major public facility either exists is or planned on a location. The BOCC also rezoned a site as a "Community Unit" District. Under this zoning classification, an approved site development plan and a review of the project in terms of compliance with the Comprehensive Plan is required. The reclassification and rezoning of the site were initiated to assure compatibility with the goals of the Horizon 2000 Plan as well as the requirements of the Hillsborough County Zoning Regulations.

2.2.2.1 Land Use Plans

The Horizon 2000 Comprehensive Plan governs development in the unincorporated areas of Hillsborough County, which includes the resource recovery site location. The Comprehensive Plan is comprised of the following elements:

- o Economic Assumptions
- o Intergovernmental Coordination
- o Land Use
- o Traffic Circulation and Mass Transit
- o Aviation
- o Port of Tampa
- o Housing
- o Solid Waste
- o Water and Sewer
- o Drainage
- o Electric Power Siting
- o Parks, Recreation and Open Space
- o Conservation
- o Coastal Zone Protection
- o Policy Statement

Some of these elements are more specifically addressed in Section 2.2.2.2. of this application. Applicable portions of some of these elements are contained in the Compliance Document.

The Land Use Element of the Horizon 2000 Comprehensive Plan, adopted on October 18, 1982 (effective October 27, 1982) is the official statement of the Hillsborough County Board of County Commissioners on the desirable future physical environment of the community. The Land Use Element is composed of Goals, Objectives, Policies and a Land Use Plan Map.

Figure 2.8 shows the land use categories for the five-mile area around the site. The legend for the Land Use Plan Map is provided in Table 2.3.

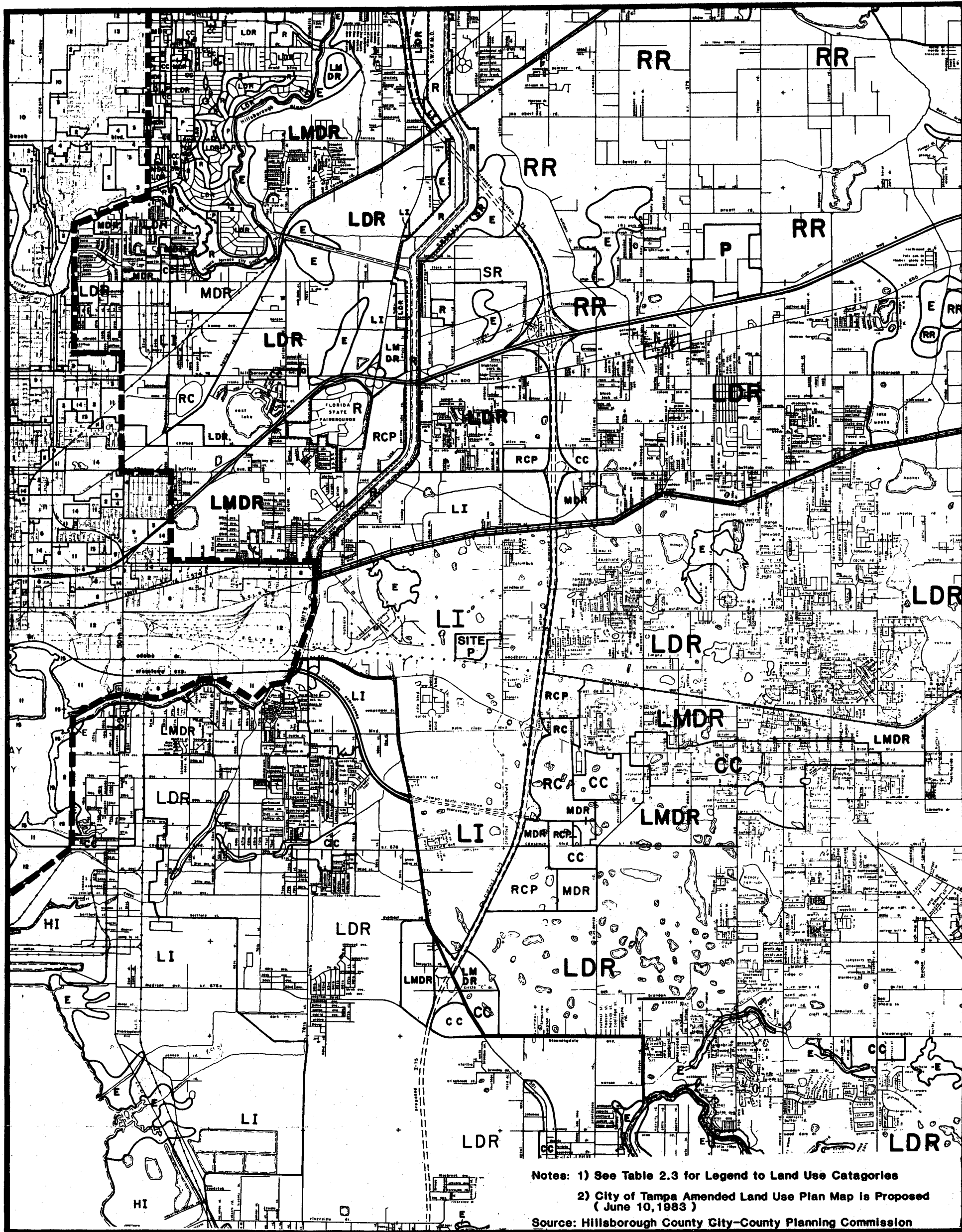


FIGURE 2.8

HILLSBOROUGH COUNTY
 ENERGY RECOVERY PROJECT

LAND USE PLAN MAP-5 MILE AREA

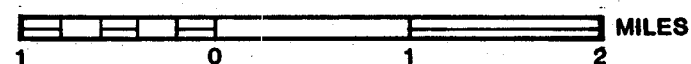


TABLE 2.3
LEGEND FOR LAND USE PLAN ON FIGURE 2.8

Legend for City of Tampa

- | | | |
|--------------------------------------|------------------------------------|--------------------------|
| 1 Low density residential | 6 High density residential | 11 Light industrial |
| 2 Low medium density residential | 7 High residential - office-rental | 12 Heavy industrial |
| 3 Medium density residential | 8 Mixed use | 13 Recreation/open space |
| 4 Medium residential - office-retail | 9 Community commercial | 14 Public/semi-public |
| 5 Medium - high density residential | 10 Regional commercial | 15 Preservation |

Legend for Unincorporated Areas/Hillsborough County

- | | |
|--|--|
| Ag Agricultural | RCP Research/Corporate Park |
| RR Rural Residential | LI Light Industrial |
| SR Suburban Residential | HI Heavy Industrial |
| LDR Low Density Residential | R Recreation/Open Space |
| LMDR Low-medium Density Residential | P Public/Semi-Public |
| MDR Medium Denisty Residential | E Environmentally Sensitive Areas |
| CC Community Commercial | |
| RC Regional Commercial | |

SOURCE: Hillsborough County City-County Planning Commission (1983)

The site is currently designated for Public/Semi-Public (P) uses. Under Part II Section 1 of the Horizon 2000 Land Use Element, Public/Semi-Public designations are defined as:

...those major existing public or semi-public facilities that have major unique land use impacts on the surrounding land uses...it may be used to designate major future uses or other major existing uses having a unique impact as described in Part III, Section 3.2.8 of this Land Use Element, subject to the Goals, Objectives, and Policies and the exceptions and provisions of the Land Use Element and the various public facilities elements of the Horizon 2000 Comprehensive Plan and to the applicable development regulations pursuant thereto.

According to Part III, Section 3.2.8.1 of the Horizon 2000 Land Use Element, the purpose of the Public/Semi-Public land use category is:

To show those major government owned facilities, and other public uses, existing or proposed. This category will also accommodate semi-public uses such as private establishments generally available for public use; for example, churches, hospitals, schools, clubs, and utility and transportation facilities.

By designating the site as Public/Semi-Public, the County's Comprehensive Plan Map identifies the site as the location of a major proposed public use.

The Horizon 2000 Land Use Plan Map categorizes an extensive area of about 5800 acres (about 9 square miles surrounding the resource recovery site) as Light Industrial (LI). The Light Industrial area extends from the site north to Buffalo Avenue, south to the apex of the proposed I-75 extension and west to the Tampa By-Pass Canal and beyond the Crosstown Expressway. The site itself was also categorized as Light Industrial prior to the County initiated amendment to designate the site Public/Semi-Public (P) for the resource recovery facility and wastewater treatment plant.

The Horizon 2000 Land Use Element specifies the types of uses allowed in Light Industrial areas. Allowable uses are determined, in part, on the expected environmental impacts of the activities. According to Part II Section 1 of the Horizon 2000 Land Use Element, the Light Industrial Land Use Category is used to designate:

...those areas in the County potentially suitable for industrial activities that create a minimal degree of impact to the surrounding environment, particularly in terms of non-objectionable levels of noise, vibration, dust, and/or odors. Development in these areas are [sic] subject to the Goals, Objectives, and Policies and land use category descriptions related to industrial activities in Sections 2.5 and 3.2 Part III of this Ordinance Section.

Part III Section 3.2.6 of the Land Use Element also relates allowable uses to environmental effects. Under that Section, the purpose of the Light Industrial designation is to "provide areas for those industrial uses that create a minimal degree of impact to the environment. Generally, the type of activity permitted will be light manufacturing, heavy mechanical repairs, and workshops for various types of processing."

Although Section 3.2.6 of the Land Use Element identifies some of the activities that would generally be permitted in Light Industrial areas (i.e. light manufacturing, heavy mechanical repairs, and workshops for various types of processing), the performance of those activities, based on environmental impact, determines what uses are suited for those areas. This point is clearly stated in Section 3.2.1 of the Horizon 2000 Land Use Element, which states:

The land use categories shown on the Land Use Plan Map are identified according to the predominant use or maximum level of intensity intended for that category of land use. Other uses may be permitted in any land use category, as described in Sections 3.2.2 through 3.2.9, inclusive.

The Compliance Document contains the full text of the Horizon 2000 Land Use Element including those sections quoted above.

2.2.2.2 Consistency with the Comprehensive Plan

As noted previously, Hillsborough County has changed the land use designation of the site from Light Industrial (LI) to Public/Semi-Public (P) by adopting Ordinance #84-5 on February 27, 1984. The adoption of that ordinance occurred after receiving testimony and documents at an advertised formal public hearing (February 27, 1984) and after receiving a favorable recommendation from the Hillsborough County City-County Planning Commission (HCCCPC resolution adopted on June 27, 1983).

The chronology of major events leading to the Land Use Plan Map Amendment is presented in Table 2.4. Hillsborough County Ordinance #84-5 amending the Land Use Plan Map and Exhibit A to that Ordinance, and the HCCCPC resolution recommending the amendment, are included in the Compliance Document and in Appendix 10.3 of this application.

The proposed County resource recovery facility, has been evaluated to determine whether it is consistent with the Comprehensive Plan. As presented in Section 2.2.2.1 of this chapter, the definition of Public/Semi-Public refers to the Goals, Policies, and Objectives of the Land Use Element and the other elements of the Horizon 2000 Plan. In addition, Chapter 75-30, the Hillsborough County Local Government Comprehensive Planning Act, states that public development must be consistent with the plan.

In order to determine consistency, the development proposal has been considered within the context of the standards and criteria found within those Goals, Policies and Objectives. Table 2.5 summarizes the energy recovery project's consistency with the various elements of the Comprehensive Plan. The table does not present all of the Goals, Policies, and Objectives of the Comprehensive Plan. However, it shows the general thrust of each element and the general consistency of the project. The full text of the

TABLE 2.4

CHRONOLOGY OF MAJOR EVENTS LEADING TO
LAND USE PLAN AMENDMENT AND REZONING

May 19, 1983	Initial request to the Hillsborough Co. City-County Planning Commission (HCCCPC) by the Hillsborough Co. Dept. of Public Works for a specific amendment to the Land Use Plan Map.
June 14, 1983	Detailed report supplementing the request for Land Use Plan Map Amendment is submitted to the HCCCPC by the Hillsborough Co. Dept. of Public Works.
June 17, 1983	HCCCPC staff recommends approval of Land Use Plan Map Amendment (#83-09) to HCCCPC. (See Appendix 10.3.1).
June 27, 1983	At an advertised public hearing the HCCCPC adopts a resolution recommending Plan Amendment #83-09. (See Appendix 10.3.2).
June 29, 1983	Application for Rezoning is submitted to the Hillsborough Co. Dept. of Development Coordination by the Dept. of Public Works.
February 2, 1984	Dept. of Solid Waste informs HCCCPC of modifications to the Conceptual Site Plan. (See Appendix 10.3.3).
February 9, 1984	HCCCPC notifies Dept. of Solid Waste that status of adopted resolution is not effected by the modifications. (See Appendix 10.3.4).
February 20, 1984	Dept. of Solid Waste submits revised Conceptual Plan for incorporation into Land Use Plan Amendment request and request for rezoning.
February 27, 1984	At an advertised public hearing, the Hillsborough Co. Board of County Commissioners adopt Ordinance #84-5 amending the Land Use Plan Map. (See Appendix 10.3.5)
April 5, 1984	Hillsborough County Dept. of Development Coordination recommendation of approval with conditions to the rezoning petition (#83-274). (See Appendix 10.2.1)
April 13, 1984	Advertised public hearing before the Hillsborough Co. Zoning Hearing Master concerning rezoning petition #83-274.
April 30, 1984	Hillsborough Co. Zoning Hearing Master recommends granting of rezoning petition #83-274 with conditions. (See Appendix 10.2.2)
May 14, 1984	Public hearing on rezoning petition #83-274. After receiving testimony and reports from petitioner the BOCC continue hearing until May 29, 1984.
May 29, 1984	Continuation of advertised public hearing. The Hillsborough Co. Board of County Commissioners adopt Resolution #R84-0097 approving rezoning petition #83-274 with conditions. (See Appendices 10.2.3 and 10.2.4)

TABLE 2.5
CONSISTENCY WITH THE COMPREHENSIVE PLAN¹

ELEMENT OF COMPREHENSIVE PLAN	POLICY/ISSUE SUMMARY	PROJECT CONSISTENCY SUMMARY	ELEMENT OF COMPREHENSIVE PLAN	POLICY/ISSUE SUMMARY	PROJECT CONSISTENCY SUMMARY
Economic Assumptions	- o Coordination of governmental activities in land use planning with activities of the private sector. - o New businesses and industry are encouraged in Hillsborough County. - o Long-term costs should be considered a community benefit for the decision-making process.	- o The energy recovery facility and WMTF are inter-related with other light industrial activities in the area. - o The energy recovery facility is a new industry for Hillsborough County. - o Resource recovery has long-term beneficial economic, environmental and societal impacts to the County.	Water and Sewer	- o Formulate methods of wisely managing water resources so as to optimize water availability. - o Provide for adequate collection, treatment and disposal of effluents in a sound manner. - o Wastewater facilities should not enhance urban sprawl.	- o The energy recovery facility will use effluent from the co-located wastewater treatment plant for process water. - o The WMTF will treat discharges from the energy recovery facility. - o The locations of the wastewater treatment plant supports modified compact development.
Intergovernmental Coordination	o Board of County Commissioners should encourage implementation of Horizon 2000 Plan with affected agencies.	o Power Plant Siting Act process includes coordination of the project with comprehensive planning.	Drainage	o New drainage systems must minimize adverse hydrologic effects.	o The proposed stormwater drainage system meets the requirements of the Hillsborough County EPC, SWFWMD and DER.
Land Use	- o Achieve compatibility of land uses using sound planning principles. - o Ensure that industrial developments are sound and attractive; meet safety, health, environmental and location standards; and are compatible with surrounding uses.	- o The energy recovery facility has been deemed compatible with existing and future land use by the Hillsborough County City-County Planning Commission, the Hillsborough County Zoning Hearing Master, and the Hillsborough County Board of County Commissioners. - o The energy recovery facility incorporates modern design techniques. The facility will not have adverse external impacts and is compatible with the surrounding area.	Electric Power Siting	- o Coordinate electric power siting with the development of land use plans. - o Review power plant sites with a view to eliminating adverse environmental and socio-economic impacts.	- o The Public/Semi-Public Land Use designation serves to inform the public of the location of the energy recovery facility. - o The energy recovery facility has been reviewed in conjunction with the Site Selection, Land Use Plan Amendment, Rezoning and will secure all necessary permits.
Traffic Circulation and Mass Transit	- o Incorporate transportation planning as a part of the comprehensive planning process. - o Promote energy saving measures of all transportation modes where feasible.	- o Transportation has been reviewed during the Land Use Plan Amendment and Rezoning processes. - o The site location minimizes truck route distances for MSW collection and disposal.	Parks, Recreation and Open Space	o Develop a conservation-preservation system.	o Open space resources were taken under consideration during site selection activities.
Aviation	o Coordinate airport development and operation with surrounding land use control.	o The project is being reviewed by the Federal Aviation Administration concurrent to review of this application.	Conservation	o Certain environmental features in the County are in need of adequate protection.	o The energy recovery facility was sited to avoid impacts to conservation/preservation areas.
Port of Tampa	o Support development of port facilities.	o This element is not directly applicable to the proposed project.	Coastal Zone Protection	- o Discourage new point sources which would impact existing areas of heavy pollution concentration. - o Guide growth in a manner harmonious with the coastal zone.	- o All requirements for LAER and emission offsets will be met. - o The energy recovery facility will not adversely affect the coastal zone.
Housing	o Assure the provision of a sufficient volume and variety of sound housing.	o The energy recovery facility will not impact the creation or maintenance of healthy and viable living environments.	Policy Statement	- o Consult Modified Compact Development Pattern for guidance as to future development. - o Promote a conscious concern for design quality. - o Promote continued vitality and help existing communities. - o Stress the desirability of Hillsborough County for new industries and businesses. - o Functional elements are included in the Policy Statement.	- o The proposed project conforms to the concept of modified compact development. - o The physical appearance of the energy recovery facility has been an important factor throughout the planning process. - o The energy recovery facility and WMTF assists in providing needed solid waste and wastewater disposal. - o The energy recovery facility is a new industry for Hillsborough County. - o See the above listing of the elements of comprehensive plan and the project consistency summary.
Solid Waste	- o Provide for the overall orderly and efficient collection, transport and disposal of solid waste and provide for transition into resource recovery through systematic research and planning. - o Consider resource recovery that will minimize environmental, sociological and political impacts, and maximize economic benefits.	- o The energy recovery facility is the culmination of years of solid waste management planning. - 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.			

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.

Solid Waste Element and the Land Use Element of the Comprehensive Plan are contained in the Compliance Document.

To determine whether the project is consistent with the Comprehensive Plan, County-wide effects of the project must be looked at, as well as the more localized land use compatibility issues. As noted in Section 2.2.2.1, the Land Use Element is the controlling element in the Comprehensive Plan. In Section 2.2 "General Development" of that element, one of the goals is as follows:

Enhance the quality of life through the management of private and public development in a manner which assures maximum social and economic benefits to the population of the unincorporated areas of Hillsborough County.

County-wide social and economic benefits must therefore be examined in order to determine consistency with the Comprehensive Plan.

County-Wide Effects. The resource recovery facility and co-located Northwest Brandon Subregional Wastewater Treatment Plant (WWTP) will provide a special public service to the citizens of Hillsborough County. The resource recovery facility and WWTP are public facilities needed to meet the County's future growth requirements. The resource recovery facility will provide solid waste disposal capabilities for current and future needs of the unincorporated County, reuse of effluent from the WWTP, and energy generation. The WWTP will provide treatment capacity for the increasing amount of wastewater generated in the Brandon area. Chapter 3 of this application provides a description of the proposed project, the co-located Northwest Brandon Subregional WWTP, and an explanation of the interrelationship between them.

In addition to providing a service, the benefits of resource recovery are reflected in the social effects and economics of solid waste disposal. In general, the proposed resource recovery system of solid waste disposal will be initially more expensive than landfilling. However, resource recovery could become less expensive than landfilling if the prices of real estate

and energy continue to increase. In addition, the annual land area requirement for disposal at the Southeast County Landfill will be substantially reduced.

A major societal benefit related to resource recovery is the reduced potential for damage to valuable surface water and groundwater resources. When compared to landfilling of solid waste, resource recovery has been advocated by the State of Florida as the preferred method of solid waste disposal. One major reason is the protection of groundwater in the state.

The economic and social effects of plant construction and operation are more specifically described in Chapter 7 of this application.

The benefits noted above, as well as other County-wide benefits of the energy recovery facility, are listed among the project consistency summaries in Table 2.5 and include the following:

- o Resource recovery has long-term economic, environmental, and societal beneficial impacts to the County,
- o The energy recovery facility is a new industry that incorporates modern design techniques,
- o The project conforms to the concept of modified compact development, and
- o The proposed facility is the culmination of years of dedicated solid waste management planning in Hillsborough County.

The County-wide benefits of the energy recovery facility assist in reaching some of the goals outlined in the Comprehensive Plan. To be consistent with the Plan, however, County-wide benefits must be balanced with local land use compatibility issues.

Local Land Use Compatibility. Land use compatibility was fully examined in the Land Use Plan Amendment and Rezoning hearings. In order for the site to be redesignated on the Land Use Plan Map from Light Industrial to Public/Semi-Public, existing and future compatibility with the surrounding area had to be shown.

As noted in Section 2.2.2.1, prior to the Land Use Plan Amendment the site had been categorized as Light Industrial which represents those areas suitable for industrial activities that create a minimal degree of impact to the surrounding environment. Generally the type of activities permitted include light manufacturing, heavy mechanical repairs, and various types of processing. These types of industries reflect the maximum level of intensity intended for the Light Industrial Category. The entire area surrounding the site is also designated Light Industrial (See Figure 2.8).

The proposed resource recovery facility and co-located WWTP will have only minimal impacts on the surrounding environment. The environmental analysis presented in the County's Application for Specific Amendment to the Land Use Plan Map arrived at this basic conclusion. The analysis presented in this application supports that conclusion;

- o Noise - As discussed in Section 5.7, of this application during the normal operation of the resource recovery facility noise levels at the closest residence would increase by only 0.5 to 1.0 dBA. This increase is normally not perceptible.
- o Odors - As discussed in Chapter 3, the tipping area and refuse bunker will be enclosed. They will be under negative air pressure. Therefore, odors will not escape from the enclosed resource recovery building and will be destroyed through the combustion process.
- o Dust - Fugitive dust created during construction of the facility is addressed in Section 4.5 of this application. With 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 will emit only about 2.2 percent of the Florida Ambient Air Quality Standard for TSP.

- o Traffic - As discussed in Section 5.9.4, the resource recovery facility and WWTP will increase traffic by about 5 percent on Faulkenburg Road and less than 1 percent on State Road 60. The analysis shows that there will be no capacity problems with this additional traffic. Additionally, these facilities will generate less traffic than a typical light industrial development would (see Section 5.9.5).
- o Land Value - An appraisal which was conducted found that there would be no impact to adjacent industrial property values due to the proposed facility. (See Section 7.2 of this application).
- o Aesthetics - As discussed Section 3.2.2, there will a visual height impact associated with the facility. The County is using best effort to minimize the visual impact. The selected construction vendor will be required to use significant landscaping and buffering. The visual appearance of the proposed facility is an important criterion which will be taken under consideration in the selection of a vendor.

The minimal external impacts noted above establish the appropriateness of the proposed project in the described location and support the conclusion that the proposed facility is compatible. Section 2.2.3 describes the current land uses around the site.

The compatibility issue has been examined on numerous occasions. In each instance, as listed below, the reviewing body has found the proposed project to be compatible with existing and future land uses.

The Hillsborough County City-County Planning Commission (HCCCPC) staff found that the Land Use Plan Amendment was consistent with all portions of the Comprehensive Plan is was compatible with existing land uses in the

area (see Appendix 10.3.1). The staff's recommendation of approval was then submitted to the HCCCPC.

The Hillsborough County City-County Planning Commission adopted a resolution on June 27, 1983 stating, in part, "The Hillsborough County City-County Planning Commission finds the proposed public facilities to be located on the site are compatible with the current Light Industrial designation without a Plan Amendment..." (see Appendix 10.3.2).

Finally, on February 27, 1984 the Hillsborough County Board of County Commissioners passed Ordinance #84-5 which amended the Land Use Plan Map and stated in part, two points -

1. The change in the Land Use Plan Map designation is consistent with the other portions and features of the Land Use Plan Map, the Goals, Objectives, and Policies of the Land Use Element, and the other elements of the adopted Comprehensive Plan (Horizon 2000 Plan).
2. The Board of County Commissioners, having received testimony and other evidence, finds that the proposed site for location of a resource recovery plant and wastewater treatment facility represents a site which is compatible with the Light Industrial designation contained in the Comprehensive Plan (Horizon 2000 Plan).

These findings reflect a consensus that the proposed facilities are compatible with surrounding land uses. The Compliance Document contains additional material related to land use compatibility.

2.2.2.3 Zoning Regulations

The Hillsborough County Zoning Regulations were adopted by the Board of County Commissioners on December 6, 1976 and subsequently amended. These regulations establish districts that regulate land uses within the unincorporated area of Hillsborough County and regulate land use and development within those districts.

Figure 2.9 shows the generalized zoning designations for the five-mile radius area around the site. The Compliance Document contains the detailed zoning map of the site and the adjacent zoning maps of unincorporated Hillsborough County.

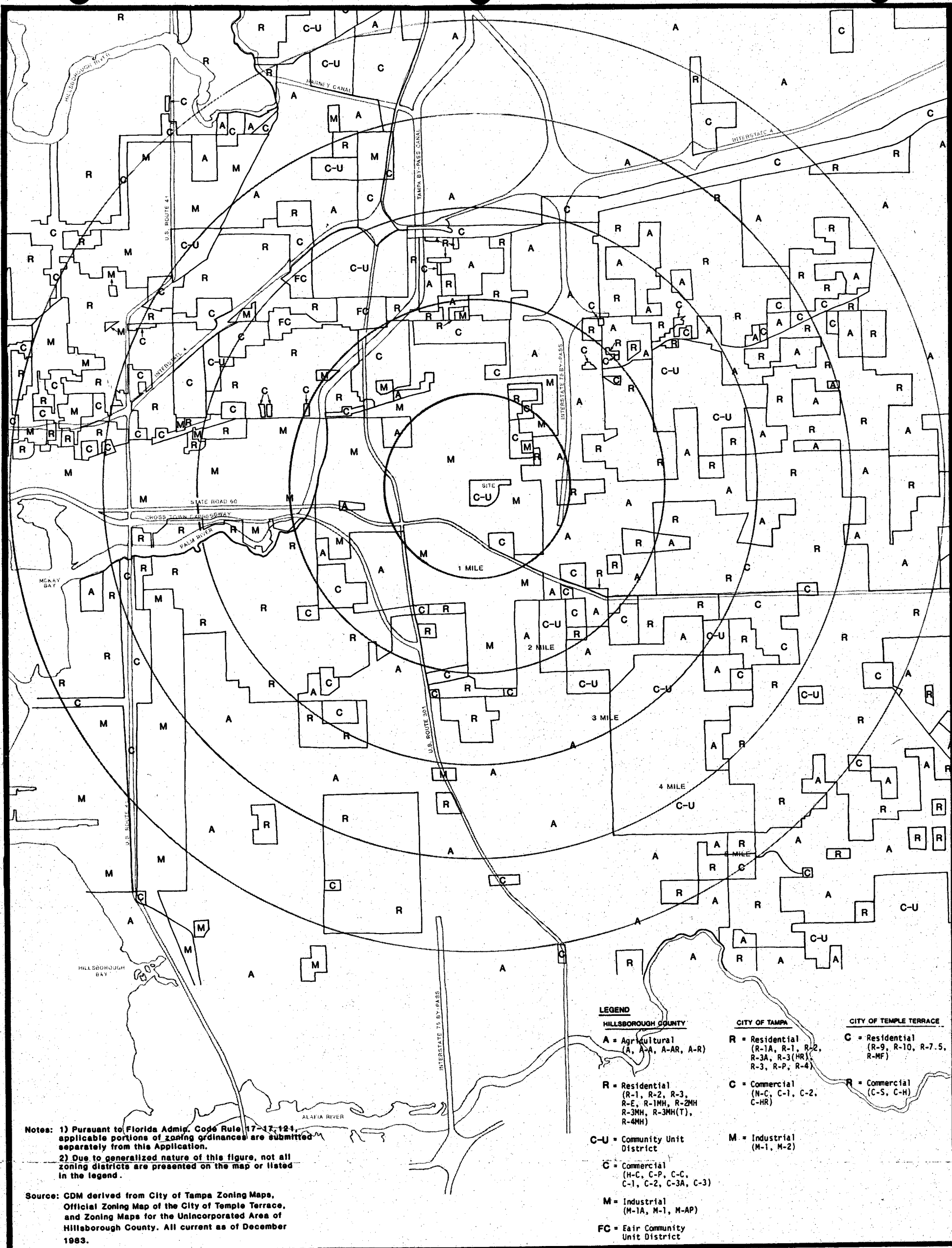
Generally, the greatest amount of residentially zoned land within the five-mile radius area is within the City of Tampa, west of the site. Other large residential areas exist in Brandon east of the site. North and south of the site there is significantly less residential development.

The site is currently zoned C-U, "Community Unit District." According to Section 22 of the Zoning Regulations:

A Community Unit District is not limited as to types of land usage which may be permitted. Uses proposed must be found to be of such types and to be so located and arranged as to assure complete compatibility among themselves and with adjacent existing land uses or land use zones of adjacent property and existing or future public facilities and utilities.

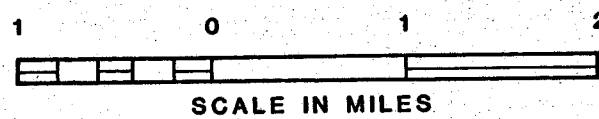
Section 22 of the Zoning Regulations limits Community Unit Districts to unique type of planned development. The development must be shown on a site plan which is reviewed by the Department of Development Coordination. If the site development plan is finally approved by the Board of County Commissioners, only those uses shown on the approved plan are permitted on the site.

The area around the site is primarily zoned MI-A, a Restricted Industry District under Hillsborough County Zoning Regulations. The site of the proposed resource recovery facility was also zoned Restricted Industry prior to the adoption of a Resolution by the Hillsborough County Board of County Commissioners approving the rezoning to a Community Unit District.



HILLSBOROUGH COUNTY ENERGY RECOVERY PROJECT

FIGURE 2.9
GENERALIZED ZONING
5 - MILE AREA



The Restricted Industry designation permits any uses which meet the regulations in the C-3 Commercial District, except that residential dwellings are generally not permitted. The C-3 classification permits any plant or factory designed for uses such as the manufacturing or operation of: breweries and distilleries; clay and stone products; fruit and vegetable processing; galvanizing or plating; glass and glass products; locomotive and railroad car building and repair; paint and varnish and allied products; paper and wallboard; pottery and porcelain; radio or TV stations; structural iron and steel fabrication; wallboard and plaster; building insulation and composition flooring; and any other use similar to foregoing.

A full description of the Restricted Industry zoning classification is provided in the Compliance Document.

2.2.2.4 Consistency with Zoning

As noted previously, Hillsborough County rezoned the site from Restricted Industry to Community Unit District. The rezoning process involved three primary approvals of the rezoning application:

1. On April 5, 1984 the Hillsborough County Department of Development Coordination recommended approval of the rezoning with conditions.
2. On April 30, 1984, the Zoning Hearing Master recommended to the Board of County Commissioners that the rezoning be approved with conditions after hearing testimony and receiving documents at an advertised public hearing.
3. On May 29, 1984, the Board of County Commissioners adopted Resolution #R84-0097 rezoning the site, after hearing testimony and receiving documents at an advertised public hearing on May 14, 1984 that was continued to May 29, 1984.

The above mentioned recommendations and a copy of Resolution #R84-0097 are included in the Compliance Document and in Appendix 10.2 of this application. The chronology of major events leading to the rezoning is presented in Table 2.4.

In order to comply with the Community Unit District provisions (Section 22) of the Zoning Regulation, the proposed development must fulfill the following requirements:

1. The proposed project must be a unique type of planned development; and
2. The proposed uses must be of such types and so located as to assure complete compatibility among themselves and with adjacent existing land uses or land use zones.

These two requirements are discussed in detail below.

Planned Development. The proposed project is a unique use of the site. Together, the energy recovery facility and the Northwest Brandon Subregional Wastewater Treatment Plant will provide a special public service to the citizens of Hillsborough County and create a unique public use. The multi-purpose development consists of the following interrelated activities:

- o the Northwest Brandon Subregional Wastewater Treatment Plant will supply the process and cooling water for the resource recovery plant,
- o the resource recovery facility will dispose of treated effluent from the wastewater treatment plant through evaporation,
- o the energy recovery facility will supply steam to power the turbine-generator,

- o the electric power generator will, in turn, supply electric power to the resource recovery facility with the excess power sold to TECO, and
- o the wastewater treatment plant will treat the discharges from the resource recovery plant.

Non-residential projects, if considered Planned Unit Developments, can be regulated and approved under the Community Unit zoning. A Planned Unit Development (P.U.D.) is defined in Part II, Section 1, of the Amended Land Use Element of the Horizon 2000 Comprehensive Plan as:

Development, governed by the requirements of Hillsborough County's C-U (Community Unit) zoning district or a revision thereof, that is defined as a unit, and which may include only one or a mixture of land uses, and which generally avoids a gridiron pattern of streets, and usually provides common open space, recreation areas or other amenities. Requirements include submission and review of plans, construction in accordance with approved plans, and a re-hearing for plan modification.

In addition, Section 3.2.1.6 of the Amended Land Use Element relates P.U.D.s to non-residential projects such as the proposed energy recovery facility in the following manner:

Only non-residential P.U.D.s may be considered for development approval within Research/Corporate Park, and Light and Heavy Industrial Land Use categories. All proposed P.U.D. projects are subject to the Goals, Objectives, and Policies and related provisions of the Land Use Element and applicable development regulations, including the provision of the County's zoning ordinance.

Therefore, the proposed project can be considered a P.U.D. The requirements of the Community Unit District govern the development of such P.U.D.s.

Compatibility with Zoning and Projected Development Trends. Section 2.2.2.2 of this application highlighted the environmental impacts of the proposed use of the site in terms of compatibility with adjacent land uses. That summary referenced previous sections throughout this application which show that there are no significant impacts associated with the facility. The energy recovery facility, as proposed, would not create more noise, vibration, dust, heat, smoke, odor, glare or other impacts than the amount normally resulting from other uses allowed in the Restricted Industry district.

After hearing testimony and receiving documents at an advertised public hearing on April 13, 1984, the Hillsborough County Zoning Hearing Master found in his recommendations, dated April 30, 1984:

"The proposed resource recovery plant is not considered to be an incinerator which requires M-1 [Heavy Industrial] zoning because it does not, by virtue of its unique design, produce the objectionable external effects normally associated with an incinerator."

The Hillsborough County Zoning Hearing Master also found in his April 30, 1984 recommendations that the proposed development of the site,

"...is compatible with surrounding development patterns which are predominantly industrial. Its external effects, on which compatibility should be judged, are considered to be no more severe than those of existing industries in the area."

On May 29, 1984 after receiving public testimony, the Hillsborough County Board of County Commissioners passed Resolution #R84-0097 approving the rezoning petition and found that:

1. proposed facilities are compatible with the existing zoning classifications in the area of the subject property; and,

2. the proposed facilities are compatible with existing land uses in the area; and,
3. the proposed facilities are compatible with the development patterns projected for the area pursuant to the Light Industrial land use designation.

The Compliance Document contains additional material related to zoning. Appendix 10.2 of this application contains the full text of the Hillsborough County Department of Development Coordination report pertaining to the rezoning petition, the recommendation of the zoning Hearing Master, the Board of County Commissioners resolution approving the rezoning, and the conditions put on the approval.

2.2.3 Demography and Ongoing Land Use

2.2.3.1 Existing Populations

The existing populations of the cities within Hillsborough County and areas shown on Figure 2.7 are shown below.

<u>Area</u>	<u>1980 Census Total</u>
Unincorporated County	347,276
City of Tampa	271,523
Plant City*	17,064
Temple Terrace	<u>11,097</u>
	646,960

*Not shown on Figure 2.7. Plant City is located about 14 miles northeast of the site.

2.2.3.2 Existing Land Use - Five Mile Radius

Existing adjacent land uses include vacant agricultural land, pasture land, commercial, light and heavy industrial uses, and residential. The existing

land use using Level II categories of the Florida Land Use and Cover Classification System for an area extending five miles from the plant is shown in Figure 2.10.

Land use directly north of the site is vacant agricultural land and pasture land. Further north of the site, south of the State Road 574, is an industrial area which includes Reeve Southeastern Steel Corporation, Consolidated Bagging Company, Peak Oil Company and Kings Scrap Metal and Aluminum.

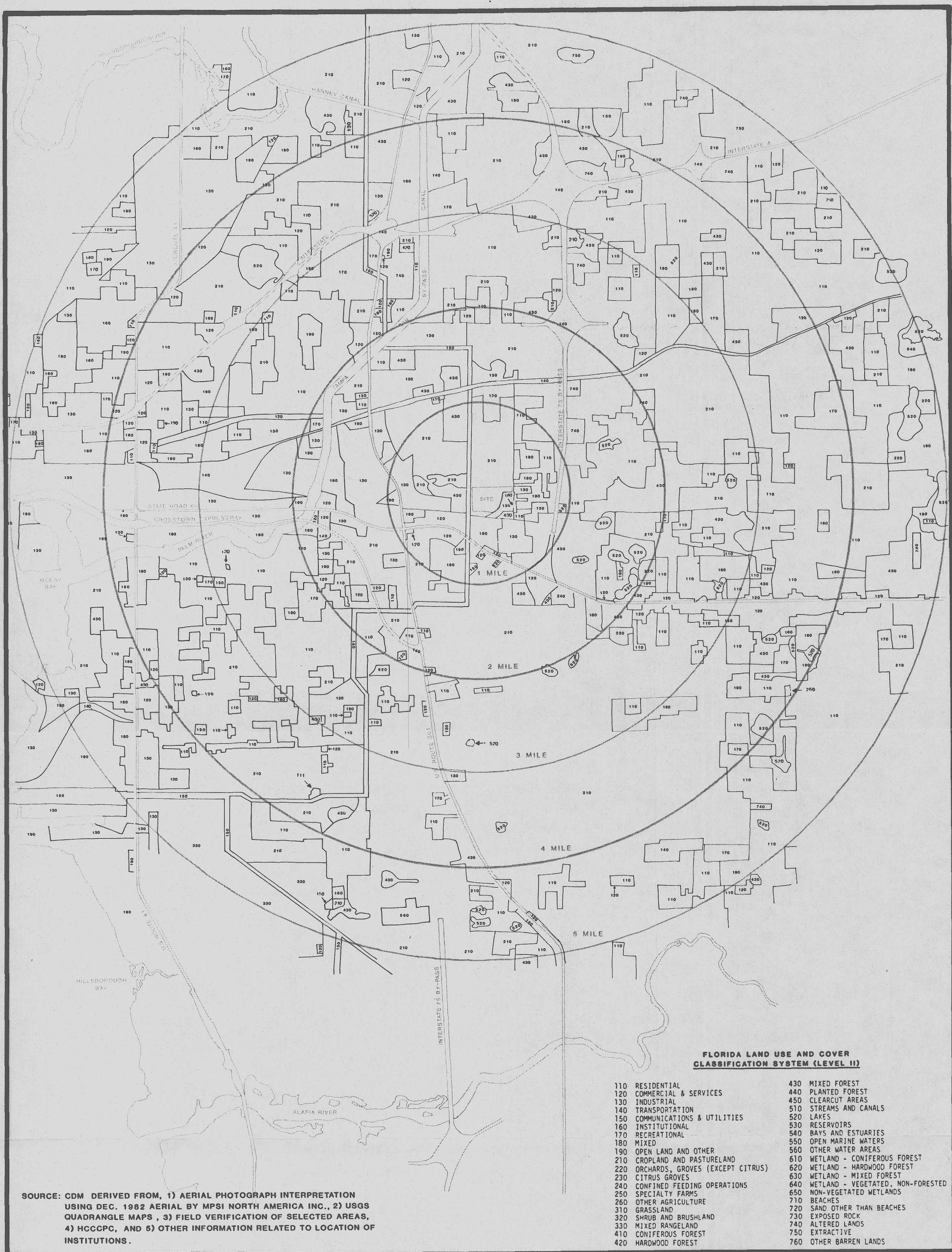
Directly adjacent to the site on the west is an undeveloped wooded area and the TECO easement. Trademark Nitrogen Corporation, a heavy industry, lies west of the wooded area in the M-1 district, just north of the Seaboard System Railroad. Other large areas of M-1 zoning are located along State Road 301. Home Building Supplies, Allis Chalmer and B&B Grocery Distribution Center are located southwest of the site near the intersection of Route 301 and State Road 60.

Immediately south of the site, between the Seaboard System Railroad and State Road 60, is a commercial and industrial park development identified as the Interstate Park of Commerce. This 90-acre industrial park presently contains a bank and the Eastgate Service and Distribution Center.

Figure 2.11 shows the location of the major industrial and commercial activities near the site. Table 2.6 describes existing industrial facilities near the site.

South of State Road 60 is the commercial and office development identified as Tampa Central Park. Adjacent to this development is the site of the proposed Tampa Corporate Center, a commercial and office park. These areas are currently zoned M-1A.

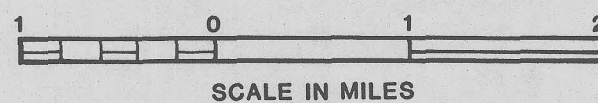
Southeast of the site, west of Faulkenburg Road and north of State Road 60, is an industrial/commercial area comprised of Tank Erectors Welding and Fabricating, Suburban Disposal Service, Inc., Martin Concrete Products, Inc., Belcher Oil Company, and Weighing and Control Systems, Inc. Although

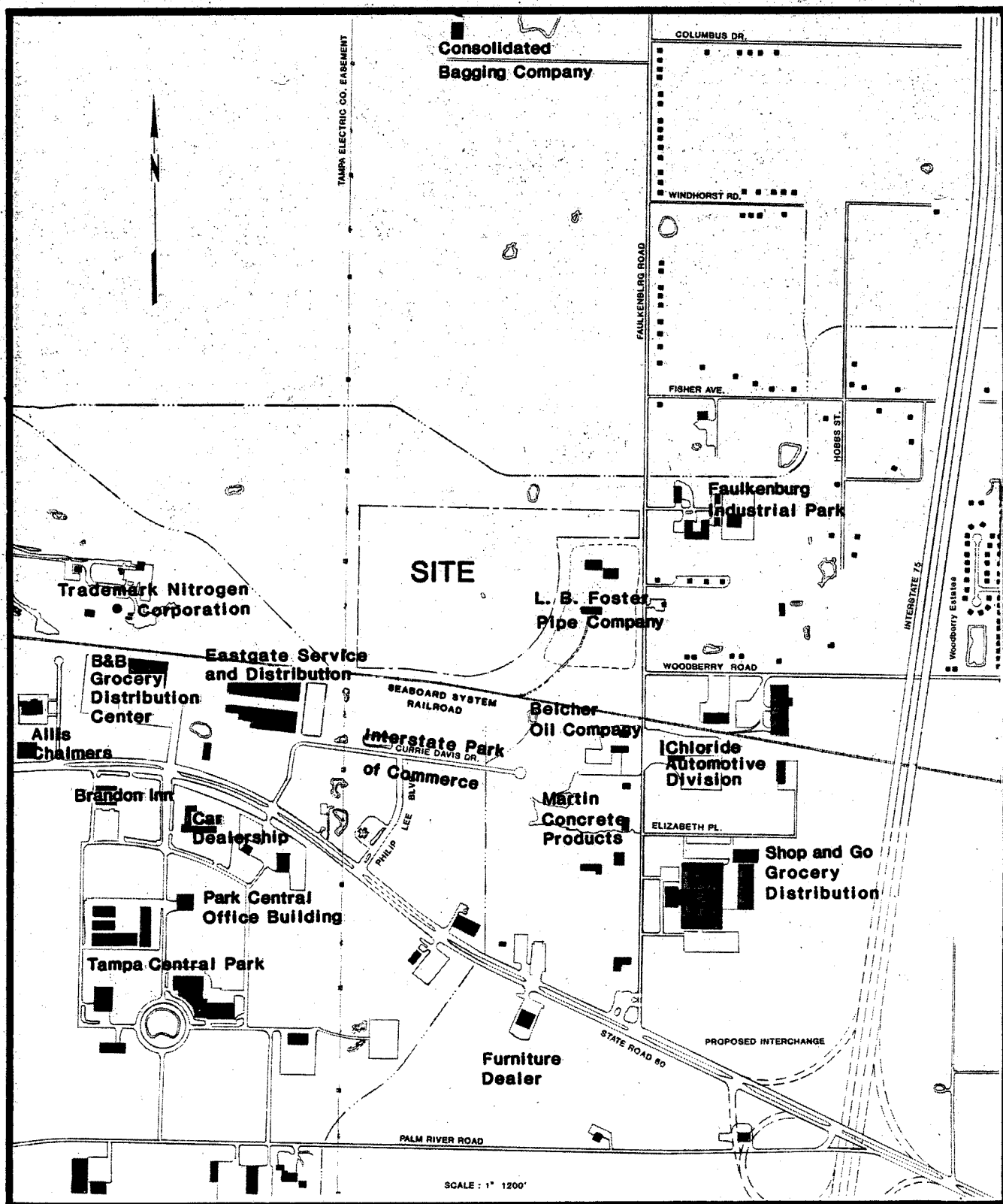


**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

FIGURE 2.10

**EXISTING LAND USE
5-MILE AREA**





**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 2.11
MAJOR INDUSTRIAL AND
COMMERCIAL ACTIVITIES NEAR
THE SITE**

TABLE 2.6
DESCRIPTION OF EXISTING INDUSTRIAL
FACILITIES LOCATED NEAR THE SITE

Name	Location	Product	Employees
Trademark Nitrogen Corporation	US 301 & SR 60	Nitrogen Solutions	21
Tank Welding & Service Co., Inc.	4101 22nd Causeway South	Custom Made Tanks	15
Cast-Metals Corp. of Florida	Faulkenburg Rd. & Hwy 574	Steel and Grey Iron Castings, Heat Treating and Pattern Making	46
R.C. Martin Concrete Products, Inc.	Faulkenburg Rd.	Ready-mix Concrete, Concrete Blocks	29
(Grocery Distribution)	3901 Riga Blvd.	Grocery Distribution	--
Chloride Automotive Batteries, Chloride, Inc.	3507 S. 50th St.	Electric Storage Batteries, Sheet Lead Products, Lead Bars, Lead Oxide, Roof Flashings	477
Reeves South-eastern Corp.	Hwy 576 & Faulkenburg Rd.	Ch.-link Fence Conc., Reinf. Mesh Hot-Dip Galvanizing	222
Peak Oil Co.	State Road 574	Proc., Reclaim, Hydr. & Motor Oil	19
Coca-Cola Bottling Plant	Sabal Industrial Park	Bottled Soft Drinks	--
Consolidated Bagging Co.	Faulkenburg Rd.	Paper Bags	--
Suburban Disposal Service, Inc.	-	Garbage Collection	--
L. B. Foster Pipe Co.	Faulkenburg Rd. & Woodberry Rd.	Steel Pipe	--

Note: Additional industries include Kings Scrap Metal and Aluminum, Belcher Oil Co., and Weighing and Controls Systems, Inc.

Source: o "Directory of Industries, Tampa, Hillsborough County, Florida," Committee of 100 Research Dept., Greater Tampa Chamber of Commerce, 1982.
o "Tampa Bay Industrial Park & Site Survey," University of South Florida College of Business Administration, 1983.
o Hillsborough County Sanitary Sewer System Maps.

there are scattered residences in this area, many of the properties are being offered for sale in M-1A or C-3 zones.

A food distribution company and Chloride Automotive Division are located along and east of Faulkenburg Road, south of Woodberry Road. Although most of this area is zoned M-1A, C-3 zoned land is also for sale in this area.

Bordering the proposed resource recovery site on the east is the L.B. Foster Pipe Company. Mixed land uses are found east of Faulkenburg Road. At the intersection of Woodberry Road and Faulkenburg Road, small tracts of M-1A zoned land are for sale. Faulkenburg Industrial Park, a development of heavy and light manufacturing and warehousing, as well as several retail businesses and scattered residences are found between Woodberry Road and Fisher Avenue. North of Fisher Avenue are single family residences along Faulkenburg Road extending north to State Road 574. Mixed with the existing residential community are properties zoned C-3A, Limited Light Industrial, and M-1A, Restricted Industry.

The nearest established neighborhood, Woodberry Estates, is east of Interstate 75 along Woodberry Road about 2600 feet east of the site's closest boundary and approximately 4200 feet east of where the facility would be located on the site.

2.2.3.3 Projected Land Use and Recent Trends

The Horizon 2000 Plan Map categorizes the area surrounding the site as Light Industrial (LI). The Light Industrial land use category indicates those areas in the County potentially suitable for industrial activities that create minimal degree of impact to the surrounding environment, particularly in terms of non-objectional levels of noise, vibration, dust, and/or odor. Generally, the type of activity permitted would be light manufacturing, heavy mechanical repairs, and facilities for various types of finished goods processing.

Interstate Highway 75, currently under construction, will pass approximately one-half mile east of the resource recovery facility site. As indicated in the Horizon 2000 Plan, the closest residential area is the low-density residential area approximately 2600 feet east of the site boundary just beyond I-75. This area is approximately 4200 feet east of where the facility would be located on the site. I-75 forms a significant buffer between the site and the residential area. Residential, neighborhood commercial, low-intensity office, and multi-purpose projects are potential uses for low density residential areas. The allowable residential density according to the Land Use Element of the Horizon 2000 Plan is 6.0 dwelling units per gross acre.

The extensive highway network comprised of I-75, the expansion of the Crosstown Expressway, Route 301, and State Road 60 is attracting many developments to the area. Expansion of the Faulkenburg Industrial Park is underway. Proposed light industrial developments include a Regional Shopping Mall known as the Brandon Town Center. This proposed development, located at the I-75 and State Road 60 interchange, will be a mixture of commercial, office and residential developments. As previously mentioned, the Tampa Corporate Center, a development of commercial and office complexes, is proposed for the intersection of Faulkenburg Road and State Road 60. Approximately two miles southeast of the proposed resource recovery facility site is the proposed Florida Corporate Center. This is a 400+ acre mixed-use project which will include a combination of research and development activities, offices and light industrial uses.

Sabal Industrial Park is currently seeking DRI approval for development of a 195-acre parcel located immediately west of the proposed I-75 By-Pass at Buffalo Avenue and Faulkenburg Road. The proposed development would include office/research and development, light industrial research and development, commercial/retail, and hotel rooms.

2.2.4 Easements, Title, Agency Works

Prior to the issuance of Certificates of Occupancy, a 150-foot long left-turn storage lane for northbound vehicles turning left into the facility

will be constructed. This is one of the conditions of the Rezoning Approval by the Hillsborough County Board of County Commissioners.

Another condition of the approval is that if requested by the County, an additional seventeen feet of right-of-way on the west side of Faulkenburg Road must be dedicated to the County if needed for future roadway improvements. This additional seventeen feet would provide part of the 94 feet of total right-of-way needed alternatively to accommodate a symmetrical four-lane divided urban section.

Utilization of the existing TECO easement is currently under study by TECO. The interconnection study is discussed in Chapter 6 of this application.

2.2.5 Regional Scenic, Cultural and Natural Landmarks

Based on the research performed in conjunction with Section 2.2.1 "Governmental Jurisdictions," the following areas were found to exist within five miles of the site:

- o County Parks
- o State Fairground
- o Seminole Indian Reservaton

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

Information provided in "The Cultural Resources of the Unincorporated Portions of Hillsborough County: An Inventory of the Built Environment," by the Historic Tampa/Hillsborough County Preservation Board is provided in Section 2.2.1.

2.2.6 Archaeological and Historic Sites

The site does not have any archaeologically or historically significant sites or areas considered to be potentially significant archaeologically or historically as identified by the Department of State, Division of Archives, History and Records Management (DAHRM).

During the site selection activities for the proposed energy recovery facility, the DAHRM was contacted to determine the historic/archaeological significance of the property. According to the DAHRM, the Florida Master Site File indicated no known sites on the property. However, since sites were known to exist in similar geographical and environmental areas nearby, a survey was recommended by the State Historic Preservation Officer (SHPO).

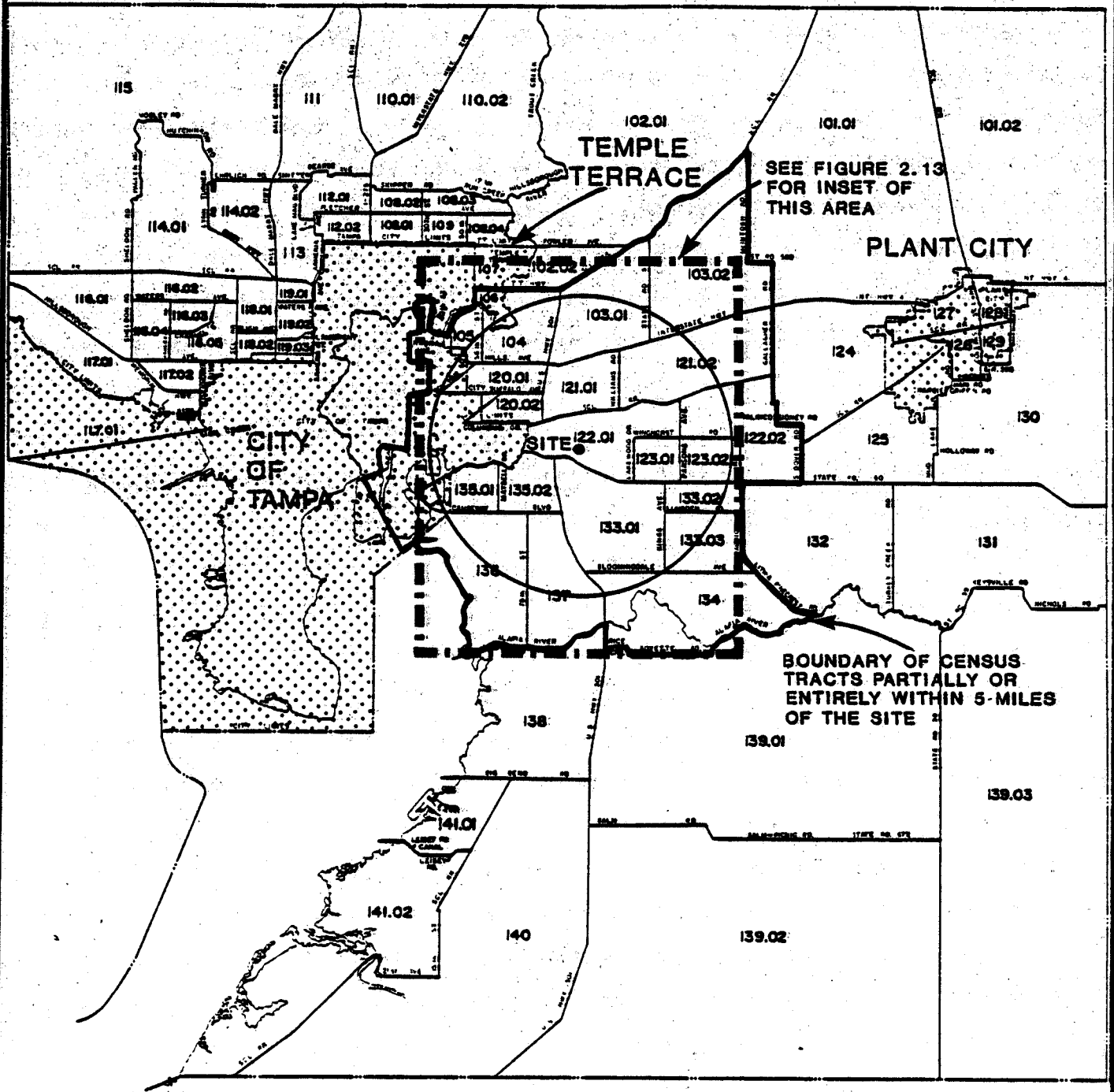
Hillsborough County retained the services of Dr. J. Raymond Williams of the University of South Florida, Department of Anthropology to do a walkover reconnaissance survey and subsurface testing. The report, "An Archaeological and Historical Survey of the Faulkenburg Road Resource Recovery Facility Tract, Hillsborough County, Florida," was prepared in May 1983 by Williams, Newman, Estabrook, and Johnson and is included in Appendix 10.8. In general, the report concluded that the planned use of the project area will have no impact on any prehistoric or historic cultural resources.

The archaeological and historical survey has been reviewed by the DAHRM. In a correspondence dated June 21, 1983, to Hillsborough County, the DAHRM noted that "...the proposed project is unlikely to affect any significant archaeological or historic resources, and may proceed without further involvement with this agency." A copy of this correspondence is also included in Appendix 10.8.

2.2.7 Socioeconomics and Public Service

2.2.7.1 Social and Economic Characteristics

Current and Projected Population. Table 2.7 details the 1980 census population counts for those census tracts partially or wholly within five miles of the site. The census tract which contains the site had a 1980 population of 5,756. The 1980 census population of those tracts partially or wholly within five miles of the site was 136,336. As shown on Figure 2.12 the total area within those census tracts partially within the 5 mile area is considerably larger than the 5 mile radius area itself. Figure 2.13 shows the 1980 census tracts near the site including those within the City of Tampa.

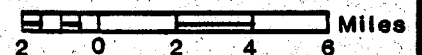


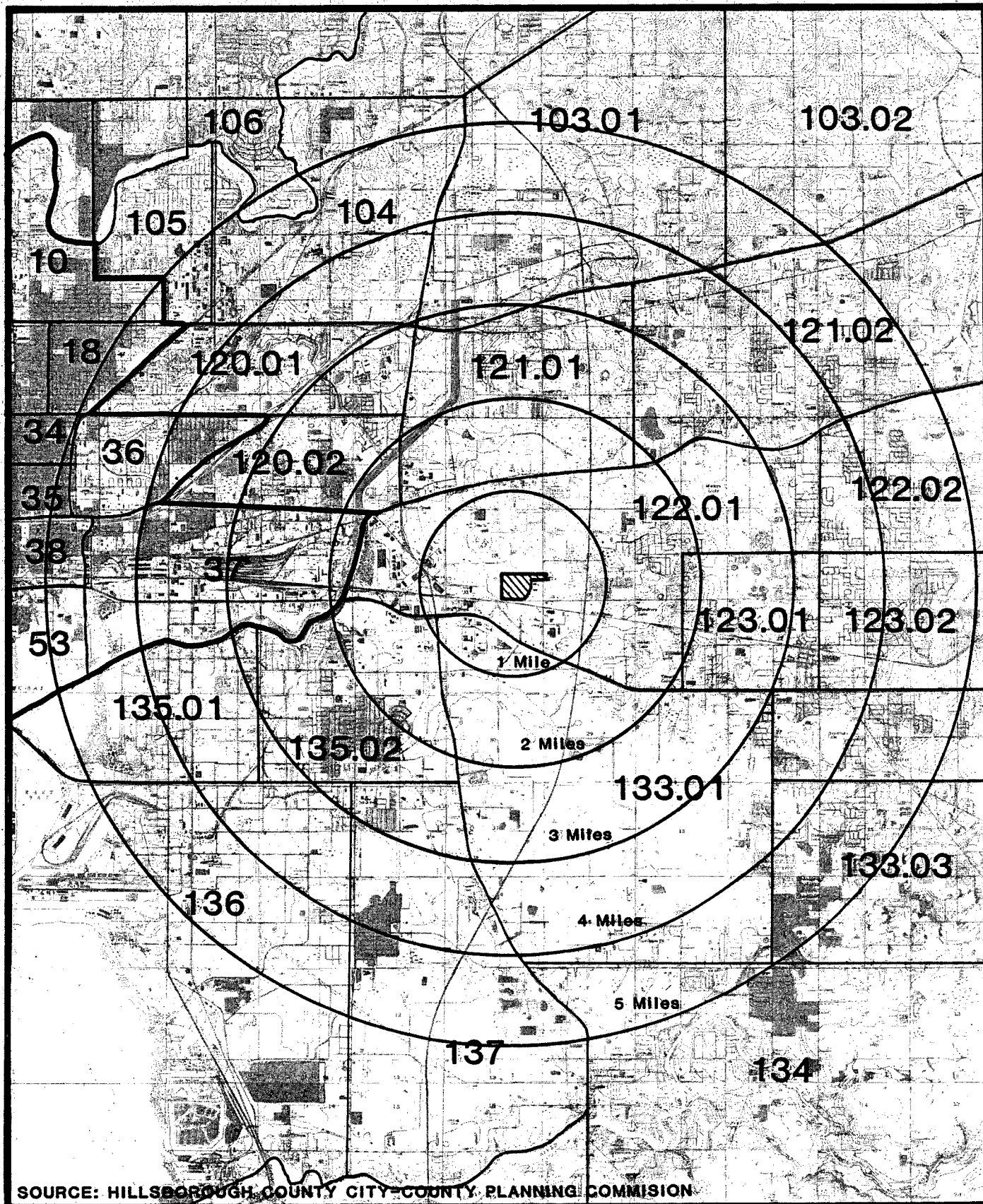
SOURCE: HILLSBOROUGH COUNTY CITY-COUNTY PLANNING COMMISSION



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 2.12
1980 CENSUS TRACTS
IN HILLSBOROUGH COUNTY





**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 2.13
1980 CENSUS TRACTS
NEAR THE SITE**

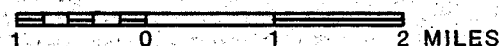


TABLE 2.7
POPULATION PROJECTIONS BY CENSUS TRACT¹

CENSUS TRACT	METHOD ²	1980	1985	1995	2010	% Change 1980-2010
<u>City of Tampa</u>						
010	LOGCV	7,759	7,800	8,100	8,600	10.8
018	CONSH	4,443	4,700	5,100	5,600	26.0
034	LOGCV	3,744	3,700	3,500	3,400	-9.2
035	LOGCV	3,011	2,900	2,700	2,500	-17.0
036	CONSH	3,818	3,900	3,800	4,000	4.8
037	LOGCV	1,667	1,600	1,500	1,500	-10.0
038	LOGCV	1,995	1,900	1,700	1,600	-19.8
053	****	2,223	2,500	10,100	14,500	552.3
<u>Temple Terrace</u>						
106	LOGCV	3,402	3,500	3,700	3,800	11.7
<u>UNINCORPORATED HILLSBOROUGH</u>						
103.01	LINAVE	3,931	4,500	5,800	8,400	113.7
103.02	CONSH	3,335	4,200	6,100	10,100	202.8
104	DENSC	4,501	5,500	8,100	12,400	175.5
105	DENSC	5,368	6,700	7,900	9,300	73.2
120.01	DENSC	2,514	3,100	3,600	4,800	90.9
120.02	DENSC	2,492	3,300	3,700	4,700	88.6
121.01	LINAVE	4,041	4,700	5,900	8,500	110.3
121.02	DENSC	10,556	13,300	20,600	29,000	174.7
122.01	LINAVE	5,756	7,300	10,600	16,900	193.6
122.02	CONSH	7,439	9,400	13,600	22,600	203.8
123.01	LINAVE	3,657	4,500	6,100	9,300	154.3
123.02	DENSC	6,979	8,200	11,300	16,300	133.6
133.01	DENSC	3,843	5,200	9,700	20,300	428.2
133.02	EXAVE	3,745	4,100	4,800	6,600	76.2
133.03	LINAVE	8,289	10,400	14,800	23,300	181.1
134	DENSC	8,443	12,500	21,800	36,500	332.3
135.01	DENSC	3,216	3,500	4,600	6,200	92.8
135.02	DENSC	10,023	11,000	14,200	19,600	95.6
136	DENSC	2,491	2,900	3,700	5,100	104.7
137	LINAVE	5,905	6,400	7,300	9,400	59.2
<u>SUBTOTALS</u>						
CITY OF TAMPA		28,660	29,000	36,500	41,700	45.5
TEMPLE TERRACE		3,402	3,500	3,700	3,800	11.7
UNINCORPORATED HILLSBOROUGH		104,274	130,700	184,200	243,840	133.8
TOTAL (TRACTS WITHIN 5 MILES)		136,336	163,200	224,400	289,340	112.2
REMAINING HILLSBOROUGH CO. ^{3,4}		510,664	554,100	631,700	755,960	48.0
TOTAL HILLSBOROUGH COUNTY ⁴		647,000	717,300	856,100	1,045,300	61.6

¹Includes only those census tracts partially or entirely within 5 miles of the site. See Figures 2.12 and 2.13.

²Method of projection. See description of methodology in Table 2.8.

³Includes all census tracts (unincorporated, Temple Terrace, Tampa and Plant City) entirely outside of the 5 mile radius of the site See Figures 2.12 and 2.13.

⁴Based on University of Florida Bureau of Economic and Business Research medium range projections.

SOURCE: Hillsborough County City-County Planning Commission, "Population Projections," December 1983.

TABLE 2. 8

POPULATION PROJECTION METHODOLOGY

The population projections presented in Table 2.7 are taken from "Population Projections" by Hillsborough County City-County Planning Commission, December 1983. As noted in that publication, the population projections are a disaggregation of the total county projections issued by the Bureau of Economic and Business Research.

To make reasonable projections at the census tract level required several different methods and some professional judgment. The general procedure was to create a computer program which provided five different projections for each census tract. Then the Planning Commission staff evaluated these projections and picked the most appropriate one for each census tract based on adopted land use plans, amount of vacant land, development potential, and recent development activity as indicated by our building permit and subdivision data. The method selected for each census tract is listed in the table. Finally, the tract projections within each jurisdiction were adjusted and rounded off so that they would add up to projections already derived for the jurisdictions. Because of rounding, split tracts with less than 50 people are reported as zero.

Following is a brief discussion of the six methods used to calculate population projections.

LINAVE = Linear Average

This method starts with a tract's population in 1980 and adds to it the average annual change in population for that tract between 1970 and 1983.

EXAVE = Exponential Average

An average annual percentage change in population from 1970 to 1983 is calculated for each tract. This growth rate is then used in an exponential curve formula to project the change in population from 1980.

CONSH = Constant Share

This method assumes that a census tract's share of its jurisdiction's population will remain constant over time. Because the projections for each jurisdiction are generally linear, these census tract projections also tend to be linear.

DENSC = Density Ceiling

This method uses a logistic curve formula to project a tract's population. The formula uses two data points (i.e. population in 1970 and 1983) and an estimate population capacity for each census tract. The density ceilings were forecast using census tract information on people per acre and the general density pattern established by each jurisdiction's adopted land use plan.

LOGCV = Logarithmic Curve

A logarithmic curve is one which increases or decreases at an ever decreasing rate. Projections using this method will level off over time with the amount of growth or decline being dependent upon population change from 1970 to 1983.

Population projections by census tract have been developed by the County and are also shown on Table 2.7. The specific population projection methodology is shown in Table 2.8. The expected population for the year 2010 for the census tract that contains the site is 16,900 which represents an increase of about 194 percent over the 1980 count. That percentage increase is considerably higher than for the total area within 5 miles of the site which is projected to increase 112 percent to 289,340 by the year 2010.

According to the population projections, those tracts partially or wholly within five miles of the site are expected to increase in population considerably more than the remaining portions of the County. The remaining County (including City of Tampa, Plant City, and Temple Terrace) is expected to increase by 48 percent, from 510,664 in 1980 to 755,960 in 2010.

Labor Force. The civilian labor force in Hillsborough County as a whole increased by about 8 percent from 1976 to 1980. This represents 22,548 new workers in the labor force. During the same period, employment increased by 38,299, or about 16 percent. This resulted in a net reduction of the unemployment rate, from 9.9 percent in 1976 to 4.9 percent in 1980. Labor force statistics are shown in Table 2.9.

Employment by Occupation. Table 2.10 shows a breakdown of employment statistics by occupation for the year 1980 for those census tracts wholly or partially within five miles of the site. Temple Terrace has the highest percentage of people who had professional, managerial, and sales oriented jobs (52 percent) while the City of Tampa and Unincorporated Hillsborough County each contain individuals holding more skilled and unskilled jobs. Professional, managerial and sales oriented jobs account for 20 percent of the former and 32 percent in the latter area groupings.

Employment by Industrial Sector. In terms of actual numbers of persons employed within a given industrial sector, retail trade provided the most jobs in 1980 for those individuals in census tracts partially or wholly within five miles of the site. This was typical for the portions of the

TABLE 2.9

LABOR FORCE IN HILLSBOROUGH COUNTY

1976-1980

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>% Change 1976-1980</u>
Civilian Labor Force	266,852	264,986	272,519	285,091	289,400	-8.45
Employment	236,801	243,066	257,585	271,005	275,100	16.17
Unemployment	26,418	21,920	14,934	14,086	14,300	-45.11
Unemployment Rate (%)	9.9	8.3	5.5	4.9	4.9	N/A

Source: Hillsborough County City-County Planning Commission,
 "Selected Statistics for Hillsborough County, Florida",
 October 1982.

TABLE 2.10

1980 EMPLOYMENT BY OCCUPATION

<u>Census Tracts Within 5 Miles</u>	<u>Private Household Service</u>	<u>Protective Service</u>	<u>Other Type Service</u>	<u>Farming, Fishing, Forestry</u>	<u>Precision Production Craft & Repair</u>	<u>Assemblers, Inspectors & Machine Operators</u>
City of Tampa	172	82	1,705	254	1,098	1,146
Temple Terrace	10	28	141	15	178	28
Unincorporated Hillsborough County	171	699	4,040	819	7,092	3,014
TOTAL	353	809	5,886	1,088	8,368	4,188

<u>Census Tracts Within 5 Miles</u>	<u>Transportation & Material Moving</u>	<u>Handlers, Equipment Cleaners, Helpers, Lab.</u>	<u>Executive, Managerial & Administrative</u>	<u>Professional Specialty</u>	<u>Technicians & Related Support</u>	<u>Sales</u>	<u>Administrative Support</u>
City of Tampa	852	975	488	792	194	683	1,394
Temple Terrace	56	86	247	381	25	298	297
Unincorporated Hillsborough County	3,501	3,005	5,207	4,474	1,363	5,711	8,822
TOTAL	4,409	4,066	5,942	5,647	1,582	6,692	10,513

NOTE: Refer to Table 2.7 for a complete listing of the census tracts within each sub-area.

SOURCE: Hillsborough County City-County Planning Commission, "Hillsborough County Employment by Industry and Occupation," May 1983 and "City of Tampa Employment by Industry and Occupation," May 1983.

City of Tampa, Temple Terrace, and Unincorporated Hillsborough County. Agriculture and mining provided the smallest number of jobs for individuals living within each of these areas. Table 2.11 presents a breakdown of employment figures by industrial sector for those subareas.

Baseline Employment Projections. Baseline employment projections for the year 2010 are shown in Table 2.12. Approximately 26 percent of the projected employment for those census tracts partially or wholly within five miles of the site in the City of Tampa is expected to be in the retail sector. In the Temple Terrace subarea, the retail employment is expected to be about 67 percent of the total while in the Unincorporated Hillsborough County subarea, it would account for 24 percent of the total employment.

General Income Characteristics. The Temple Terrace subarea, within a median income of \$22,149, has the largest proportion of upper income households. Approximately 42 percent have incomes over \$25,000 while only 8 percent have incomes under \$5,000. In contrast, the City of Tampa subarea, with a median income of \$9,329, has 28 percent of its households with incomes under \$5,000 while only 12 percent are over \$25,000. The statistics for the Unincorporated Hillsborough County subarea are closer to those for Temple Terrace with 11 percent of the households having incomes under \$5,000 and 29 percent over \$25,000. General household income characteristics are shown in Table 2.13.

Source of Income. Throughout all three subareas, the City of Tampa, Temple Terrace, and Unincorporated Hillsborough County, the primary source of income for households is wage or salary. Statistics on sources of income are shown in Table 2.14.

Average Wage and Salary Income. For those census tracts either partially or wholly within five miles of the site, retail trade accounted for the primary source of income. As discussed under "Employment by Industrial Section", retail trade provided more than twice as many jobs in 1980 for this area than any other industrial sector.

TABLE 2.11

1980 EMPLOYMENT BY INDUSTRIAL SECTOR

<u>Census Tracts Within 5 Miles</u>	<u>Agriculture & Mining</u>	<u>Construction</u>	<u>Manufacturing</u>		<u>Transportation</u>	<u>Communication & Public Utilities</u>	<u>Wholesale Trade</u>	<u>Retail Trade</u>
			<u>Non-Durable Goods</u>	<u>Durable Goods</u>				
City of Tampa	245	807	803	991	605	378	639	1,436
Temple Terrace	13	99	80	60	108	61	106	313
Unincorporated Hillsborough County	1,437	3,902	4,068	3,891	3,372	2,294	3,560	8,559
TOTAL	1,695	4,808	4,951	4,942	4,085	2,733	4,305	10,308

<u>Census Tracts Within 5 Miles</u>	<u>Finance Insurance & Real Estate</u>	<u>Business & Repair Services</u>	<u>Personal Recreation & Entertainment</u>	<u>Health Services</u>	<u>Educational Services</u>	<u>Other Professional Services</u>	<u>Public Administration</u>
City of Tampa	467	479	766	755	829	320	315
Temple Terrace	110	162	67	135	273	110	93
Unincorporated Hillsborough County	3,006	2,496	5,441	2,462	3,381	1,525	2,187
TOTAL	3,583	3,137	6,274	3,352	4,483	1,955	2,595

NOTE: Refer to Table 2.7 for a complete listing of the census tracts within each sub-area.

SOURCE: Hillsborough County City-County Planning Commission, "Hillsborough County Employment by Industry and Occupation," May 1983 and "City of Tampa Employment by Industry and Occupation," May 1983.

TABLE 2.12

2010 BASELINE EMPLOYMENT PROJECTIONS

<u>Census Tracts Within 5 Miles</u>	<u>Retail Employment</u>	<u>Total Employment</u>
City of Tampa	101,709	390,856
Temple Terrace	2,496	3,727
Unincorporated Hillsborough County	42,922	181,573
TOTAL	147,127	576,156

Note: Refer to Table 2.7 for a complete listing of the census tracts within each sub-area.

Source: Hillsborough County City-County Planning Commission, unpublished, 1984.

TABLE 2.13

GENERAL HOUSEHOLD INCOME¹ CHARACTERISTICS, 1980

Census Tracts Within 5 Miles	Less Than \$2,500	\$2,500- 4,999	\$5,000- 9,999	\$10,000- 14,999	\$15,000- 19,999	\$20,000- 24,999	\$25,000- 29,999	\$30,000- 49,999	\$50,000 or More	Average Median Income ²
City of Tampa	935	1,746	2,275	1,454	1,195	796	494	512	153	\$ 9,329
Temple Terrace	42	66	91	175	177	167	140	270	115	\$22,149
Unincorporated Hillsborough County	1,649	2,124	4,917	5,910	6,090	5,155	3,892	5,305	1,221	\$17,404
TOTALS	2,626	3,936	7,283	7,539	7,462	6,118	4,526	6,087	1,489	\$16,294

SOURCE: Hillsborough County City-County Planning Commission, "Hillsborough County Income Information by Census Tract," November 1982 and "City of Tampa Income Information by Census Tract," November 1982.

NOTE: Refer to Table 2.7 for a complete listing of the census tracts within each sub-area.

¹Household income is defined by total money income received in calendar year 1979 by all household members 15 years old and over.

²Average Median Income was computed by summing the applicable median values (e.g., values for tracts listed in Table 2.7) and dividing by the number of tracts.

TABLE 2.14

AVERAGE HOUSEHOLD INCOME BY SOURCE

<u>Census Tracts Within 5 Miles</u>	<u>Wage or Salary</u>	<u>Self-Employment Non-Farm Farm</u>	<u>Interest Dividends & Net Rental</u>	<u>Social Security</u>	<u>Public Assistance</u>	<u>Other</u>
City of Tampa	\$14,491	\$ 7,880 \$ 1,805	\$1,480	\$3,484	\$2,036	\$3,644
Temple Terrace	\$22,550	\$ 9,095 \$19,915	\$3,178	\$4,695	\$1,944	\$5,076
Unincorporated Hillsborough County	\$19,522	\$12,729 \$4,168	\$2,227	\$4,082	\$2,213	\$5,005
Sub-Area Averages	\$18,700	\$11,938 \$4,778	\$2,196	\$3,925	\$2,123	\$4,760

Source: U.S. Bureau of the Census (1980).

Note: Refer to Table 2.7 for a complete listing of the census tracts within each sub-area.

Baseline Income Projections. Based upon the population projections presented in Table 2.7, and the employment projections in Table 2.12, baseline income in the area is expected to increase. New development, especially in the form of industrial and business parks is occurring in this portion of Hillsborough County. These developments will create new jobs within five miles of the site.

Housing. Recent growth in the number of housing units has been very limited in the City of Tampa and Temple Terrace subareas. The Unincorporated Hillsborough County area, on the other hand, shows an 11.9 percent increase from 1980 to 1983. Housing unit statistics are presented in Table 2.15.

Existing Housing Stock. Housing statistics are shown in Table 2.16. The Unincorporated Hillsborough County portion of the 5 miles area has the greatest population of owner-occupied housing units (77 percent) while the City of Tampa has the lowest (63 percent). Tampa also has the lowest proportion of occupied housing units (60 percent) with Temple Terrace having the greatest (94 percent).

Building Activity. Single-family units represented the largest proportion of building activity, 43 percent in Hillsborough County between 1970 and 1982. That figure grew to 55 percent for the five-year period between 1978 and 1982. Multi-family units accounted for 36 percent and 32 percent of the activity during the 13 and 5 year periods, respectively. Such development is in direct contrast to trends which were typical of the earlier 1970's. Between 1970 and 1974, 48 percent of the residential building activity was multi-family units while only 28 percent was single-family.

Residential building activity has been most pronounced in the Unincorporated Hillsborough County subarea of census tracts either partially or wholly within 5 miles of the site with a total of 1,776 new housing units. Table 2.17 shows net changes in the number of housing units.

TABLE 2.15

HOUSING UNIT TRENDS

<u>Census Tracts Within 5 Miles</u>	<u>1980 COUNT</u>	<u>1983 ESTIMATE</u>	<u>ESTIMATED CHANGE</u>	<u>% CHANGE</u>
City of Tampa	10,531	10,582	51	0.48
Temple Terrace	1,337	1,343	6	0.45
Unincorporated Hillsborough Co.	38,513	43,092	4,579	11.89
TOTAL	50,381	55,017	4,636	9.2

SOURCE: Hillsborough County City-County Planning Commission, "1983 Population and Housing Estimates by Census Tract and Jurisdiction," September 1983.

NOTE: Refer to Table 2.7 for a complete listing of the census tracts within each sub-area.

TABLE 2.1 6
EXISTING HOUSING STOCK (1980)

CENSUS TRACTS WITHIN 5 MILES	TOTAL HOUSING	TOTAL YEAR-ROUND HOUSING UNITS	TOTAL OCCUPIED HOUSING UNITS	TOTAL OWNER-OCCUPIED HOUSING UNITS	TOTAL RENTER- OCCUPIED HOUSING UNITS	VACANT YEAR- ROUND HOUSING UNITS	AVERAGE MEDIAN HOUSING VALUE ¹
City of Tampa	10,777	10,764	6,494	4,094	2,400	1,009	\$16,938
Temple Terrace	1,337	1,337	1,261	815	446	76	\$56,600
Unincorporated Hillsborough	39,383	38,638	36,000	27,877	8,123	2,638	\$39,640
TOTAL	51,497	50,739	43,755	32,787	10,969	3,723	\$33,962

SOURCE: Hillsborough County City-County Planning Commission Research and Budgeting Section, "Hillsborough Population and Housing by Census Tract, 1980 Census Summary Tape File 1 Counts," June 1982.

NOTE: Refer to Table 2.7 for a complete listing of the census tracts within each sub-area.

¹Average median value was computed by summing the applicable median values (e.g., values for tracts listed in Table 2.7) and dividing by the number of tracts.

TABLE 2.17
NET RESIDENTIAL UNITS
CALENDAR YEAR 1982

<u>Census Tracts Within 5 Miles</u>	<u>SINGLE- FAMILY</u>	<u>DUPLEX</u>	<u>MULTI- FAMILY</u>	<u>MOBILE HOME</u>	<u>TOTALS</u>
City of Tampa	-36	16	0	0	-20
Temple Terrace	4	0	0	0	4
Unincorporated Hillsborough Co.	913	186	460	217	1,776
TOTAL	881	202	460	217	1,760

SOURCE: Hillsborough County City-County Planning Commission,
"Summary of Building Permit Activity, Hillsborough
County 1982," April 1983.

NOTE: Refer to Table 2.7 for a complete listing of the
census tracts within each sub-area.

Unincorporated Hillsborough County, which saw considerable residential building activity during 1982, experienced more modest growth in non-residential construction. The reverse is true for the City of Tampa which gained 431 new units, the greatest proportion of which was office construction. At 27 percent and 25 percent, respectively, offices and retail/wholesale represent the most active categories of non-residential building activity in Hillsborough County during 1982. Non-residential building activity is presented in Table 2.18.

Housing Costs. Of those census tracts partially or wholly within 5 miles of the site, the average median housing value is highest in Temple Terrace at \$56,600. The City of Tampa has the lowest value, at \$16,938. Median housing values are shown in Table 2.16.

2.2.7.2 Area Public Service and Utilities

Education. Schools within the 5 mile area of the site include:

High Schools

Brandon High

Junior High Schools

Maclean Junior High

Mann Junior High

Valdell Junior High

Elementary Schools

Limona Elementary

Yates Elementary

Clairmel Elementary

Palm River Elementary

Seffner Elementary

Brooker Elementary

Kingswood Elementary

None of the schools is within one mile of the site.

Transportation. The site is located off of Faulkenburg Road and is adjacent to the Seaboard System Railroad. A complete description of the existing transportation conditions near the site is provided in Section 5.9.

Fire Fighting Facilities. The site is located within the Brandon Fire District. The nearest station is Brandon Fire Station #2 at 10050 Palm River Road.

TABLE 2.18
NEW NON-RESIDENTIAL CONSTRUCTION
NUMBER OF PERMITS
CALENDAR YEAR 1982

	OFFICES	RETAIL/ WHOLESALE	WARE- HOUSING	OTHER COMMERCIAL	INSTITUTIONAL/ PUBLIC	OTHER NON-RESIDENTIAL	TOTAL
City of Tampa	167	115	53	57	39	0	431
Temple Terrace	0	0	0	0	1	0	1
Unincorporated Hillsborough Co.	199	221	117	184	112	89	922
TOTAL	366	336	170	241	152	89	1,354

SOURCE: Hillsborough County City-County Planning Commission, "Summary of Building Permit Activity, Hillsborough County, 1982," April 1983.

Police Protection. The site is located within Patrol District Area 2, Brandon Proper. The headquarters address is 205 S. Moon, Brandon.

Recreation Facilities. Major recreational areas (state parks and County parks) are addressed in Section 2.2.1 "Governmental Jurisdictions." Camp Florida is located southwest of Lakewood Drive about 1.5 miles east of the proposed resource recovery facility location. Limona Park is also located off Lakewood Drive about 1.5 miles west of the site.

Electricity and Gas. There is a 200 foot TECO easement with three 230 kV lines directly adjacent to the site. The County is currently negotiating a Small Power Production Agreement with TECO. A Houston Texas Gas and Oil, gas pipeline runs directly to the west of the site.

Water Supply Facilities. The existing potable water service to the site is a twelve (12) inch City of Tampa water main that runs along Faulkenburg Road. The existing twelve (12) inch main provides water at a static pressure of 40-45 psi. Table 2.19 presents an analysis of the potable water supply.

Non-potable treated wastewater from the proposed adjacent County wastewater treatment plant will be used for the cooling water and boiler make-up water requirements of the project. The quantity of treated wastewater will be adequate for the requirements of the Project. Table 2.20 presents a projected analysis of the treated wastewater which will be supplied to the Project.

Sewage Treatment Facilities. The Northwest Brandon Subregional Wastewater Treatment Plant (WWTP) is planned to be co-located with the resource recovery facility on the Faulkenburg Road site. The preliminary design of the WWTP is presently being conducted. The final design stage of the WWTP is expected to require approximately six months, concluding by December 1984. It is expected that the WWTP will be permitted prior to the start-up of construction of the resource recovery facility. This preliminary schedule may be revised once final design is completed for the WWTP.

TABLE 2.19
POTABLE WATER ANALYSIS

LOCATION Hillsborough River Plant

SOURCE OF SAMPLE Surface Water

RAW OR FINISHED Finished Water

DATE COLLECTED 7/11/83

TIME COLLECTED 0830

Method of Analyses Used:

(A) "Standard Methods"

(B) "Method for Chemical Analyses of Water and Waste"

Results are expressed in milligrams per liter or otherwise indicated.

Aluminum (Al)	(B) 0.60	Ammonium-Nitrogen (NH ₃)	(A) 1.06
Arsenic (As)	(B) 0.014	Fluorides (F)	(A) 0.15
Barium (Ba)	(B) <0.1	Nitrates (N)	(A) 0.18
Cadmium (Cd)	(B) <0.005	Phosphates (PO ₄)	(A) <0.1
Calcium (Ca)	(B) 44	Silica (SiO ₂)	(A) 4.6
Chloride (Cl)	(B) 15	Sulphates (SO ₄)	(A) 56
Chromium (Cr)	(B) <0.01	Total Alkalinity (CaCO ₃)	(A) 50
Copper (Cu)	(B) <0.01	Total Hardness (CaCO ₃)	(A) 114
Iron (Fe)	(B) 0.01	Non-Carb. Hardness (CaCO ₃)	(A) 64
Lead (Pb)	(B) <0.01	Foaming Agents (MBAS)	(A) < 0.10
Magnesium (Mg)	(B) 2.7	Color (Pt. Co-Cl)	(A) 4
Manganese (Mn)	(B) < 0.005	Turbidity (NTU)	(A) 0.12
Mercury (Hg)	(B) <0.0005	pH (Units)	(A) 7.85
Potassium (K)	(B) 1.6	Temperature °C	(A) 27.5
Selenium (Se)	(B) < 0.005	Sp. Conductivity (umhos)	(A) 250
Silver (Ag)	(B) < 0.005	Dissolved Oxygen (DO)	(A) 6.6
Sodium (Na)	(B) 5.4	B.O.D. (5 day @ 20°C)	(A) 0.2
Zinc (Zn)	(B) 0.008	C.O.D.	(A) 12
Odor (T.O.N.)	(A) ---	Tot. Dissolve Solids 180°C	(A) 170
Total Organic Carbon	(C) 1.28	Corrositivity (pHa-pHs)	(A) - 0.16
		Hydrogen Sulfide (S)	(A) ---

< = Less Than

Source: City of Tampa Water Department

TABLE 2.20

PROJECTED TREATED WASTEWATER EFFLUENT ANALYSIS

<u>Parameter</u>	<u>Anticipated Average Concentration (mg/l)</u>
BOD	20
Total Suspended Solids	5
Total Dissolved Solids	500
Fecal Coliform	Not Detectable
Chlorine Residual (ppm)	1.0
pH (pH units)	6.5 - 8.5
Calcium Hardness	150
Magnesium Hardness	150
Sulfates	150

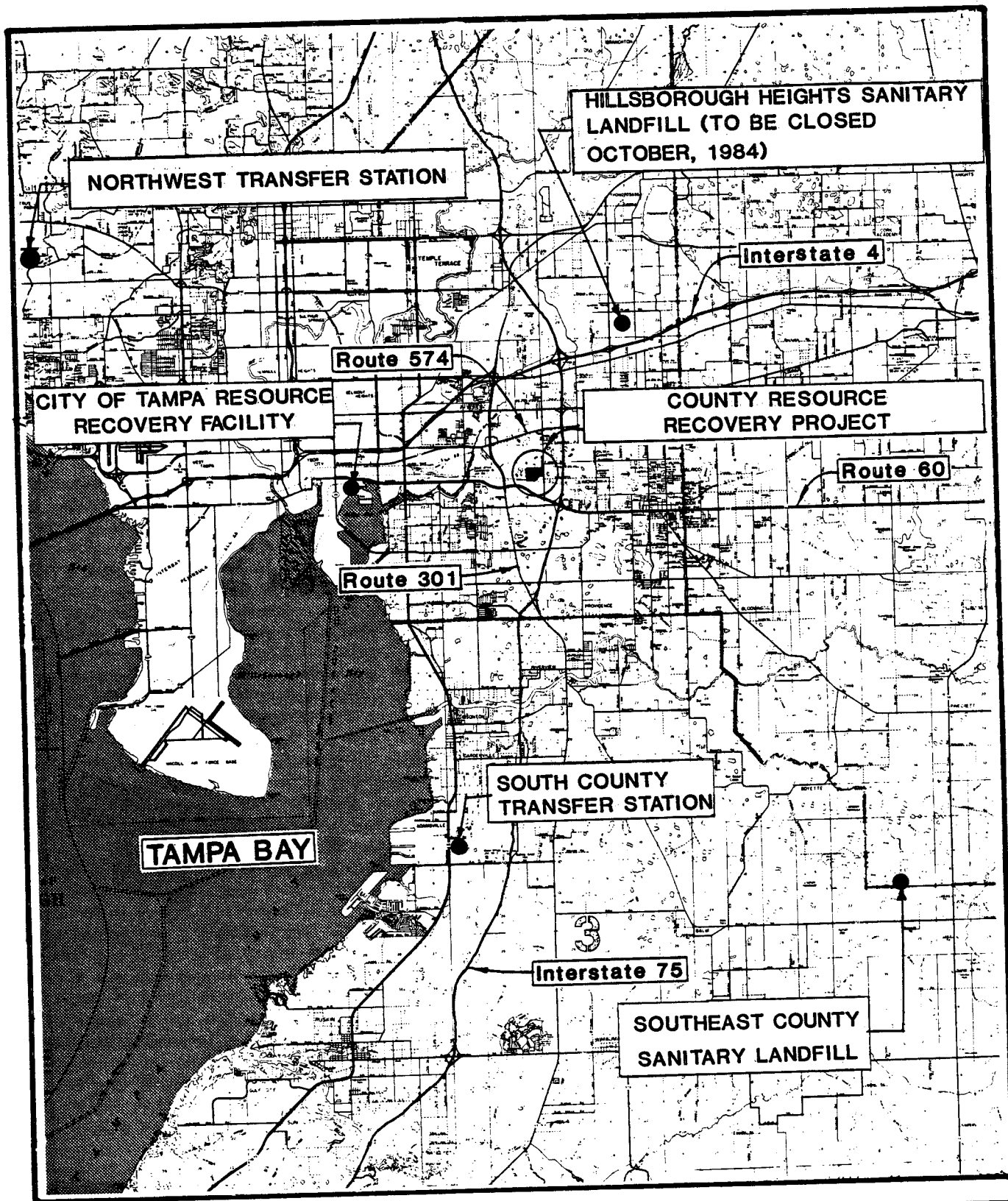
Source: CDM

It will be the responsibility of the Contractor to discharge wastewater to the County's adjacent wastewater treatment plant in accordance with County pretreatment standards, which have not been completed.

Solid Waste Disposal. Figure 2.14 shows the location of existing and proposed solid waste management facilities within the County. Currently, all of the solid waste generated in Hillsborough County, including that generated by the three cities, is disposed of at the County's Hillsborough Heights landfill. The monthly solid waste quantities received at the Hillsborough Heights Sanitary Landfill from May 1981 to April 1983 are shown in Table 2.21. Approximately 2,000 tons per day (six days per week) of solid waste are disposed of at this site, of which about 750 tons per day (six days per week) is delivered by the City of Tampa. Due to capacity limitations and legal restrictions, the Hillsborough Heights landfill is under state administrative order to close by October 31, 1984. The County has commenced construction on the new Southeast County Sanitary Landfill which will be in operation by November 1, 1984. The Southeast County Sanitary Landfill will be used initially for all solid waste disposal, and then as both a residue and emergency backup disposal site for the resource recovery facility, as well as for the disposal of solid waste which cannot be processed.

A 1,000 ton per day (rated capacity) solid waste resource recovery facility to serve the City of Tampa is presently under construction at McKay Bay in Tampa with operation scheduled for May 1986. The Southeast County Sanitary Landfill will be utilized by the City for the disposal of non-processible solid waste and for residue and emergency backup.

The solid waste collection system in the County consists of both city and private refuse collection, and solid waste transfer stations. The County franchises private collection services for the unincorporated areas of the County. There are five franchise districts. Each franchise is for a period of five years and requires each hauler to provide twice-weekly collection to all persons requesting service. For this service, each hauler is permitted to charge fees not to exceed those established annually by the County. The County owns and operates two solid waste transfer stations, the South County transfer station and the Northwest transfer station.



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FIGURE 2.14
SOLID WASTE MANAGEMENT FACILITIES
IN HILLSBOROUGH COUNTY

TABLE 2.21
MONTHLY SOLID WASTE QUANTITIES RECEIVED
AT THE HILLSBOROUGH HEIGHTS SANITARY LANDFILL

NON - FRANCHISE								
FRANCHISE COLLECTORS	CITY OF TAMPA		CITY OF TEMPLE TERRACE	PLANT CITY	COMMERCIAL COLLECTORS WITHIN MUNICIPALITIES	ALL OTHERS	TOTALS (A)	
	SANITATION DEPT.	ALL OTHER DEPT.						
May, 1981	16,441	16,379	1,498	603	957	5,088	4,256	45,222
June, 1981	20,600	18,487	2,005	744	1,153	5,199	5,738	53,926
July, 1981	20,018	16,994	1,521	756	1,073	5,561	4,692	50,615
August, 1981	19,608	17,130	2,924	719	1,076	5,731	4,989	52,177
September, 1981	19,385	16,546	1,094	696	1,042	5,630	5,027	49,420
October, 1981	16,536	15,170	1,829	599	942	5,477	5,028	45,581
November, 1981	15,651	14,138	1,834	564	876	5,001	4,135	42,199
December, 1981	16,880	15,858	2,248	601	1,023	5,283	4,411	46,304
January, 1982	16,397	15,394	2,053	577	985	5,234	4,682	45,322
February, 1982	17,224	15,868	1,479	646	1,047	5,336	4,875	46,475
March, 1982	21,171	19,270	1,624	823	1,298	6,115	5,661	55,962
April, 1982	18,799	17,703	1,815	744	1,170	5,855	5,504	51,590
Tonnage	218,710	198,937	21,924	8,072	12,642	65,510	58,998	584,793
Percentage	38%	34%	4%	1%	2%	11%	10%	100%

(A) Total tonnage tied to billings from the contracted landfill operator.

NON - FRANCHISE								
FRANCHISE COLLECTORS	CITY OF TAMPA		CITY OF TEMPLE TERRACE	PLANT CITY	COMMERCIAL COLLECTORS WITHIN MUNICIPALITIES	ALL OTHERS	TOTALS (A)	
	SANITATION DEPT.	ALL OTHER DEPT.						
May, 1982	18,161	16,118	1,910	709	1,017	4,755	5,443	48,113
June, 1982	22,043	18,886	2,740	852	1,189	5,723	5,608	57,041
July, 1982	20,472	18,005	7,085	826	1,117	6,249	5,595	54,349
August, 1982	21,462	18,624	2,916	810	1,114	6,049	6,073	57,048
September, 1982	20,325	17,253	1,645	695	1,087	5,916	6,043	52,964
October, 1982	18,110	16,125	1,757	599	1,048	5,719	5,843	49,201
November, 1982	18,728	16,162	1,706	623	1,124	4,857	5,596	48,796
December, 1982	19,254	15,862	3,475	664	1,122	5,356	5,535	51,208
January, 1983	18,341	15,211	1,195	590	1,087	5,179	5,067	46,670
February, 1983	17,970	15,552	1,554	559	1,109	5,238	4,739	46,721
March, 1983	23,147	19,782	1,241	775	1,560	6,379	6,196	59,080
April, 1983	<u>21,364</u>	<u>18,254</u>	<u>1,964</u>	<u>793</u>	<u>1,261</u>	<u>5,944</u>	<u>6,018</u>	<u>55,598</u>
Total Tonnage	<u>239,377</u>	<u>205,834</u>	<u>24,188</u>	<u>8,495</u>	<u>13,835</u>	<u>67,364</u>	<u>67,756</u>	<u>626,849</u>
Percentage	38%	33%	4%	1%	2%	11%	11%	100%

(A) Total tonnage tied to billings from the contracted landfill operator.

In 1982, Hillsborough County, excluding the three cities, generated approximately 300,000 tons of solid waste. Due to the projected population increase, the total solid waste generated in the unincorporated County is expected to increase to an estimated 565,000 tons in the year 2005.

2.3 BIOPHYSICAL ENVIRONMENT

The proposed facility will be located within the jurisdiction of the Southwest Florida Water Management District (SWFWMD). The Rules of the SWFWMD do not define specific review criteria for power plant site certification, and a Consumptive Use Permit will not be required. Therefore, the information presented herein fulfills the requirements of DER Form 17-1.211(1).

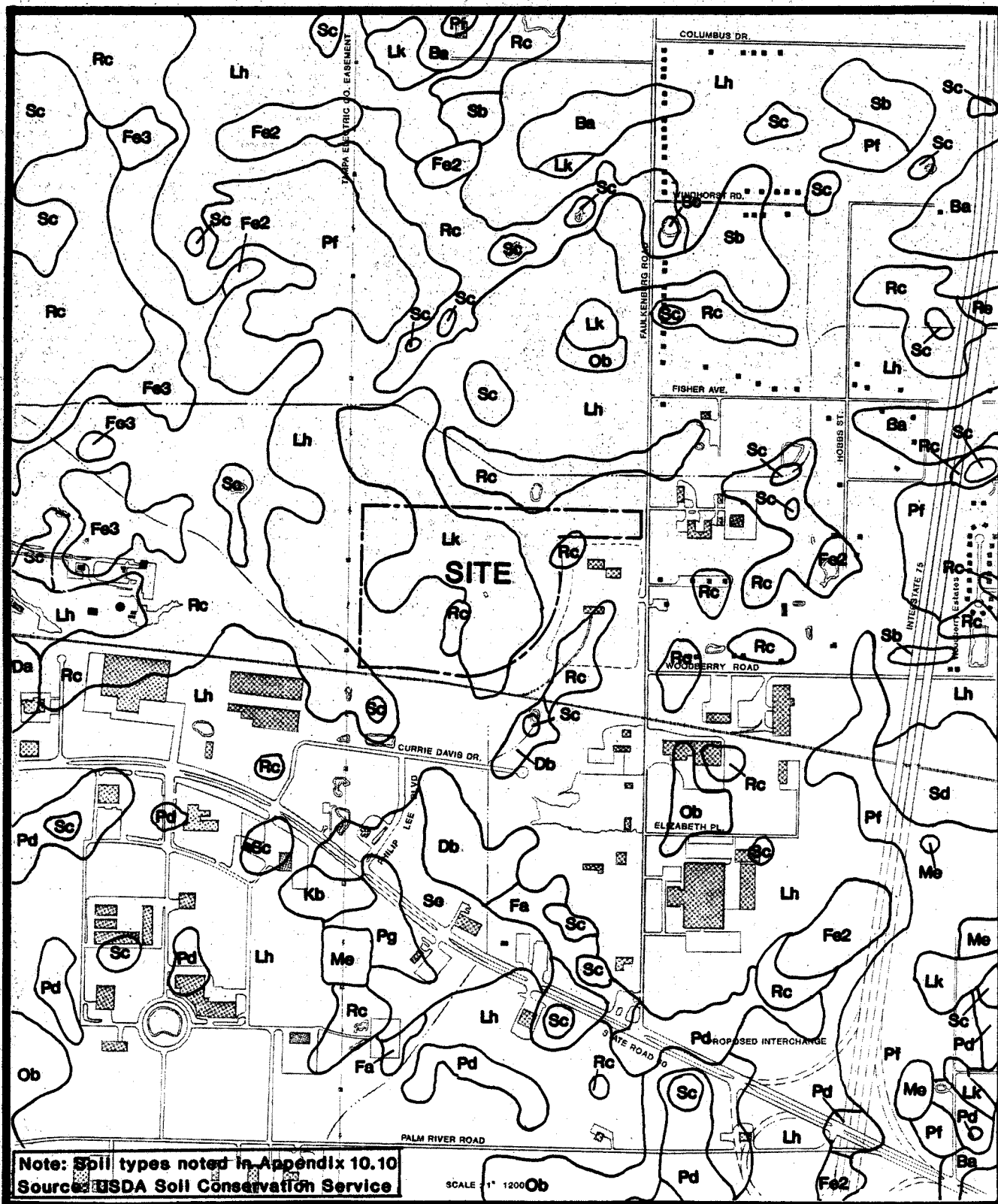
2.3.1 Geohydrology

The following sub-sections describe the major geologic features of the site and associated facility areas. This includes a description of the geotechnical studies which were undertaken to determine the structural and environmental suitability of the site. The study description includes identification and justification of the sampling pattern, sampling method, and analytic techniques.

The facility will not incorporate holding or cooling ponds, ash ponds, FGD sludge or coal piles, or any other potential contamination sources. Therefore, site specific aquifer characteristics which relate to potential pollutant transport have been omitted.

2.3.1.1 Geologic Description of the Site-Area

The U.S.D.A. Soil Conservation Service (SCS) "Hillsborough County Soil Survey", defines three major surficial soil types on the site: Rc (Rutledge fine sand), Lh (Leon fine sand), and Lk (Leon fine sand, light colored surface). The SCS soils classifications onsite and adjacent to the site are shown on Figure 2.15. A "Summary of Important Characteristics" of



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**FIGURE 2.15
 SOILS**

the soils from the Hillsborough County Soil Survey (September 1958) and the "Estimated Soil Properties for Engineering" taken from the Hillsborough Soil and Water Conservation District Soil Survey Supplement (June 1981) are included in Appendix 10.10.

In general, the Rutledge fine sand reflects areas with a seasonal high water table and nearly level, or slightly depressed, relief. Ponding can occur with this soil type. The Leon fine sand also represents areas with a high water table and a 0-2 percent slope. The Lh and Lk soils have relatively slow surface runoff and medium to rapid internal drainage if drainage improvements lower the natural high water table.

Table 2.22 summarizes the study area stratigraphy assembled from several published sources. The table includes formation names, lithologic descriptions, thickness and average depth below land surface. While detailed information is not available for extreme depths, the shallow and intermediate formations are well documented using the loggings from a large number of wells throughout central Hillsborough County.

The study area is located within the Coastal Lowlands Physiographic Division of Florida. The Coastal Lowlands consist primarily of marine terraces which are below 100 feet in altitude. The study area elevation ranges from 28 to 41 feet above Mean Sea Level (MSL). (Figure 2.2) with a topographic high in the east central portion of the site, gently sloping to lower elevations in the southwest.

The shallow and intermediate depth geologic units expected to be beneath the study area range in age from Recent to Eocene, and include (youngest to oldest): surficial (unconsolidated sands), the Hawthorn Formation, the Tampa Limestone, the Suwannee Limestone, the Ocala Limestone, the Avon Park Limestone, the Lake City Limestone, and the Oldsmar Limestone. The latter two formations contain salt water and are not known to be used for any potable water supply. Figure 2.16 illustrates a generalized geologic column in the vicinity of the proposed facility.

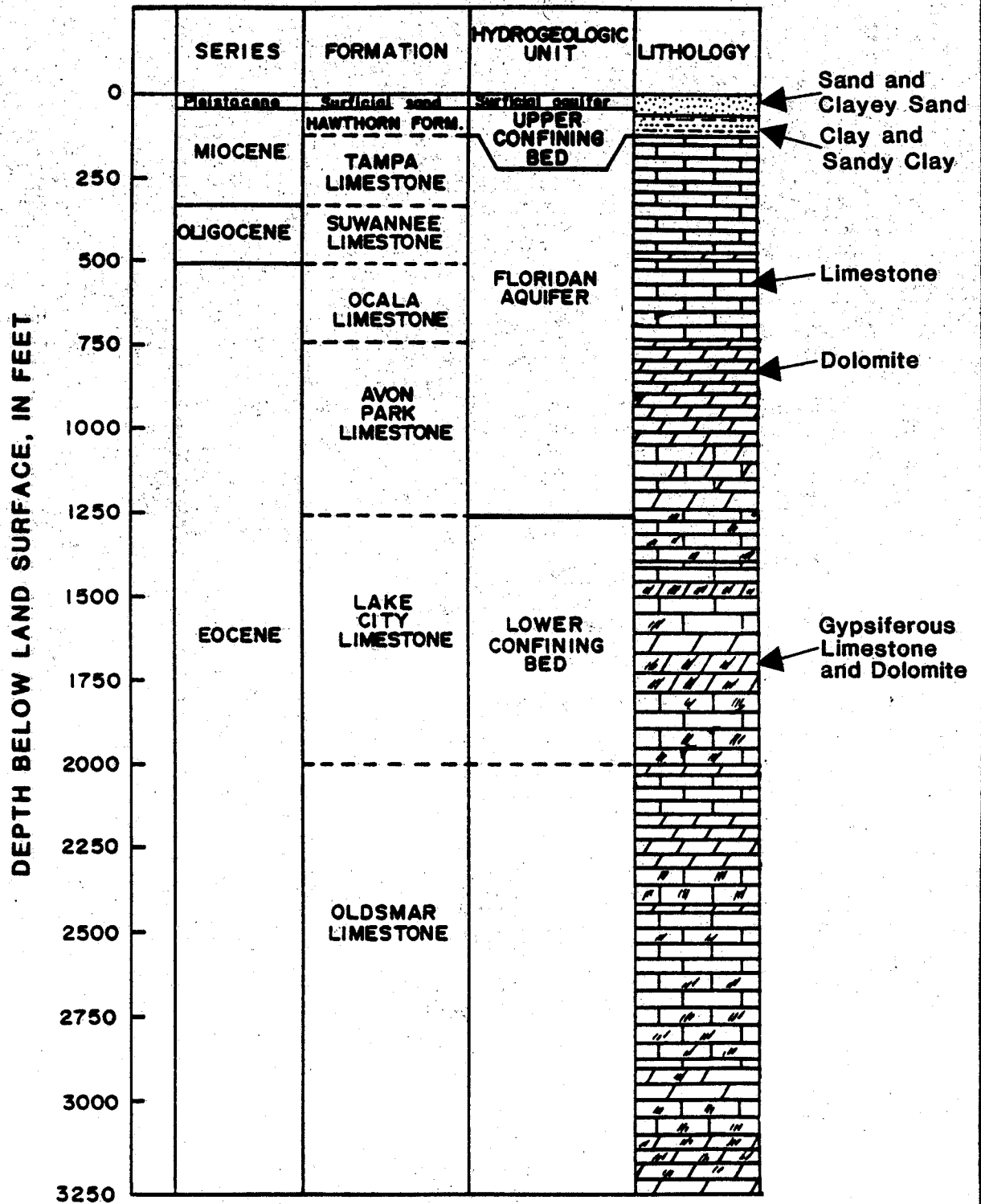
TABLE 2.22
STUDY AREA STRATIGRAPHY

System	Series	Stratigraphic Unit	Range of Reported Thickness (ft)	Estimated Avg. Depth Below Land Surface (ft)	Lithology	General Water Bearing Properties
Quaternary	Recent and Pleistocene	Recent aeolian and Pamlico - Talbot marine terrace deposits	15-25	0	Undifferentiated fine brown sands, and clayey sands, grey to green plastic clays and sandy clays	Surficial aquifer yields water to shallow wells; clay barrier acts as confining unit for Floridan with Upper Hawthorn clay.
Tertiary	Pliocene	No Pliocene units believed present	-	-	--	--
	Miocene	Hawthorn Formation	25-45	20	Hawthorn consists chiefly of interbedded sand, clay and limestone	Yields small to moderate quantities of artesian and nonartesian water. Upper part of Hawthorn forms the confining layer for the underlying artesian water
		Tampa Limestone	0-250	35	Limestone with sands, silt and clay; some parts of the limestone are silicified. The formation contains many solution cavities in recharge area	Upper Floridan Aquifer yields large quantities of water in west-central Florida; yield is generally lower in other parts of the State
	Oligocene	Suwannee Limestone	0-450	200	Limestone containing many solution cavities in recharge areas	Top of Lower Floridan Aquifer yields moderate amounts of water, but generally less than underlying Eocene formations
	Upper Eocene	Upper Member	0-380	420	Chiefly chalky fossiliferous limestone	One of the most productive formations of the principal artesian aquifer
		Ocala Limestone	0-150	520	Chiefly calcitic limestone	Upper member is more productive than lower member. Formation contains many solution cavities in recharge areas.

TABLE 2.22 (Cont.)

System	Series	Stratigraphic Unit	Range of Reported Thickness (ft)	Estimated Avg. Depth Below Land Surface (ft)	Lithology	General Water Bearing Properties
Cretaceous and Older	Middle Eocene	Avon Park Limestone	0-845	600	Cream-colored to brown chalky limestone and dolomite. Contains gypsum and chert	Principal source of water where overlying limestone is thin or absent
		Lake City Limestone	110-990	1,000	Alternating beds of dark brown dolomite and chalky limestone	Oldest formation of the principal artesian aquifer (Floridan Aquifer) and an important source of artesian water in some areas
	Lower Eocene	Oldsmar Limestone	250-1,000	1,900	Limestone containing chert and gypsum which grades into sandy facies in western Florida	Contains salt water
	Paleocene	Cedar Keys Limestone	165-2,250	2,500	Gray and cream colored to white limestone containing gypsum and anhydrite stringers	Contains salt water
				4,500		Contains salt water

- SOURCE:
1. Fernandez (1983)
 2. Florida Geological Survey (1983)
 3. Williams and Associates (1983)
 4. Geraghty and Miller (1982)
 5. Hickey (1981)
 6. Hutchinson and Stewart (1978)
 7. Stringfield (1966)
 8. Peek (1959)
 9. Cooke (1945)



Source: Hickey (1981)

The uppermost geologic deposit, the Hawthorn Formation, includes all deposits of Miocene age which are younger than the Tampa Limestone. The Hawthorn Formation in this area consists predominantly of green to blue sandy clay and clayey sand. The top of the Hawthorn Formation is generally encountered between 10 and 20 feet deep below ground surface in the area.

Beneath the Hawthorn Formation in the Hillsborough County area lies the Tampa Limestone. The Tampa Limestone is commonly a hard dense grey, white or tan sandy limestone which is generally fossiliferous while some parts are crystalline and dolomitic. The top of this formation ranges in depth from about sea level or a little below in northern Hillsborough County to about 250 feet below sea level in the southern part of the County. It is estimated that the depth to this formation in the vicinity of the site is in the general range of 25 to 45 feet below ground level.

The Suwannee Limestone includes all deposits of Oligocene age. The upper part of the Suwannee is generally a cream-white to tan, soft to hard, granular, porous limestone with some beds of crystalline and dolomitic limestone. The lower part of the Suwannee is generally tan to gray, is more crystalline and/or dolomitic, contains fewer fossils, and is generally harder.

The Ocala Formation is of Eocene age and consists of a highly fossiliferous, soft, chalky cream, tan, and grayish-tan limestone in the upper portion. The lower part is similar to the upper part except that it contains beds of brown to tan hard crystalline dolomite and dolomitic limestone.

The Avon Park Limestone, generally found at depths in excess of 600 feet, is of Eocene age. Lithologically, it ranges from white to tan coquinoïd or granular soft limestone to dark brown, hard, crystalline dolomite. Most of this formation is dolomitized to some degree and is very fossiliferous, containing bryozoans, coral, echinoids, mollusks, and foraminifera. It is generally more than 200 feet thick in Hillsborough County.

2.3.1.2 Detailed Site Lithologic Description

Information contained in this section has been developed primarily from borings completed onsite and in the immediate vicinity, as part of the site selection and geotechnical investigation efforts of Hillsborough County's resource recovery program.

As part of the County's resource recovery facility siting, the following geotechnical studies were commissioned by the County:

- o "Report of Preliminary Subsurface Exploration, Proposed Solid Waste Management Recovery Facility, Hillsborough County, Florida", prepared by Williams and Associates, Inc., dated 1 November 1982.
- o "Report of a Preliminary Subsurface Exploration, Proposed Solid Waste Energy Recovery Facility, Faulkenburg Road Site, Hillsborough County, Florida", prepared by Williams and Associates, Inc., dated 29 March 1983, revised 12 December 1983.
- o "Report of Preliminary Geotechnical Study, Resource Recovery Facility, Faulkenburg Road Site, Hillsborough County, Florida", prepared by Test Lab Inc., dated 20 April 1984.

These reports, especially the latter two, will be referenced in later sections. The Williams and Associates (1983) and the Test Lab (1984) reports contain detailed site lithologic descriptions and soil boring logs, which have been summarized in this section. These two complete geotechnical reports are combined in Appendix 10.10 to this application. The 1982 Williams and Associates report examined four preliminary sites, one of which is located several hundred feet north of the present site, and is therefore not included in the application appendices.

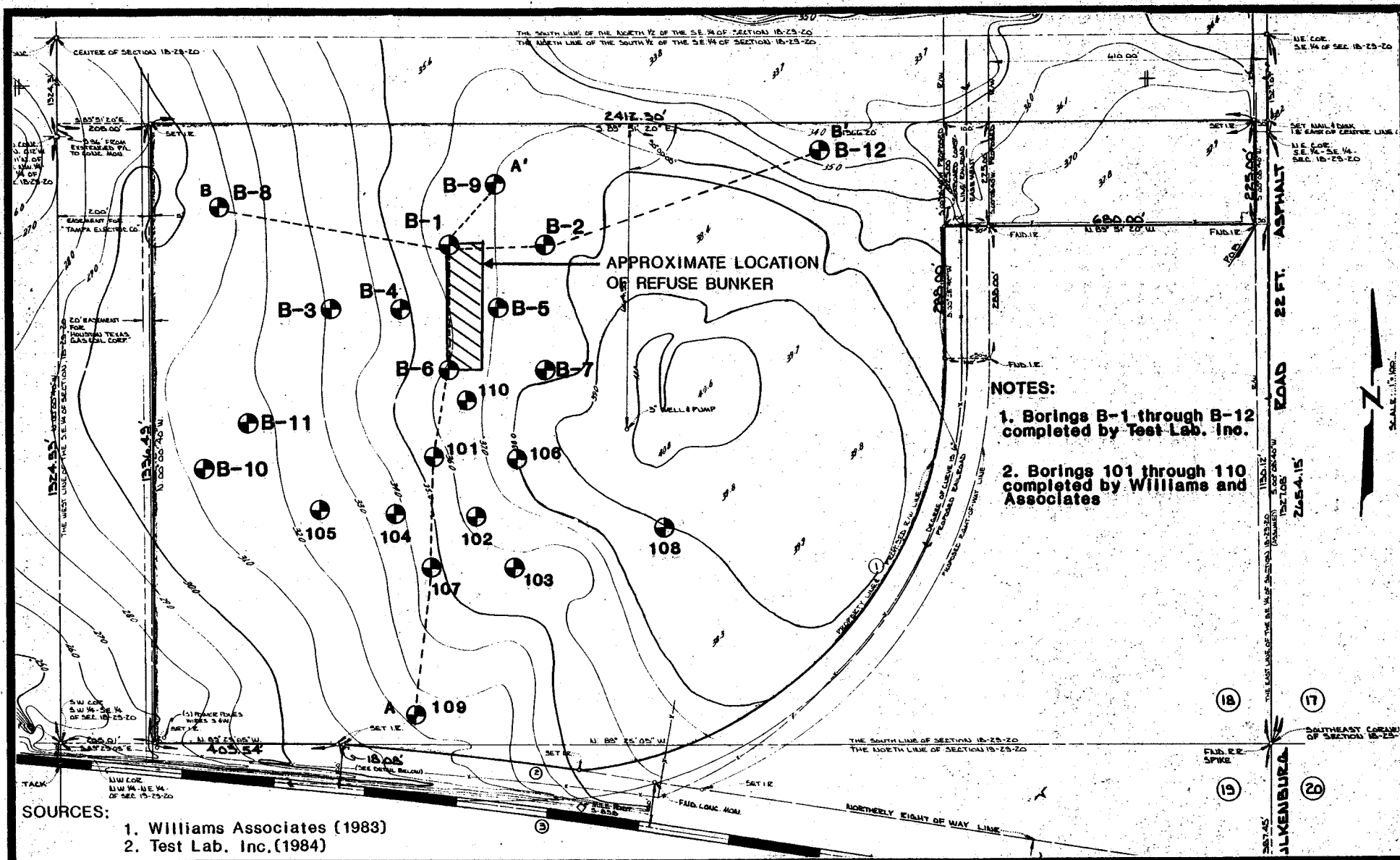
The March 29, 1983 report prepared by Williams & Associates Inc. entitled, "Report of a Preliminary Subsurface Exploration Proposed Solid Waste Energy Recovery Facility Faulkenburg Road Site, Hillsborough County, Florida," is included in Appendix 10.10. This report details both field and laboratory testing which was performed with the intent of developing preliminary or conceptual soil-related criteria for foundation design. The report includes descriptions of sampling design methodology, field and laboratory procedures, and a report of results for soil borings, utilizing undisturbed samples, NX corings, grain size analysis, moisture content, and consolidation tests. Test results are summarized in Section 2.3.1.4. Ten soil test borings were made at the site at the locations shown on Figure 2.17. These borings were made at locations recommended by Williams and Associates.

The Test Lab Inc. (1984) report details field and laboratory testing which was performed with the intent of determining the general nature of the subsurface conditions at the plant site and generally ascertaining the types of foundation systems which might be used to support the facilities.

As part of the April 1984 effort, twelve soil test borings were made at the site at the locations shown on Figure 2.17. These borings were made at locations recommended by Test Lab Inc., and which were staked in the field by county personnel, who also determined the ground surface elevation at each location.

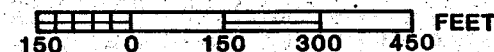
The exploratory borings were made with a truck-mounted CME-55 drilling rig. Conventional rotary drilling procedures were utilized along with a bentonite drilling fluid to stabilize the bore holes. Standard penetration tests were made and split-barrel soil samples were obtained at 2.5 foot intervals to a depth of 10 feet and at 5 foot intervals thereafter. A description of this procedure is contained within the Test Lab Inc. report found in Appendix 10.10.

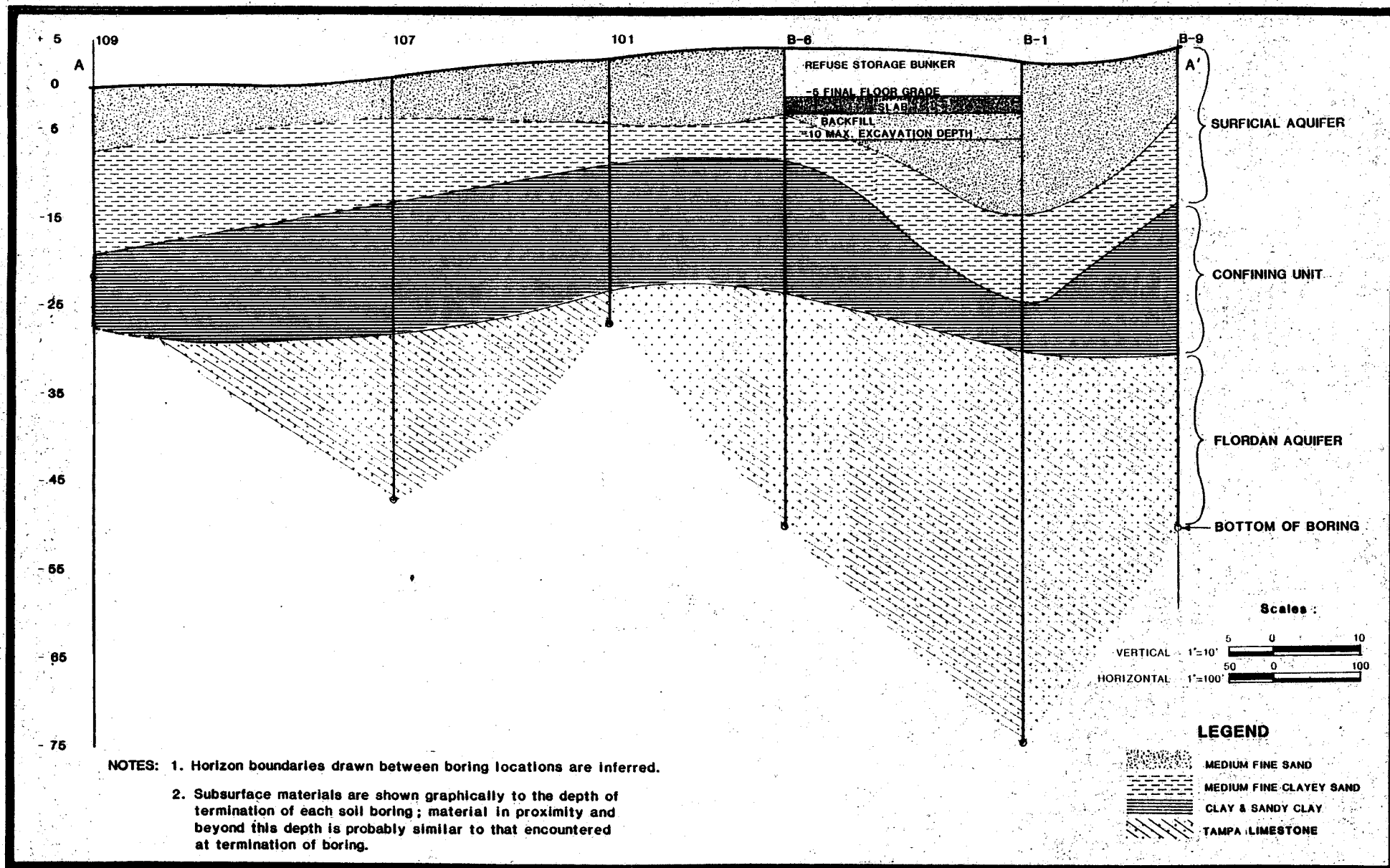
The subsurface data obtained from the field exploration program are presented on the logs which accompany the Test Lab report in Appendix 10.10. Cross sections developed from these logs as well as the logs contained in the Williams and Associates Report (March, 1983), described below, are shown in Figures 2.18 and 2.19.



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**FIGURE 2.17
LOCATIONS OF SOIL BORINGS
AND GEOLOGIC CROSS-SECTIONS**

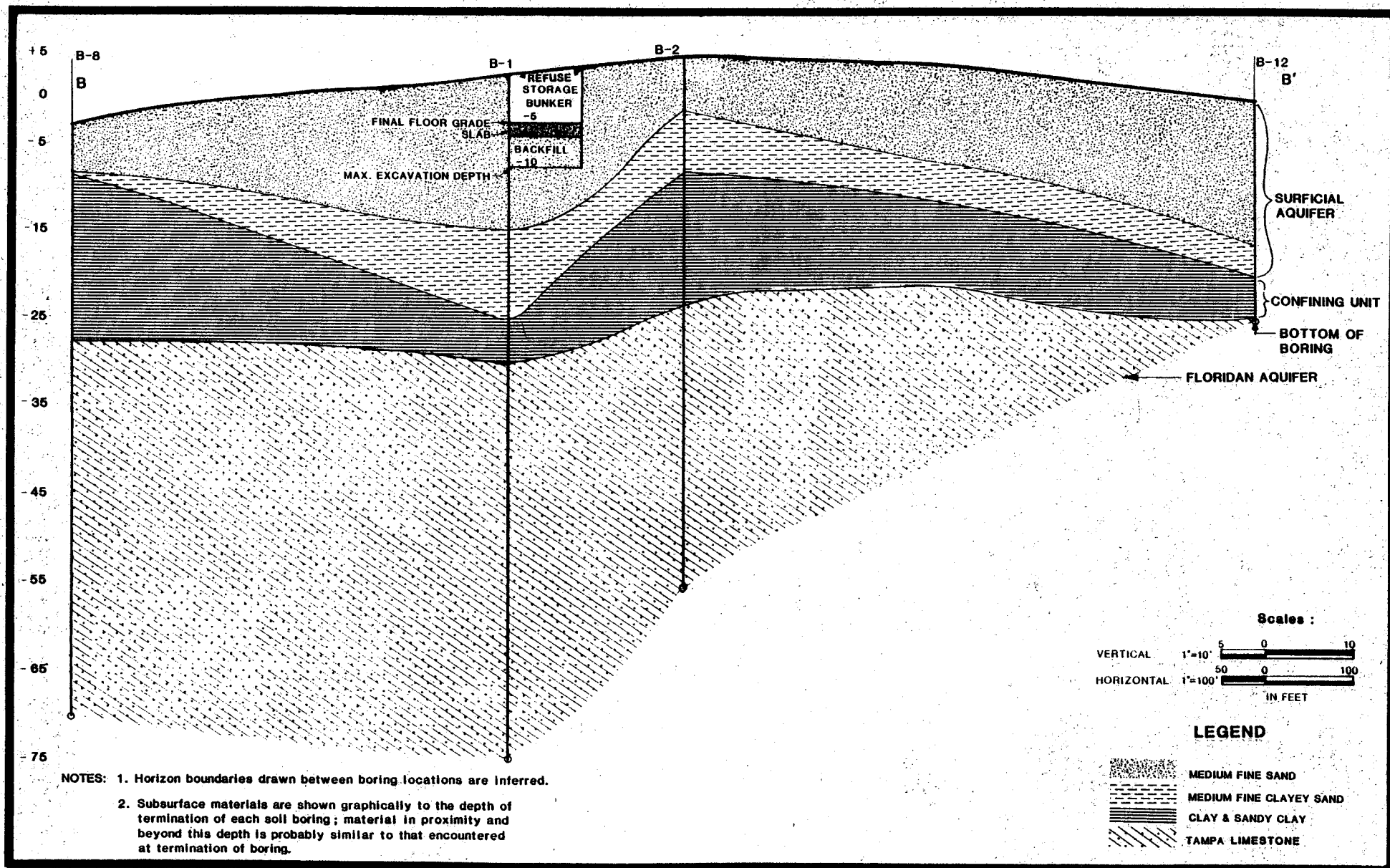




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FIGURE 2.18

GEOLOGIC CROSS-SECTIONS A-A'



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FIGURE 2.19
GEOLOGIC CROSS-SECTIONS B-B'

Laboratory test programs, limited to determining soil index properties were undertaken by both Williams and Associates (1983) and Test Lab Inc. (1984) to better ascertain the physical characteristics of the various soil strata found at the site. The results of these tests, which include grain size analyses and determination of Atterberg limits, are found in the respective reports in Appendix 10.10, and are summarized in Section 2.3.1.4.

The field exploration program of Test Lab Inc. revealed generally similar subsurface conditions existing in the various areas investigated. These conditions were similar to those found in the southern portion of the tract by the earlier Williams study. The following four relatively distinct soil/rock strata were revealed by the borings:

- o Stratum No. 1: This is a moderately thick cohesionless surface stratum which consists of very loose to loose gray and brown medium fine sand and slightly clayey sand containing numerous dark brownish black slightly clayey organic stained zones. This surface stratum varies from 5 feet to 22 feet in thickness, but is typically 10 feet thick.
- o Stratum No. 2: This is a moderately thin semi-cohesive stratum which consists of generally firm brown, grayish brown and light tannish gray, clayey medium-fine sand with some slightly clayey lenses. This stratum varies in thickness from 0 to 15 feet, but is typically 5 feet thick.
- o Stratum No. 3: This is a thick complex stratum of interbedded semicohesive and cohesive soils. Typically, the upper part of this stratum is a firm light green clay which transgresses with depth to more granular semi-cohesive soils - that is, greenish gray and tan fine sandy clay and clayey fine sand which contain some zones with cemented sand fragments. This stratum is typically about 20 feet thick.

- o Stratum No. 4: This stratum, which is the Tampa Formation, is the limestone bedrock. The nature of this stratum is quite variable, typically being a hard light tannish white calcareous sandy clay containing rock fragments, hard limestone lenses, some weathered zones and occasional green and gray sandy clay lenses. Generally, the upper part of the stratum is poorly indurated and softer, probably the result of weathering; whereas at depth, this stratum tends to be somewhat harder and more competent, but frequently contains softer zones. This stratum was encountered at depths of 24 to 47 feet.

2.3.1.3 Geologic Maps

Tables 2.23 and 2.24 show the depth and thickness of the clay confining unit and the top of the Tampa Limestone as encountered by Williams and Associates (1983) and Test Lab Inc. (1984) during test hole construction on and around the site. It is significant to note that the clay confining unit, which separates the surficial aquifer from the Floridan aquifer, is continuous throughout the site and at least five feet thick at all boring locations. Although the planned facility will not produce water-borne contaminants, this confining unit is highlighted because of its low permeability and adsorptive capacity. It is the subsurface feature which would attenuate contaminants from leachate or runoff.

From the standpoint of potential impact from the proposed facility to subsurface geologic features, the geology of the site may be generalized as follows.

1. Surficial sands: These deposits may be subject to the greatest disturbance during construction, and would be most susceptible to environmental impact from surface or near surface disturbance.
2. Clay confining unit: These deposits of very low permeability separate the limestone bedrock from the overlying undifferentiated sands. Because of the low permeability and high adsorptive capacity of this material, this "confining" layer could serve to act as a barrier to

TABLE 2.23

DEPTHS TO TOP OF CLAY CONFINING UNIT AND
TOP OF LIMESTONE FROM SITE BORINGS FROM
WILLIAMS AND ASSOCIATES 1983 REPORT

<u>Boring No.</u>	<u>Depth to Clay Unit (ft)</u>	<u>Thickness of Clay Unit (ft)</u>	<u>Depth to Limestone (ft)</u>
101	13.5	15.0	28.5
102	13.5	20.0	33.5
103	13.5	15.0	28.5
104	9.5	19.0	28.5
105	13.5	13.5	27.0
106	18.5	20.0	38.5
107	13.5	15.0	28.5
108	13.5	$\geq 8.0^1$	-
109	9.5	$\geq 3.0^1$	-
110	18.5	15.0	33.5

¹Borings terminated at -21.5 feet.

Source: CDM after Williams and Associates (1983).

TABLE 2.24

DEPTH AND THICKNESS OF CLAY CONFINING UNIT
AND TOP OF LIMESTONE FROM TEST LAB INC. SITE BORINGS (1984)

<u>Boring No.</u>	<u>Depth to Clay Unit (ft)</u>	<u>Thickness of Clay Unit (ft)</u>	<u>Depth to Limestone (ft)</u>
B-1	17.5	15	32.5
B-2	17.5	10	27.5
B-3	12.0	10	27.0 ¹
B-4	12.0	15	32.0 ¹
B-5	17.0	5.0	37.0 ³
B-6	12.0	15.0	27.0
B-7	27.0	5.0	47.0 ²
B-8	5.0	19.0	24.0
B-9	17.0	17.5 ³	34.5
B-10	17.5	6.5 ⁴	-
B-11	17.5	8.0 ⁴	-
B-12	19.5	5.5 ⁴	-

¹ Weathered limestone overlain by 5.0 feet of very loose green clayey fine sand.

² Weathered limestone overlain by 15.0 feet of clayey fine sand.

³ Includes 5.0 feet of loose light greenish tan clayey fine sand.

⁴ Boring terminated -25.0.

SOURCE: CDM after Test Lab Inc. (1984).

vertical mixing of groundwater between the Surficial and the Floridan aquifers. It provides a hydraulic barrier which inhibits the vertical movement of water to the more environmentally sensitive underlying limestone formations.

3. Limestone bedrock: The limestone bedrock which underlies the unconsolidated surficial deposits constitutes the major water supply source for much of the region, and is therefore the most sensitive geologic feature in terms of potential environmental impact.

2.3.1.4 Bearing Strength

Two site-specific preliminary geotechnical studies were completed by Williams and Associates, Inc. and Test Lab Inc. to determine general foundation suitability characteristics. The first report, completed in March 1983 by Williams and Associates, Inc., evaluated an area located within the present site boundaries but situated more southerly on the site relative to the proposed location of the resource recovery facility. This report is included in Appendix 10.10.4.

The second preliminary geotechnical report which was prepared by Test Lab Inc. in April 1984 is contained in Appendix 10.10.3. The Test Lab Inc. report evaluated an area onsite which includes the location of the proposed facilities. This section provides a summary of findings and preliminary evaluations of subsurface conditions from a foundation suitability perspective and recommendations as reported by Test Lab Inc. and Williams and Associates Inc.

The Test Lab Inc. (1984) report identified certain subsurface conditions at the site which will require specific site preparation and subsurface foundation design. However, these subsurface conditions, as listed below, are considered typical of those normally encountered in the area:

- o cohesionless surface soils with a generally loose consistency

- o weak and potentially compressive nature of the soft and loose zones within the deeper underlying semicohesive and cohesive soils
- o poorly indurated or highly weathered zones within the limestone bedrock.

The Test Lab Inc. report emphasized that these generally typical and normally encountered conditions were quite similar to those revealed by the earlier Williams and Associates (1983) report, and that no "unusual or significantly different conditions" were found. Both reports offered general design considerations for dealing with this type of subsurface condition.

The Williams and Associates (1983) report stated that for relatively light loads (i.e. "column loads less than 20 kips"), post-construction settlement due to consolidation will likely be less than 1 inch, and therefore that shallow foundation support for lightly loaded components is therefore quite feasible. Soil bearing pressures of up to 3,000 pounds per square foot (total load) are available for design of the more lightly-loaded components. According to Williams and Associates, minimum footing widths of not less than 18 inches for continuous footings and 24 inches for isolated column footings should be specified even though maximum allowable bearing pressures may not be developed. These minimum dimensions are considered necessary to provide confinement which cohesionless bearing soils require to develop adequate shear strength.

For heavily-loaded components of the proposed facility, individual pile compressive capacities of up to 60 tons are estimated. The Williams and Associates report recommends that minimum pile sections consist of 12-inch x 12-inch precast, prestressed concrete pile and a closed-end concrete-filled pipe pile with a minimum diameter of 10 inches. The report also made other preliminary recommendations related to pile driving. The report noted that after the final subsurface exploration is performed, criteria for test pile driving and load testing should be developed.

The Test Lab report also concluded that a more comprehensive final foundation study should be undertaken to obtain the additional data needed to establish specific site preparation procedures and foundation design criteria for the various facilities at the site. These specific subsurface studies will be performed by the selected contractor for the resource recovery facility prior to their completion of the final engineering design for the project.

In general, however, the preliminary subsurface data identified in the previous reports indicate that any potentially limiting conditions can be overcome by appropriate site preparation and foundation design, such as the use of piles or other appropriate procedure. Again, such specific site preparation and subsurface/foundation designs and procedures will be further established during the design of the resource recovery facility.

2.3.2 Subsurface Hydrology

This section contains two subsections which describe the physical, chemical, and hydrological characteristics of subsurface waters that have the potential to be affected by the construction or operation of the proposed plant and associated facilities. Although localized and temporary disturbance of the surficial aquifer may occur during facilities construction, the long term operation of the facility will not have an effect on subsurface waters. The facility will not produce an effluent which could affect the subsurface waters.

2.3.2.1 Subsurface Hydrologic Data for the Site

Surficial Aquifer. In February 1983 when soil test borings were being conducted by Williams and Associates, the water table was observed to occur generally within one foot of the surface across much of the site, and some areas were noted to have standing water at the surface. Field investigations in August 1983 (wet season) by Williams and Associates indicated that surface water was noted only in the vicinity of the southwest corner of the site, which coincides with the topographic low area of the site. Field investigations completed in April 1984 (dry season) by

Test Lab Inc. noted that water table elevations were within 2 to 3 feet of the ground surface in the northern part of the site. In general, the water table parallels topography with an average seasonal fluctuation of five feet or less.

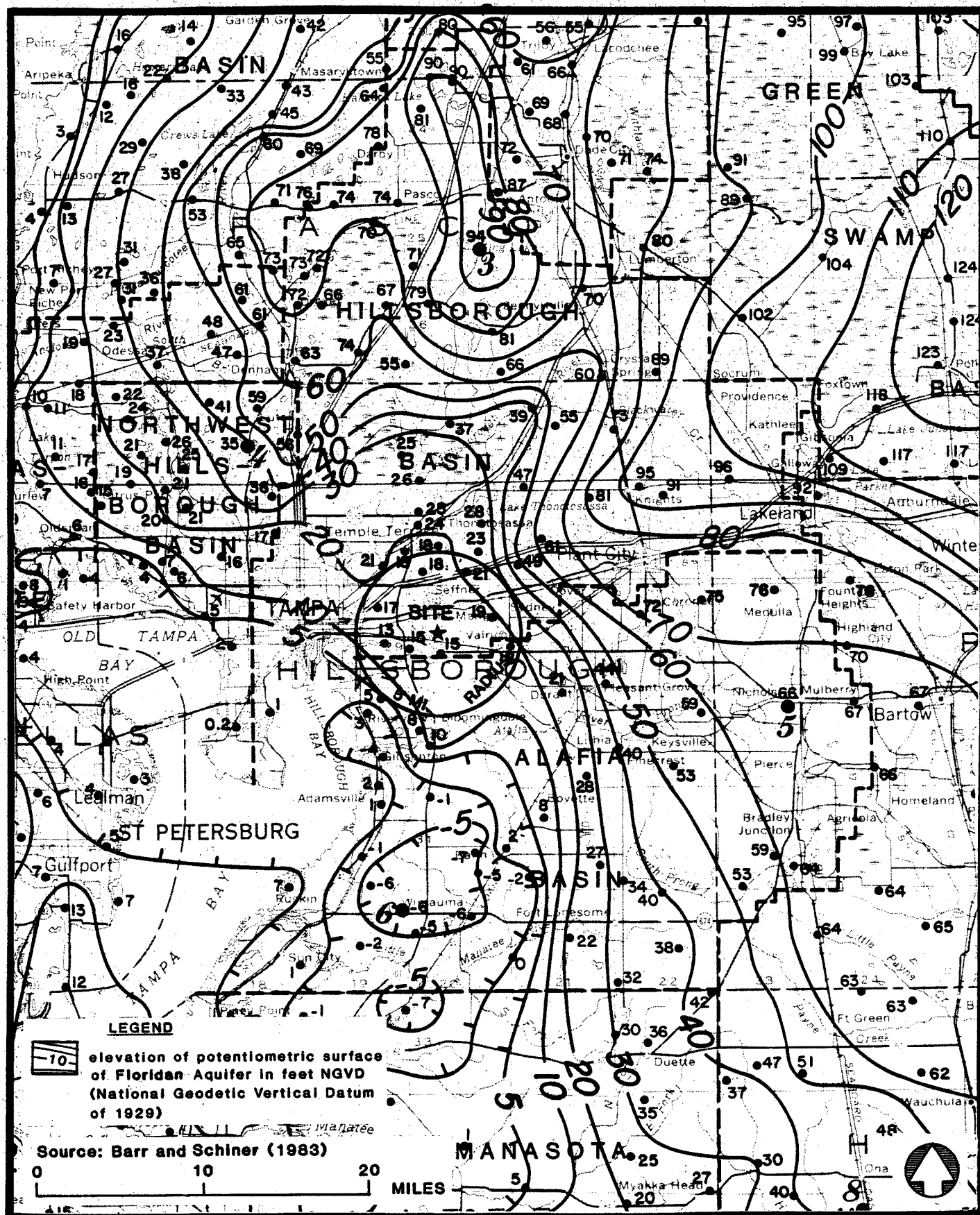
Figure 2.20 is a portion of a regional water contour map prepared semi-annually by the USGS in cooperation with the SWFWMD.

The surficial aquifer is comprised of marine and aeolian sands of Pleistocene age, and ranges from 15 to 25 feet in thickness in Hillsborough County. The aquifer is recharged directly through rainfall, and supplies small, low yield domestic wells.

In most areas of Hillsborough County, the surficial aquifer is underlain by clay that acts as a leaky confining unit which separates the surficial aquifer from the underlying Floridan aquifer. In the northern portion of the County, the clay is absent and the surficial aquifer and the Floridan aquifer are in direct connection.

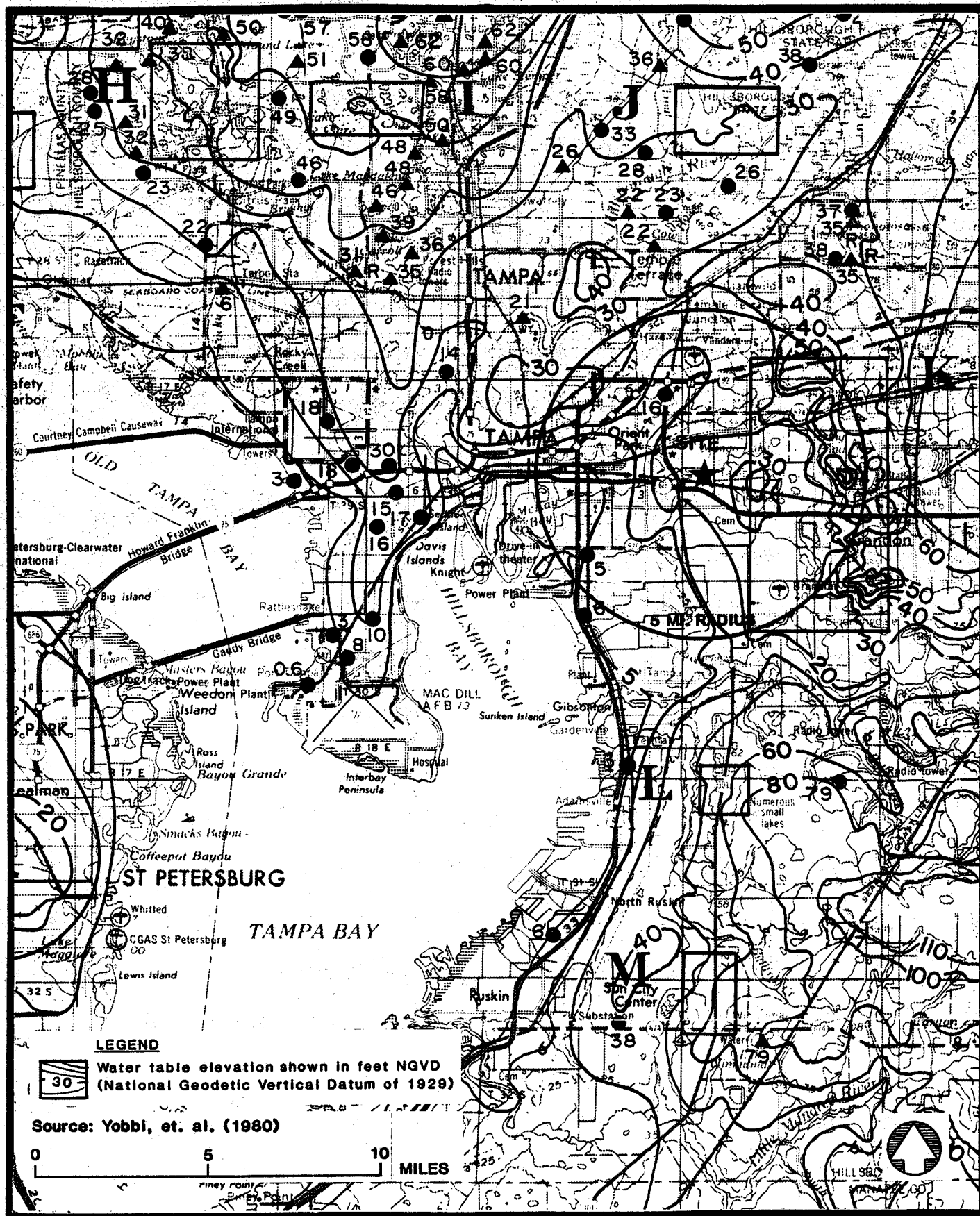
The Floridan aquifer, consisting of limestone and dolomite beds, has an average thickness in the region of up to 1,000 feet. The potentiometric surface of the Floridan aquifer was not measured during test drilling onsite. However, the U.S.G.S. prepared regional potentiometric surface contour maps on a semi-annual basis, which incorporates the site. Figure 2.21 represents a portion of the regional potentiometric surface map for May, 1983.

Rainfall during the 1982 water year (October 1981 through September 1982) was about 20 percent greater than the 1941-70 normal. The area had above-normal rainfall in December, January, March, April, May, June, and September and below-normal rainfall in October, November, February, July, and August. Rainfall during the 1982 dry season (October through May) averaged about 20 percent above normal; rainfall during the 1982 wet season (June through September) averaged about 17 percent above normal (Barr, 1983).



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**FIGURE 2.20
POTENTIOMETRIC SURFACE OF
THE FLORIDAN AQUIFER, MAY 1983**



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**FIGURE 2.21
GROUND-WATER LEVELS IN
THE SURFICIAL AQUIFER, MAY 1980**

In September 1982, groundwater levels in the surficial and Floridan aquifers were generally higher than in May 1982. Water levels measured in September 1982 were usually higher than in September 1981. These increases were due to above-normal rainfall in the 1982 water year and reduced pumpage.

The water table in September 1982 averaged about 1.8 feet higher than in September 1981 and about 3.6 feet higher than in May 1982. Potentiometric levels of the Floridan aquifer in September 1982 averaged about 9.5 feet higher than those in May 1982 and levels in September 1982 averaged about 2.9 feet higher than levels measured in September 1981.

Aquifers Relationship to Local Geology. Based upon data provided in the Test Lab Inc. geotechnical report, the following sequence of subsurface deposits, in descending order, comprise the groundwater matrix at the Faulkenburg Road site (summarized in Section 2.3.1.2):

- o fine sand
- o clayey sand
- o clay
- o calcareous cemented marl and limestone

As previously discussed, variations occur in these lithologies and in the elevation of top and bottom of each of these units across the site. Geologic cross sections of the site are presented in Figures 2.18 and 2.19.

The first two strata appear to represent two subunits of the surficial aquifer as described by Sinclair (1977) and others. These units probably do not represent a significant aquifer with respect to total water withdrawal. The units generally do not have sufficient hydraulic conductivity or thickness to be used as a supply for all but small domestic wells.

The third stratum, comprised predominantly of clay but grading to clayey sand, represents the confining unit for the limestone of the Floridan aquifer which lies below. Groundwater above this confining unit is under

unconfined or water-table conditions, and groundwater in the Floridan aquifer below is in a confined state. The confining unit appears to be continuous across the site, based upon results of test borings.

Based upon published data, recharge rates to the surficial deposits have been estimated by Camp Dresser & McKee to vary from 0.4 to 2.5 inches per month, depending upon wet or dry season. Stewart (1968) reported the transmissivity of the Floridan aquifer in Northwest Hillsborough County to be about 73,500 ft²/day, with a storage coefficient of about 1.0×10^{-4} . The regional gradient of the potentiometric surface of the Floridan aquifer is southwestward, from the topographically high area in the northeast, toward the Gulf of Mexico (Sinclair, 1977; Yobbi 1980; Yobbi 1983, Barr and Schiner, 1983). Table 2.25 provides a summary of reported published values for various aquifer characteristics including thickness, transmissivity and storage (storativity).

Fernandez (1983) has reported that the rate of horizontal movement of groundwater in the surficial aquifer for an area within Pinellas County to be about 1.2 feet/year, and has reported a rate of downward vertical migration through the confining bed to be on the order of .005 feet/year. Theoretically, a slug of groundwater could move through a ten-foot thickness of the confining unit at the site in approximately 2000 years, assuming no alteration of hydraulic properties.

The Hillsborough County Health Department has provided the results of chemical analyses of water samples taken from selected community and non-community public water systems which utilize groundwater from surficial aquifer wells in the vicinity of the Faulkenberg Road site. The locations of the wells from which sample analyses were obtained are shown in Figure 2.22, with results of selected parameters shown relative to various regulated levels in Table 2.26. From these results it can be concluded that the groundwater contained in the surficial deposits in the vicinity of the site is of generally good quality, with most wells examined showing most water quality parameters as being well within established state and federal primary and secondary drinking water standards.

TABLE 2.25

REPORTED VALUES FOR VARIOUS AQUIFER CHARACTERISTICS

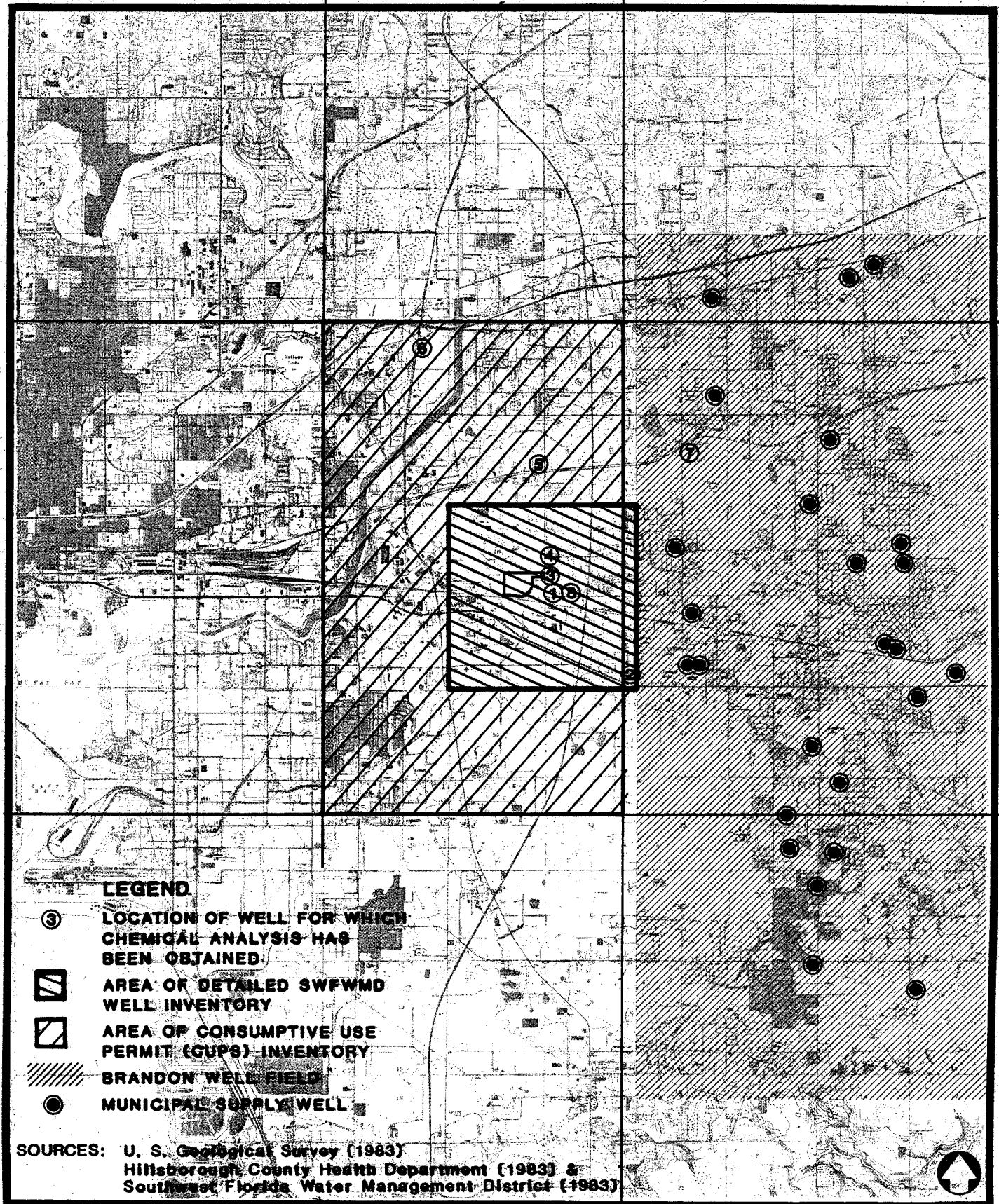
References	Area	Aquifer	Thickness	Aquifer Transmissivity	Storage Coefficient	Confining Unit Permeability (or Leakage)	Hydraulic Conductivity
Fernandez (1982)	Pinellas County	Surficial Confining	- -	- -	- -	- -	2.1 ft/d 5×10^{-5} ft/yr (in confining unit)
Geraghty & Miller (1982)	Tampa Bypass Canal	Upper Floridan	-	400,000 gpd/ft	5×10^{-4}	1×10^{-3} gpd/ft ³	
Geraghty & Miller (1982a)	East Central Regional Well Field	900' depth Floridan	- -	220, 300- 267,300 gpd/ft	7×10^{-5} to 1.2×10^{-3}	2.2×10^{-3} to 9.8×10^{-4} gpd/ft ³	
Hickey (1981)	Tampa Bay	Surficial	30'	448 gpd/ft	-	-	20 ft/d
		Upper Confining Bed	70'	0.42 gpd/ft	-	-	8×10^{-4} ft/d
		Upper Floridan	180'	225,000 gpd/ft	-	-	167 ft/d
		Middle "	400'	300 to 3000 gpd/ft	-	-	0.1 to 1 ft/d
		Lower "	530'	7,493,000 gpd/ft	-	-	1.890 ft/d
Stewart et al (1978)	Temple Terrace	Upper Floridan	-	972,400 gpd/ft	3×10^{-4}	-	5.2×10^{-5} to 2.6 ft/day
Sinclair (1977)	Northwest Hillsborough County (Section 21)	Surficial	40'	2020-3216 gpd/ft	0.20×10^{-3}	-	-
Stewart (1968)	Northwest Hillsborough County	Floridan	1,000'	550,000 gpd/ft	1.0×10^{-4}	5.35×10^{-5} gpd/ft	-

82 22 30

82 18 45

27 59 45

27 55 00



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**FIGURE 2.22
AREAS OF INVENTORY OF PUBLIC &
PRIVATE WATER WELLS**

1 0 1 2 MILES

TABLE 2.26 RESULTS OF SELECTED WATER QUALITY PARAMETERS FOR WELLS
IN THE VICINITY OF THE FAULKENBURG ROAD SITE

PARAMETER	WELL LOCATION								
	MCL	1	2	3	4	5	6	7	8
Total Dissolved Solids	500**	150	165	177	180	226	260	230	464
Chlorides as Cl	250**	3	12	8.4	8.6	11.3	14.8	16	60
Sulfate as SO ₄	250**	1.0	10.0	7.7	13.1	3.9	34.0	22.1	17.0
Fluoride	1.4-2.4*	0.22	0.15	0.28	0.909	0.23	0.14	0.19	0.36
pH	minimum 6.5†	7.2	7.6	7.9	7.9	7.4	7.4	7.6	7.3
Iron as Fe	0.3**	0.08	0.05	0.05	<0.02	0.17	<0.02	0.02	0.84
Copper as Cu	1.0**	<0.1	<0.1	-	<0.01	<0.01	<0.01	BDL	<0.005
Color (reported in standard unit)	15**	5	0	10	1	12	2	0	25
Color (reported as Threshold Odor Number)	3**	2	-	none	1	1	4	-	1
H ₂ S (Hydrogen Sulfide)	.002†	0.49	<0.05	none	0.06	0.20	0.80	-	<0.04
Sodium as Na	160*†	9.5	-	9.3	-	-	-	6.2	12.0
Nitrate as N	10*	-	-	0.38 (as NO)	2.7	0.39	8.7	0.3	0.05

SOURCE: CDM from Hillsborough County Health Department Records

* National and State Primary Maximum Contaminant Level (MCL)

** National and State Secondary MCL

† State of Florida MCL

NOTES:

1 All wells finished in surficial aquifer.

2 Well locations shown in Figure 2.22.

2.3.2.2 Karst Hydrogeology

Karst generally refers to characteristic terrain features which develop in purer limestones. Key characteristics of karst topography are its predominantly vertical and subsurface drainage, relative lack of surficial drainage systems, and the development of circular depressions and sinks. The terrain of the site area would be classified as buried karst, as the limestone base is generally covered with an overburden of approximately 30 feet.

The topography of the area is predominantly karst-controlled. The site lies near the edge of an area that Hall and Metcalf (1979) have termed the Brandon Karst Area. This is an area of about 40 square miles which is centered around the communities of Brandon, Seffner, Valrico, and Mango. Within a five-mile radius of the site, 105 probable sinkholes or subsidence features can be located on the U.S.G.S. topographic maps for the area.

Boyes (1980) located 106 such features for a similar three-mile radius from the site of the present Taylor Road Landfill, located within the Brandon Karst Area about five miles northeast of the Faulkenburg Road site.

Analysis of high resolution color aerial photography indicated the presence of a circular terrain feature on the site which may have been karst-related. Subsequent onsite examination revealed the pattern to be a "grass pond". Geotechnical reports prepared for Hillsborough County in 1983 and 1984 concluded that there was no evidence of any advanced solution activity beneath the site.

According to Legget (1983) the solution channels in carbonate rocks may start out along joint planes but thereafter develop in a heterogeneous fashion. Following preliminary siting and site studies, the only real means of insuring substructural integrity is to take test borings at the location of every important column or load bearing member onsite in order to assure the immediate absence of voids which may be indicators of advanced solution activity. This will be done prior to final foundation

design. If such voids are determined to be present, there are numerous design factors which may be considered in order to overcome any potential site limitations.

2.3.3 Site Water Budget and Area Uses

Table 2.27 presents a compilation of hydrologic data representative of the site area and includes information on rainfall and temperature, evapotranspiration, evaporation, runoff, and groundwater recharge, as required by Section 2.3.3 of the Instruction Guide for Certification Applications.

The monthly evapotranspiration potential was calculated using the Blaney-Criddle formula which describes a linear relation between evapotranspiration potential and mean air temperature. The proportionality factor is the product of a crop/location coefficient and a day length factor:

$$ET_p = CL_d T$$

where

$$ET_p = \text{evapotranspiration potential}$$
$$C = \text{monthly "consumptive use" crop and location coefficient}$$
$$L_d = \text{day length factor}$$
$$T = \text{mean monthly air temperature}$$

For this analysis the crop was considered to be pasture grass with a coefficient of 0.75. There are no surface water bodies on the site so there is no evaporation from a free surface.

Table 2.27 indicates that under average conditions site runoff will occur most frequently during the rainy summer months of July and August. Depending on localized drainage conditions, runoff may occur at other times as well.

Major water uses in the area are divided into domestic, industrial, irrigation, and public supply. The Southwest Florida Water Management District (SWFWMD) has provided a well construction permit listing for all wells greater than 2-inches in diameter within Sections 17, 18, 19 and 20

TABLE 2.27

HYDROLOGIC DATA REPRESENTATIVE FOR THE SITE AREA

Month	Mean Air Temperature (°F)	Monthly Percentage of Daylight Hours in a Year	Monthly Evapotranspiration Potential (inches)	Mean Monthly Precipitation (inches)	Runoff, inches	
					Groundwater Recharge 0.4 in./month	Groundwater Recharge 2.5 in./month
JAN	61	7.40	3.38	1.8	-	-
FEB	59	7.07	3.13	3.0	-	-
MAR	65	8.37	4.08	2.7	-	-
APR	71	8.67	4.62	0.9	-	-
MAY	77	9.46	5.46	2.2	-	-
JUN	81	9.39	5.70	5.7	-	-
JUL	82	9.58	5.89	6.9	0.61	-
AUG	82	9.17	5.64	7.9	1.86	-
SEP	81	8.32	5.05	5.0	-	-
OCT	75	8.02	4.51	2.2	-	-
NOV	66	7.28	3.60	1.6	-	-
DEC	62	7.27	3.38	2.4	-	-

SOURCE: NOAA (1980).

in Township 29 Range 20E. This listing has been included in Appendix 10.9. In addition, SWFWMD has provided a list of the Consumptive Use Permits (Cups) - (issued for wells greater than four inches in diameter) which have been issued for the latitude/longitude boundaries defined by 27°59'45", 27°55'00", 82°22'30", 82°18'45", and these areas are illustrated on Figure 2.22.

Under the Consumptive Use Program, a permit for the use of groundwater is required if:

- 1) the withdrawal during any single day is to exceed one million gallons or if the average annual daily withdrawal exceeds 100,000 gallons per day on an annual basis; and
- 2) if the withdrawal is from a well having an inside diameter of six inches or more.

This listing of Consumptive User Permits has been included in Appendix 10.9. From these lists, specific wells were identified and the well completion reports obtained for the wells closest to the site. These reports are also included within Appendix 10.9.

A significant area related to Hillsborough County's water supply is the location of the Brandon well field, shown on Figure 2.22. This well field, a significant portion of which is located within five miles of the site, covers an area of 2.5 miles by 9 miles. Within this area are 25 municipal supply wells which pumped between 5.8 and 11.8 mgd in 1981 and 1982, respectively. Figure 2.22 also shows the location of these wells within the well field, the nearest of which is about 1.5 miles east of the Faulkenburg Road Site.

The Hillsborough County Health Department was contacted for chemical analyses of water from the nearby wells. The complete chemical analytical reports which were summarized in Table 2.26, are included in Appendix 10.9, and the locations of the wells are shown on Figure 2.22. These analyses indicated generally that the water quality parameters analyzed generally

meet the national primary and secondary drinking water standards from these wells.

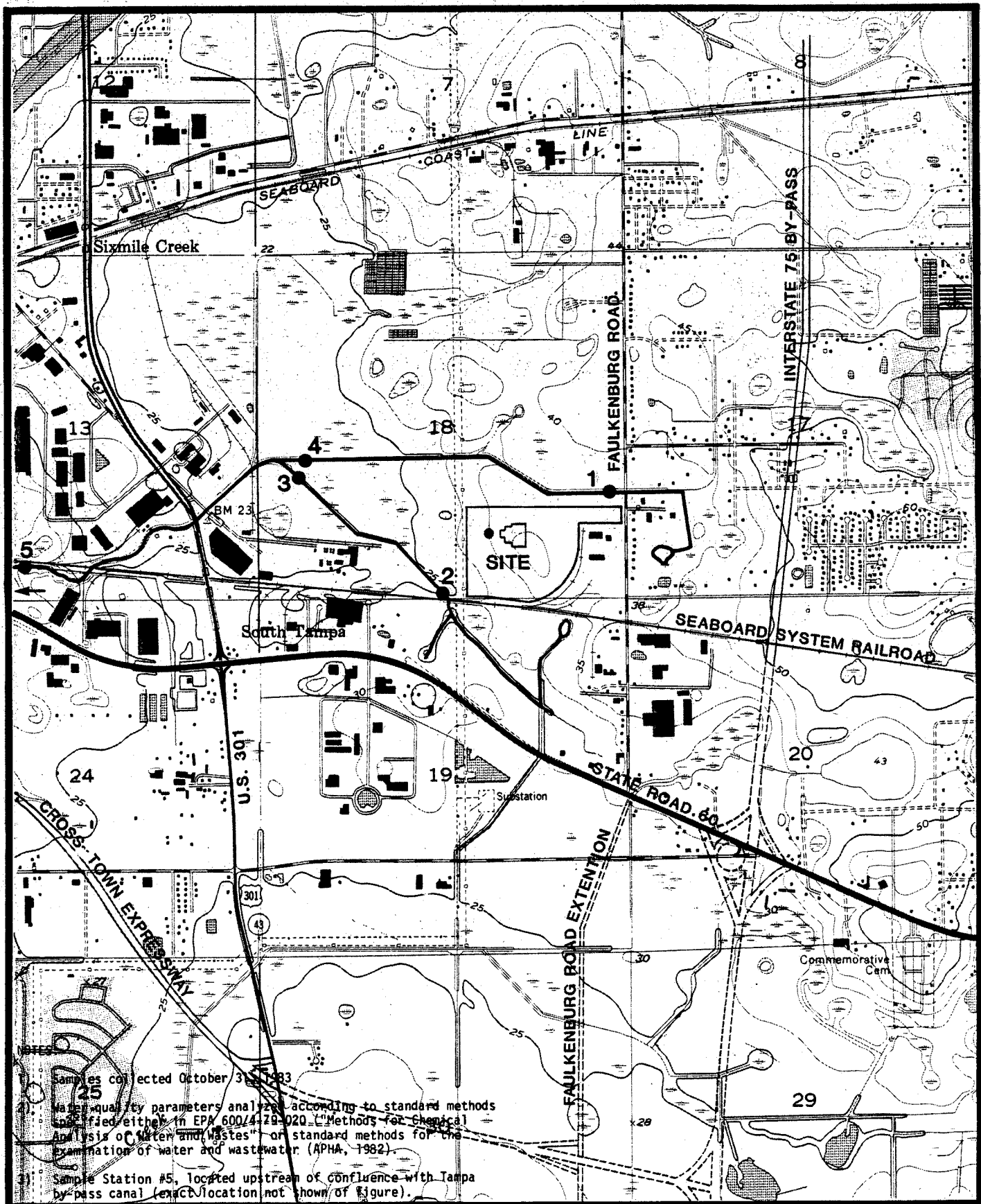
2.3.4 Surficial Hydrology

2.3.4.1 Hydrologic Characterization

The proposed site could potentially affect two ditches which approach the site's northern and southwestern borders. Little information is available on the physical, chemical or hydrological characteristics of the two ditches, especially on a seasonal basis. To provide some information on the chemical characteristics, both of the ditches were field sampled on October 31, 1983.

As indicated in Figure 2.23, the unnamed ditch to the north of the site drains a mixed light industrial-residential area to the west of the site. Station 1 is located on this ditch. Station 2 is located on a second unnamed ditch which drains a wetlands area to the southeast of the site. Stations 3 and 4 are located downstream of Stations 2 and 1, respectively, before the confluence of the two ditches. Prior to stations 3 and 4, both ditches pass through a wetland area. Station 5 is located downstream of the merged ditches, just prior to the Tampa Bay Bypass Canal.

Results of chemical analyses are presented in Table 2.28. Compared to water quality of the Tampa Bypass Canal (the receiving waters into which the ditches ultimately discharge) at the S-160 Station (USGS, 1981), water quality in both ditches is generally degraded. Levels of nitrogen compounds (nitrate, ammonia) are generally higher in the ditches than in the canal, with the exception of nitrite-nitrogen. High turbidity and suspended solids levels were seen in the ditch bordering the northern boundary of the site (Stations 1 and 4). These high levels are thought to be the result of some temporary discharge upstream and would possibly not be found in further sampling. Conditions at Station 2 are of particular interest because site discharges are proposed to occur in the vicinity of this station. Water quality at this station is generally the best of the stations sampled. Surprisingly, however, the lowest dissolved oxygen level was recorded at



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FIGURE 2.23
SURFACE WATER QUALITY
SAMPLING LOCATIONS

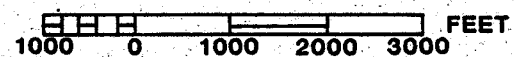


TABLE 2.28
WATER QUALITY OF SURFACE WATERS IN
VICINITY OF SITE(a)
(mg/l unless otherwise noted)

STATION	1	2	3	4	5
<u>Parameter</u>					
Temperature (°C)	24	22.5	22	22	24
pH (units)	7.35	6.90	7.2	7.9	7.4
Dissolved Oxygen	10.1	2.60	4.80	6.40	8.35
Turbidity (NTU)	196	4.9	31	126	39
Total Alkalinity, CaCO ₃	29	151	92	33	129
Ammonia Nitrogen	0.08	0.31	0.29	0.43	0.16
Total Kjeldahl Nitrogen	1.1	0.77	1.2	1.4	1.2
Nitrate Nitrogen	0.10	0.03	0.28	0.07	2.2
Nitrite Nitrogen	<0.01	<0.01	<0.01	<0.01	0.04
Total Phosphate (T-PO ₄)	0.58	0.15	2.0	0.38	0.50
Total Suspended Solids	27	9.0	60	61	26
Total Hardness, CaCO ₃	111	238	182	85.6	227

(a) Samples collected October 31, 1983, Locations as shown on Figure

this station -- 2.6 mg/l. This concentration, if persistent, would prohibit establishment of a healthy biological population. As discussed in subsequent sections (Ecology, Section 2.3.6) benthic organisms found at this station do not indicate that lowered DO is a continual occurrence.

No information is available on seasonal variations in flow in either ditch. Based on very general calculations, maximum flow which could be handled at Station 2 is approximately 65 cfs.

2.3.4.2 Measurement Programs

In order to characterize the chemical condition of the two ditches in the vicinity of the site, a limited sampling program was conducted on October 31, 1983. Grab samples were collected at each station in appropriately washed containers. Samples for dissolved oxygen (Winkler technique), ammonia, total Kjeldahl nitrogen and total phosphate were preserved as specified in "Methods for Chemical Analysis of Water and Wastes" (EPA-600/4-79-020). All samples were immediately placed on ice for transport to the laboratory. Temperature and pH were measured according to methods specified in either "Standard Methods for the Examination of Water and Wastewater" (APHA, 1982) or "Methods for Chemical Analysis of Water and Wastes" (EPA 600/4-79-020).

2.3.5 Vegetation/Land Use

On August 31, 1983, the site was visited by a representative of the Hillsborough Environmental Protection Commission (EPC) in order to ascertain the type and extent of vegetation and to determine whether any wetlands onsite come under the jurisdiction of the EPC. According to the EPC, a small depression located in the south central portion of the 50-acre site contains standing water periodically but is not a "well-defined, viable wetland and therefore, would not be within the jurisdiction [of EPC]" (written communication, Tetreault CDM from Woodard EPC, letter dated 19 October 1983; see Appendix 10.11 for complete correspondence).

The results of the field survey indicated that the majority of the site consists of "improved pasture", indicating that the site has been regraded, low spots filled, and the area allowed to seed to pasture. Currently, the area is actively used for grazing for livestock, including cattle and horses. Although most of the site is open pasture, there are scattered small- to medium-sized trees across the western half of the site which consist predominantly of longleaf pine (Pinus palustris) and live oak (Quercus virginiana). In addition to the extensive dog fennel (Eupatorium capillifolium), common grasses (predominantly rye and bahia) and sedges which commonly comprise a pasture, there are scattered isolated low areas where water has ponded (or where the groundwater table is at the surface) which are dominated by rush (Juncus sp.).

The TECO easement area to the west of the proposed site, predominantly consists of improved pasture and livestock were observed grazing within the easement boundaries. Along the west line of the S.E. 1/4 of Section 18-29-20, adjacent to the TECO easement and the proposed site, are woodlands which are dominated by live oak (Quercus virginiana), wax-myrtle (Myrica cerifera), and in the wetter areas blackberry (Rubus allegheniensis), primrose willow (Ludwigia peruviana), smartweed (Polygonum sp.), laurel oak (Quercus laurifolia), and water oak (Quercus nigra). The blackberry and primrose willow are characteristic of disturbed wet sites, and the primrose willow is considered to be of a low wildlife value because it tends to invade and dominate higher quality habitat. The area west of the site consists predominantly of a mixed oak overstory with scattered pine, and an understory of blackberry, with primrose willow in the wetter, more open areas. Examination of recent aerial photographs provides an estimated overstory cover of 60 percent in this area.

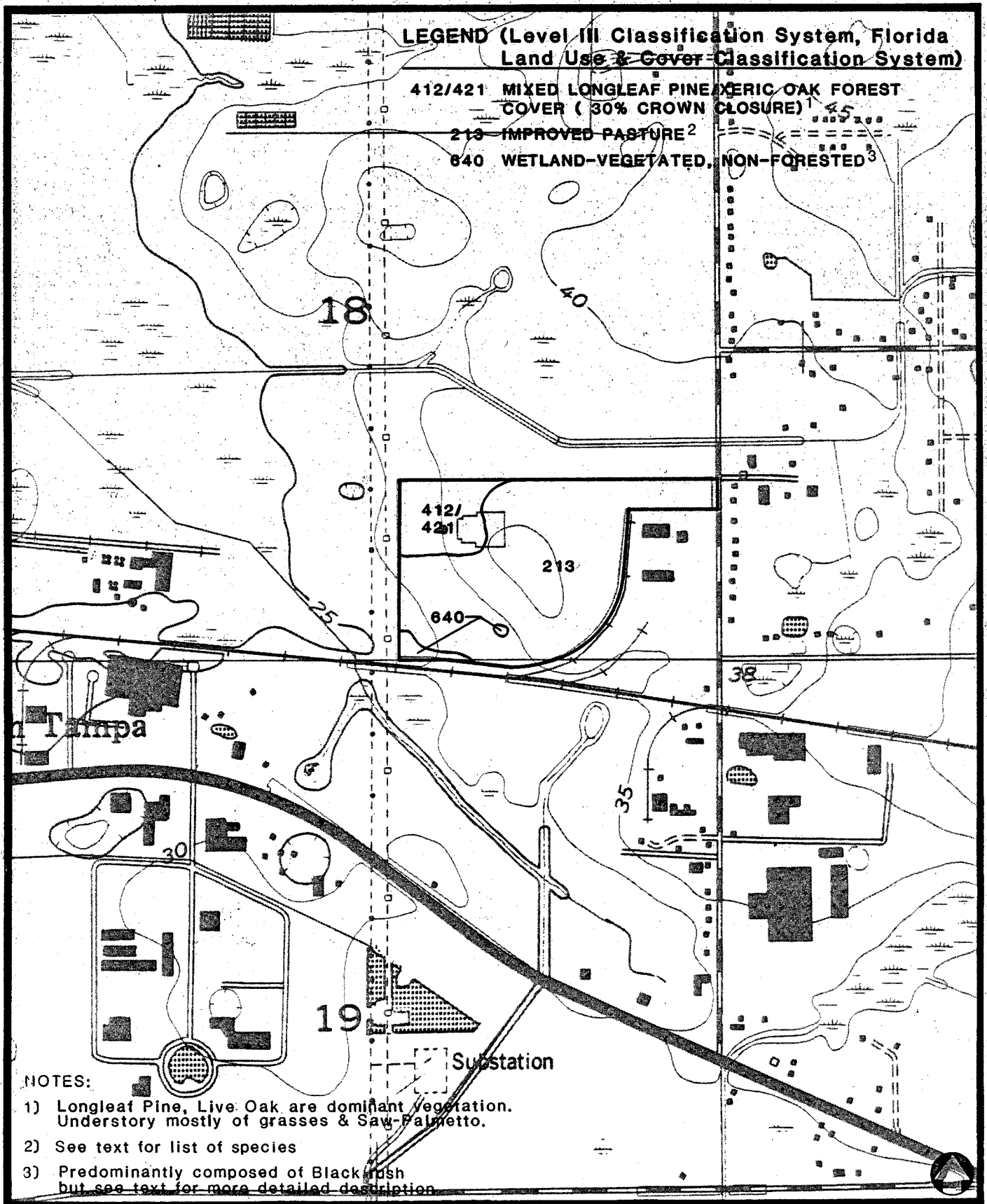
The southeast corner of the site, which is the lowest area of the entire site, was observed at the time of the field visit to contain areas of shallow (1-2") standing water with a good deal of soft rush and bladderpod interspersed among the wet grasses and field grasses, predominantly rye and bluegrass. This area was estimated at less than one acre, or less than 2% of the total site area.

The offsite wooded area to the southeast of the site was observed to include a drainage ditch with spoil banks containing water (with a slight sewage-like odor) flowing at an estimated rate of about two to three feet per second and estimated average depth of two inches. Small fish (fingerling size) were observed in the drainage way. Also, one small tributary of relatively clean water was observed to flow into this drainage ditch. The ditch had an estimated width of four to six feet.

A land use/vegetation map at a scale of 1:12000 (1"=1000') is provided in Figure 2.24, based upon the Level III Classification of the Florida Land Use and Cover Classification System. This class of data was obtained from medium and low altitude aerial photography supplemented by ground level confirmation of observed data.

According to the U.S. Department of Interior Fish and Wildlife Service (USFWS) National Wetland Inventory, there are six discrete wetland areas shown which occur onsite (NWI Brandon, Florida, Quadrangle, 1972). These areas are classified as PEM5A -- "Palustrine Emergent Narrow-Leafed Persistent with a Temporary Non-Tidal Water Regime", and PEM5C which is the same as the former except for a "Seasonal Non-Tidal Water Regime". It is important to note that this mapping is based upon 1972 aerial photography and, thus, reflects conditions during the specific year and season when the photographs were taken. It is highly probable that considerable onsite activity has extensively modified conditions which existed when these aerial photographs were taken, and indeed ground level analysis did not reveal the presence of wetlands areas indicated on the USFWS map. Figure 2.24 shows wetland areas which were identified by CDM and the Hillsborough County EPC in August 1983. These small areas may still be classified as Palustrine Emergent Narrow-Leafed Persistent since they consist predominantly of rush (Juncus sp.) and associated wet pasture species.

The wetlands located westerly of the TECO easement have been classified by the USFWS as "PSS 3/1C" which is "Palustrine Scrub-Shrub Mixed Broad-Leaved Evergreen and Deciduous with a Seasonal Non-Tidal Water Regime." Judging by the size of the existing trees in this area, the overstory has probably changed relatively little except for normal vegetated growth since the aerial photography in 1972.



**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 2.24
VEGETATION & LAND USE MAP**

500 0 500 1000 1500 FEET

Based upon field observations (1983), the Hillsborough County Environmental Protection Commission determined that these areas are not significant wetlands by virtue of their size and location with respect to surrounding land use. In a letter to Camp Dresser & McKee, Inc. dated October 19, 1983, the Commission staff stated that, "The purpose of the inspection was to determine what portions of the tract, if any, lie within the jurisdiction of the Hillsborough County Environmental Protection Commission (EPC) as waters of Hillsborough County," as defined in Chapter 1-5 of the Rules and Regulations of the EPC.

"The site would be classified as improved pasture with a few scattered live oaks and pines. Located in the south central portion of the tract is a small depression that contains standing water periodically but it is not a well defined, viable wetland and therefore, would not be within the jurisdiction of this agency as 'waters of Hillsborough County.'"

The complete correspondence as well as a list of wetland vegetative indicator species for Hillsborough County is found in Appendix 10.11.

2.3.6 Ecology

"Important" species of plants and animals include those which are listed as endangered, threatened or of special concern by the U.S. Fish and Wildlife Service or by the Florida Game and Fresh Water Fish Commission; those listed as game, furbearers or freshwater game fish in the Florida Administrative Code Rule 39-1; and those which are indicators of, endemic to, or are otherwise unique to specific plant communities and habitat types. Of relevance to this application are those important species found on-site or within five miles of the site which would be expected to be affected by the proposed facility.

A listing of endangered, threatened, rare or species of special concern which are found in Hillsborough County provides a data base of organisms which could possibly be impacted by the proposed facility. This listing is presented in Table 2.29 along with the range of habitat types in which the

TABLE 2.29

HABITAT OF RARE, THREATENED, ENDANGERED PLANTS AND ANIMALS FOUND IN HILLSBOROUGH COUNTY*

<u>Species</u>	<u>Habitat</u>
MAMMALS	
Shermans Fox Squirrel (SSC) <u>Sciurus niger shermani</u> Moore	Inhabits long leaf pine - turkey oak assoc of sand hill. Depends on pine seeds for food in summer and acorns of turkey oak and other oaks during remainder of year.
Florida Mouse (T) <u>Peromyscus floridanus</u> (Chapman)	Very narrow habitat range. Sand pine scrub in its early successional stage is this species primary habitat, but also occurs in southern Florida slash pine - turkey oak and scrubby flatwoods associations.
PLANTS	
Auricled Spleenwort (E) <u>Asplenium auritum</u>	Inclined trunks of large trees, usually live oaks. However, perhaps only exists now in Collier County.
Florida golden aster (UR) ^a <u>Chrysopsis floridana</u>	Part of the sand pine scrub community. Known populations exclusively in Hillsborough County.
Curtiss Milkweed (T) <u>Asclepias curtissii</u>	Found only on leached, excessively around white sand under scrub association. Found with Florida rosemary, chapman oak, myrtle oak and other scrub species.
Needle Palm (T) <u>Rhapidophyllum hystrix</u>	Lower slopes of the deep wooded ravines of Apalachicola River
Jackson vine (T) <u>Smilax smallii</u>	Richwoods and hammocks in ravines and along streams.
Spoon flower (R) <u>Peltandra sagittifolia</u>	Boggy areas and ditches, valley bottoms, within cyprus swamps along lake margins and edges of streams
AMPHIBIANS/REPTILES	
Florida gopher frog (SSC) <u>Rana areolata aesopus</u>	Sandhill communities on bluejack (<i>Quercus incana</i>) and Turkey Oak (<i>Quercus laevis</i>) ridges and in sand pine scrub habitats.
Short tailed snake (T) ^d <u>Stilosoma extenuatum</u> Brown	Restricted chiefly to Longleaf pine/ Turkey Oak association. Occasionally in upland hammock and sand pine scrub habitats.
Suwannee Cooter (SSC) <u>Chrysemys concinna suwanniensis</u>	Restricted to rivers and streams draining into Gulf of Mexico. Highest density in areas with heavy growth of <i>Najas</i> and <i>Sagittaria</i> including grassy flats of river mouths.
American alligator (SSC) <u>Alligator mississippiensis</u>	Wetlands throughout state.

<u>Species</u>	<u>Habitat</u>
BIRDS	
Wood Stork (E) (<u>Mycteria americana</u>) Linnaeus	Breeding colony found in northern Hillsborough County. Freshwater, brackish wetlands, primary nesting in cypress and mangrove swamps.
Red cockaded woodpecker (E) (<u>Picoides borealis</u>)	Primarily in longleaf pine (mature forests) also in loblolly, shortleaf, slash and pond pines.
Southern bald eagle (E) ^b <u>Haliaeetus l. leucocephalus</u>	Primarily riparian habitats. Generally associated with coastal or with lake or river shores. Also found inland, associated with marshes.
Osprey (II) <u>Pandion haliaetus</u>	Tops of living and dead cypress, mangrove, pine, swamp, hardwood trees located near seacoasts, interior lakes, large swamps and rivers.
Southeastern American Kestrel (T) ^a <u>Falco sparverius paulus</u>	Open pine forests and clearings where dead trees are found. Also open edges of river bottoms, coastal regions, suburban areas.
Florida sandhill crane (T) <u>Grus canadensis pratensis</u>	Wet praires, marshy lake margins, low lying improved cattle pastures, sparsely vegetated marshes and shallow flooded open areas.
Florida scrub jay (T) ^a <u>Aphelocoma coerulescens</u> <u>coerulescens</u>	Very specific habitat requirements: oak scrub - live oak, myrtle oak, chapman oak. Avoids wet habitats and forests.
FISH	
No rare, threatened or endangered fish species are found in Hillsborough County.	

*SOURCE: Florida Game and Fresh Water Fish Commission
Pritchard, P.C., 1978. Rare and Endangered Biota of Florida. U. Presses of Florida.

a) Under review for possible listing by USFWS
b) GFWFS classifies as threatened
E = Endangered
T = Threatened
SSC = Species of Special Concern
I = Included in Appendix I of the Convention on International Trade in Endangered Species (CITES)
II = Included in Appendix II of CITES

species are found. Habitat types were gathered from the series of publications Rare and Endangered Biota of Florida (Pritchard, 1978).

Habitats found on-site were described in the previous section. It does not appear on-site that the site, characterized as "improved pasture" would be a significant habitat for any of the species listed in Table 2.29. Of particular concern is the potential nesting of the southern bald eagle (Haliaeetus leucocephalus leucocephalus) both on and offsite. Based on mapping conducted by the Florida Game and Freshwater Fish Commission, no nests are found within a five mile radius of the site. The location of the nearest eagles' nests to the site are shown on Figure 2.7.

The Florida Natural Areas Inventory (Tallahassee, Florida) was contacted for information on known or possible occurrences of special plants, animals or natural communities on-site or within five miles of the site. No occurrences are reported on the facility site. No special plants, terrestrial/palustrine natural communities or aquatic natural communities are known or expected to occur within five miles of the site (Data Request Reply, Jim Muller, Data Manager, Florida Natural Areas Inventory, 29 December 1983). The short-tailed snake (Stilosoma extenvatum), the American alligator (Alligator mississippiensis), and wading birds are probably found in the area; the gopher turtle (Gopherus polyphemus) may possibly be found as a remnant population.

A number of game and furbearing species (as specified in the Florida Administrative Code Rule 39-1) are most probably found on-site or immediately adjacent to the site. These include raccoon, skunk, pheasant, doves, gray squirrel and rabbits. Undoubtedly, some freshwater game fish and water fowl are found associated with the various lakes, bays, rivers and canals located within a five-mile radius of the site. However, it is not anticipated that the proposed facility will have any effect on these species.

Also of interest are the characteristics of the aquatic biota found in adjacent ditches which will receive stormwater runoff from the site. Sampling of benthic invertebrates in both ditches bordering the site, as

well as downstream stations (see Figure 2.23), was conducted on October 31, 1983. Aquatic vegetation was also observed and characterized at this time. Table 2.30 presents a listing of species and abundances of benthic organisms collected. The Shannon species diversity index ranged from a low of 0.244 at Station 4, to a high of 0.76 at Station 2. Because of the compacted nature of the substrate at Station 5, no organisms were collected.

At Station 2, a limited variety of insect larvae (midges, riffle beetles, mayflies and damsel flies) was found, as well as an immature (unidentified) mollusk species. At all stations where organisms were found, tubificids and/or lumbriculids were present. These organisms are adapted to burrowing in soft sediments and can thus withstand low dissolved oxygen levels. In stony, freer flowing ditches, lumbriculids tend to replace tubificids, since the latter are able to withstand the lowest oxygen levels. It is of note that at Station 4, which exhibited high turbidity levels and elevated concentrations of reduced nitrogen compounds (although not excessively lowered dissolved oxygen concentrations) only tubificids and lumbriculids were found.

Sediments at both Stations 3 and 4 were highly organic in nature. Only at Station 2 were any fish seen; small schools of the hardy mosquito fish, Gambusia affinis were observed.

Vegetation bordering the ditches is typical of the area. The ditch to the north of the site is heavily utilized by grazing cattle, resulting in erosion of the streambed, and allowing little vegetation to be established. At Station 1, the predominant vegetation was panic grass (Panicum spp.), pennywort (Hydrocotyle umbellata) and smartweed (Polygonum Hydropiperiodes). Soft rush (Juncus effusus) and flat sedge (Cyperus odoratus) were also observed.

At Station 2, growing on top of the banks and along the sideslopes, providing much shade, were numerous laurel oaks (Quercus laurifolia). Growing in the few inches of flowing water was widow's tears (Commelina spp.), a blue-green algae (Oscillatoria spp.) and primrose willow (Ludwigia peruviana).

TABLE 2.30
SPECIES LISTING AND ABUNDANCE OF
BENTHIC ORGANISMS COLLECTED IN
VICINITY ON SITE^(a)

Species	Station					TOTAL
	1	2	3	4	5	
Crustacea						
Amphipoda						
<u>Hyalolella azteca</u>	2					2
Aschelminths						
Nematoda						
<u>Actinolaimus</u> sp.			23			23
Annelida						
Oligochaeta						
<u>Lumbriculus inconstans</u>	5	9	16	6		36
<u>Tubifex</u> sp.	2			2		4
Mollusca (immature)		2				2
Insecta						
Diptera						
<u>Pentaneura monilis</u>		2	1			3
<u>Chironomus</u> sp.	8	2				10
Coleoptera						
<u>Stenelmis</u> sp.		10				10
Ephemeroptera						
<u>Caenis diminuta</u>		9				9
Odonata						
<u>Perithemis domitia</u>			1			1
TOTAL # ORGANISMS	17	34	41	8	0	100
Shannon Species Diversity Index	0.528	0.762	0.378	0.244	-	

(a) Single 0.0225 m² grab collected on October 31, 1983. Locations as shown on Figure 2.23.

About 0.6 miles downstream of Station 2 (e.g., Station 3) the predominant aquatic vegetation was lizard's tail (Saururus cernuus) and widow's tears. Along the shallow, mucky banks primrose willow was found. A few large laurel oaks in the vicinity provide much shade at this location.

At Station 4, approximately 0.7 miles downstream of Station 1, only sparsely rooted primrose willow was observed along the banks. As previously described, water quality is quite poor at this site and no aquatic vegetation was seen. Large laurel oaks were also found at this station.

No aquatic vegetation was noted at Station 5. Along the steep sideslopes of the ditch at this point vegetation consists predominantly of castor bean (Ricinus communis), primrose willow and dog fennel (Eupatorium capillifolium). Widow's tears and arrowhead (Sagittaria latifolia) are also present.

2.3.6.1 Species-Environmental Relationships

While the site and adjacent areas provide habitats for a variety of terrestrial and aquatic organisms, it is not anticipated that the proposed project will have any significant effects on area ecology. Terrestrial fauna on-site will move to land north of the site on which is found similar plant communities. Aquatic fauna in the ditches adjacent to the site will only be affected on a very limited basis by runoff from the site which exceeds storage capacity. Species which migrate through the area will also relocate to adjacent land parcels.

2.3.6.2 Pre-existing Stresses

The site is located in the central portion of a 5,800-acre area designated on the Horizon 2000 Land Use Plan Map for light industrial uses. A description of the industries located in the vicinity of the site is found in Section 2.2.3.2. Ecological conditions on-site do not indicate the occurrence of stress as a result of these industries' operations. The site

has been used as pasture land and its terrain altered, resulting in changes in the habitats originally found and the pattern of ecological succession which would naturally have occurred. No infestations, epidemics or catastrophes (caused by natural or man-induced phenomena) are known to have occurred which would have had a significant impact on regional biota.

An examination of the water quality of the two ditches bordering the site indicates that nutrient enrichment has occurred, probably as a result of fertilizers used in agricultural applications. High turbidity levels were also noted, probably indicative of some short-term construction operations upstream of the site.

2.3.6.3 Measurement Programs

A limited biological sampling program to examine benthic invertebrates in the two ditches adjacent to the site was conducted on October 31, 1983. At five Stations, as shown in Figure 2.23, single 0.0225 m² sediment grabs were taken using a petite ponar dredge. Samples were sieved through a No. 30 mesh screen and immediately placed on ice. Upon return to the laboratory, each sample was sorted and identified. The two taxonomic keys used primarily were:

- o Tennack, R.W. 1953. Freshwater Invertebrates of the United States. Ronald Press Co., N.Y.
- o U.S. EPA. 1973. An Introduction to the Identification of Chironomid Larvae. Analytical Quality Control Laboratory, Cincinnati, OH.

In addition, further correspondence and information related to ecology is presented in Appendix 10.11. That appendix includes the findings of the Hillsborough County Environmental Protection Commission relative to the occurrence of any jurisdictional wetlands on-site, as well as a comprehensive listing of wetland vegetation indicators as prescribed in Chapter 1-11.03(g) of the Rules of the Hillsborough County Environmental Protection Commission.

2.3.7 Meteorology and Ambient Air Quality

2.3.7.1 Meteorology

The proposed resource recovery facility is situated in Hillsborough County which is located along the west coast of south central Florida. The climate of this region is influenced by the surrounding waters as no part of Florida is more than 70 miles from salt water. Topography is slight, interior ranges are 100 to 200 feet above mean sea level. Summers are long, warm and relatively humid. Summer temperatures are about the same throughout the state. Winters are mild, punctuated by periods of cool to cold air. Temperatures in the northern part of the state average 13 degrees (F) cooler than the south. The winds are influenced by the easterlies, particularly in the south. Elsewhere land/sea breeze effects and convectional forces inland make prevailing winds erratic. Rainfall is distributed throughout the year with the four month period from June to September receiving slightly more rain. Precipitation is usually in the form of local showers and thundershowers. Occasionally tropical storms will produce substantial amounts of rain over large areas.

Regional Climatology. There are five meteorological stations within 50 km of the site. The stations at Tarpon Springs Sewage Plant and St. Petersburg are along the coast. The Plant City and Lakeland stations are inland. The station at Tampa International Airport is several kilometers inland near Old Tampa Bay. Climatic summaries for the five stations are in Tables 2.31 and 2.32. Of these stations Tampa is the closest to the proposed site (21 km to the west-northwest) and has both surface and upper air meteorological data. The recorded upper air data has been used as input to the air quality modeling analysis. (See Volume III - Air Quality).

A comparison of the climatological parameters listed for each site shows annual mean temperatures at Tampa are nearly identical to the more inland stations and fall between the values of the coastal stations. Summer maximum temperatures, which are highest during July and August, are fairly

TABLE 2

INTERNATIONAL AIRPORT

EASTERN

27° 58' N

82° 32' W

19 FT

1978

[illegible]

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 98 in June 1952+; lowest temperature 18 in December 1962; maximum monthly snowfall 0.1 in February 1889; fastest mile wind 84 in September 1935.

CITY HALL

EASTERN

81° 37' W

214 FT

1978

[illegible]

(b) 70° and above at Alaskan stations.
* Less than one half.
I Trace.

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

7 Through 1964. The station did not operate 24 hours daily. Fog and thunderstorm data may be incomplete.

\$ Through 1964.

TABLE 2.32
CLIMATOLOGICAL SUMMARIES FOR
PLANT CITY, TARPON SPRINGS, and ST. PETERSBURG

PLANT CITY, FL				1951 - 1974												28° 01' N												82° 08' W												121 FT											
MONTH	TEMPERATURE (° F)																PRECIPITATION TOTALS (INCHES)																																		
	MEANS			EXTREMES						MEAN NUMBER OF DAYS			MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET					MEAN NUMBER OF DAYS																											
	DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	90° AND ABOVE	17° AND BELOW	17° AND BELOW							9° AND BELOW	MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	10 or MORE	50 or MORE	1.00 or MORE																	
JAN	74.2	49.1	61.7	87	74	21	23+	71	21	0	0	2	0	2.55	6.39	64	3.82	64	12	.0							4	2	1																						
FEB	75.2	49.7	62.5	91	68	25	25	67	26	0	0	2	0	3.42	7.56	63	4.46	71	8	.0							5	2	1																						
MAR	79.5	54.2	66.9	91+	74	26	32+	68	24	1	0	0	0	4.07	15.68	60	4.91	60	16	.0							5	2	1																						
APR	84.6	58.8	71.7	99	68	22	36	71	8	5	0	0	0	2.29	7.13	57	3.55	51	7	.0							4	2	1																						
MAY	89.2	64.1	76.7	101	67	14	46+	71	5	16	0	0	0	3.68	10.14	57	3.86	70	29	.0							5	2	1																						
JUN	90.8	69.3	80.1	99	67	1	57+	55	3	22	0	0	0	7.40	17.08	68	4.57	68	4	.0							9	3	2																						
JULY	91.6	71.3	81.5	98+	69	8	61+	65	2	26	0	0	0	8.01	21.74	60	8.56	60	29	.0							12	3	2																						
AUG	91.8	71.7	81.8	98	61	1	63	73	22	26	0	0	0	8.76	17.48	59	9.31	59	3	.0							13	6	2																						
SEPT	90.3	70.3	80.5	98	63	1	57	56	27	21	0	0	0	6.69	15.12	60	5.01	60	10	.0							10	3	2																						
OCT	85.3	63.2	74.4	95+	68	8	40+	68	30	6	0	0	0	3.03	10.43	59	2.97	72	3	.0							5	2	1																						
NOV	79.5	54.9	67.2	92	72	4	21	70	25	0	0	0	0	2.12	7.88	59	4.53	63	10	.0							3	1	0																						
DEC	75.1	49.7	62.4	88+	72	9	18	62	13	0	0	2	0	2.25	6.14	69	3.13	61	19	.0							4	1	1																						
YEAR	84.0	60.3	72.3	101	MAY	67	14	18	DEC	62	13	123	0	6	54.27	21.74	JUL	8.56	60	29	.0	.0	.00	.0	.00	.0	79	33	13																						

ST. PETERSBURG, FL				1951 - 1974										27° 46' N				82° 38' W				8 FT						
MONTH	TEMPERATURE (°F)										PRECIPITATION TOTALS (INCHES)																	
	MEANS			EXTREMES				MEAN NUMBER OF DAYS			MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET				MEAN NUMBER OF DAYS							
	DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	90° AND ABOVE							17° AND BELOW	17° AND BELOW	0° AND BELOW	MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	10 or MORE	50 or MORE	1.00 or MORE
JAN	70.3	54.1	62.2	85	62	22	29	66	31	0	0	0	0	2.41	5.91	73	3.60	59	9	.0					4	2	1	
FEB	71.4	55.1	63.2	86+	61	21	32	55	13	0	0	0	0	3.35	6.26	63	4.10	58	26	.0					5	2	1	
MAR	75.6	59.5	67.6	88	61	6	39+	60	6	0	0	0	0	4.15	11.33	59	3.40	52	26	.0					5	3	2	
APR	81.3	65.0	73.2	91+	58	26	49+	71	8	0	0	0	0	2.58	8.45	51	5.05	51	7	.0					4	2	1	
MAY	86.6	70.2	78.4	96	56	25	56+	60	14	7	0	0	0	2.92	10.64	59	3.75	74	17	.0					4	2	1	
JUN	89.1	74.3	81.7	98	64	15	61	72	7	14	0	0	0	6.65	23.00	74	9.14	74	26	.0					8	4	2	
JULY	89.9	75.8	82.9	97+	73	7	66	54	4	20	0	0	0	8.43	16.46	60	6.72	60	29	.0					11	6	3	
AUG	89.9	75.8	82.9	97	70	4	66	57	24	19	0	0	0	8.94	17.93	67	5.30	59	20	.0					13	6	3	
SEPT	88.6	74.6	81.6	95+	72	17	62	56	27	13	0	0	0	7.70	16.60	59	5.40	66	13	.0					10	5	2	
OCT	83.3	68.5	75.9	96	54	5	47	57	28	2	0	0	0	3.35	14.12	52	3.39	58	31	.0					5	2	1	
NOV	76.7	60.7	68.7	89	72	5	35+	70	24	0	0	0	0	2.26	6.85	53	4.40	63	10	.0					3	2	1	
DEC	71.5	55.3	63.4	84+	72	10	22	62	13	0	0	0	0	2.91	6.77	73	3.30	69	10	.0					4	2	1	
YEAR	81.2	65.7	73.5	98	64	JUN 15	22	DEC 13	75	0	0	0	0	55.25	23.00	JUN 74	9.14	JUN 74	26	.0	.0	.00	.0	.00	.0	76	38	19

TARPON SPGS SEWAGE PL, FL										1951 - 1974										28° 09' N										82° 45' W										8 FT									
MONTH	TEMPERATURE (°F)															PRECIPITATION TOTALS (INCHES)																																	
	MEANS			EXTREMES						MEAN NUMBER OF DAYS						MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET					MEAN NUMBER OF DAYS																						
	DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MAX.			MIN.									MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	10 or MORE	50 or MORE	100 or MORE																			
										90° AND ABOVE	32° AND BELOW	32° AND BELOW	32° AND BELOW	0° AND BELOW	0° AND BELOW																																		
JAN	69.8	49.4	59.6	84	64	28	24	66	31	0	0	2	0	2.43	6.17	58	2.30	58	22	.0							5	2	1																				
FEB	70.8	50.6	60.7	89+	61	19	28+	67	26	0	0	1	0	3.42	7.36	71	6.26	71	8	.0							5	2	1																				
MAR	75.1	55.2	65.2	92	61	19	34+	60	6	0	0	0	0	4.31	13.72	60	6.20	60	17	.0							6	2	1																				
APR	80.3	60.8	70.6	91+	70	30	40+	71	8	0	0	0	0	2.34	6.31	53	3.11	53	13	.0							3	2	1																				
MAY	85.5	66.3	76.1	96	53	28	49	70	6	4	0	0	0	2.60	7.70	69	4.08	69	17	.0							4	2	1																				
JUN	88.7	71.3	80.0	96	69	27	60+	72	2	12	0	0	0	5.47	18.29	74	5.40	74	25	.0							7	3	2																				
JULY	90.0	73.0	81.5	97	60	23	64	70	1	19	0	0	0	6.25	20.76	60	8.70	60	29	.0							11	3	2																				
AUG	90.0	73.1	81.6	98	57	2	64	74	4	20	0	0	0	8.68	18.92	69	4.59	69	11	.0							12	6	3																				
SEPT	89.1	71.6	80.4	96+	61	3	60+	67	29	16	0	0	0	7.16	15.54	71	5.96	71	10	.0							9	4	2																				
OCT	83.6	64.4	74.0	94	60	18	43+	57	28	3	0	0	0	2.43	6.88	68	4.24	68	19	.0							4	2	1																				
NOV	76.4	55.8	66.1	90	71	1	28	70	25	0	0	0	0	2.18	5.80	63	3.56	59	10	.0							4	1	0																				
DEC	71.4	50.3	60.8	85+	72	13	19+	62	14	0	0	1	0	2.97	7.79	69	3.25	69	10	.0							4	2	1																				
YEAR	80.9	61.8	71.4	98	AUG	5	2	19+	62	14	74	0	4	0	52.24	20.76	60	6.70	60	29	.0	.0	.00	.0	.00	.0	74	33	16																				

similar between the stations. Only 2 degrees Fahrenheit separates the August maximum temperature at the highest inland station from the lowest coastal station. Tampa's summer temperatures fall in between the relatively cooler coastal values and the warmer inland values. Winter temperatures are lowest during December and January and are more variable across the region. The summer record extremes are nearly identical for each of the stations. Winter record temperatures are again more variable with coastal stations slightly warmer. Tampa is among the cooler stations.

Rainfall totals are typically variable as precipitation is usually in the form of local showers and thundershowers. Coastal stations received slightly more rain (52 to 55 inches) but Plant City also received a substantial rainfall of 54.27 inches. Tampa rates comparatively dry with 49.38 inches. During July 1960, maximum monthly rainfall amounts reached record levels. Tampa received a monthly record amount of 20.59 inches.

Information on wind speed and direction is only available for Tampa and Lakeland. A comparison of annual and monthly mean wind speeds show Tampa consistently higher by about 2 mph. Prevailing wind directions have a strong easterly component throughout much of the year and a northerly component during the winter months.

On the basis of this climatological comparison, Tampa International Airport appears to be representative of the bay area. It compares favorably to other inland stations but also is influenced by the bay in a manner more typical of coastal stations. Tampa compares favorably to Plant City which is the next closest station to the proposed site.

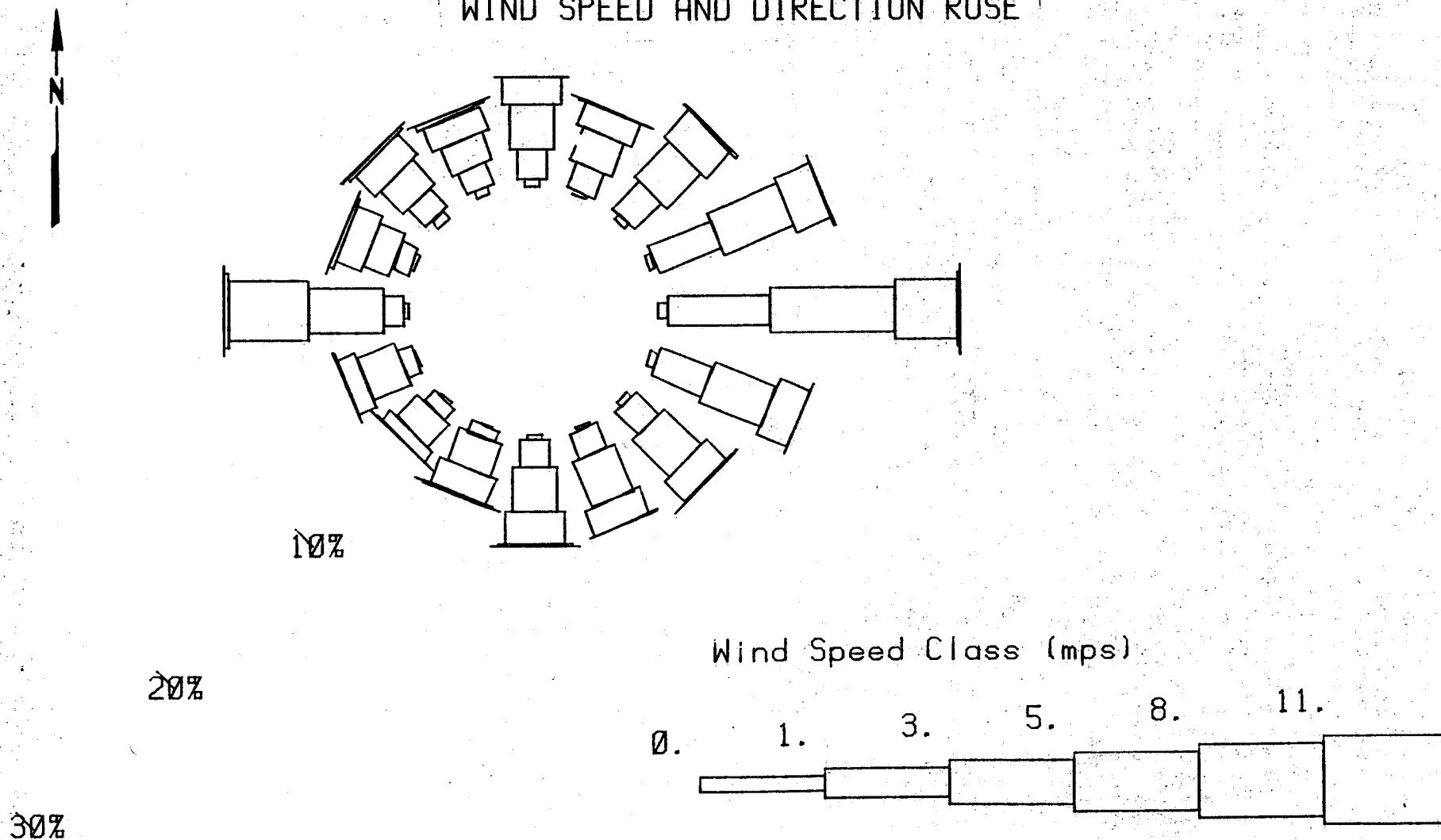
Atmospheric Dispersion. Atmospheric factors which aggravate pollution do not often occur at any one place anywhere in Florida. Air is usually sufficiently unstable to disperse pollutants as demonstrated by the frequent convective development. The easterlies sweep across the peninsula, particularly in the south. Five years of sequential meteorological data were used as input to the air quality model used in the analysis presented in Appendix 10.1.5 "Prevention of Significant Deterioration" (see Volume

III-Air Quality). The parameters which describe the dispersion characteristics are wind speed, wind direction, atmospheric stability, and mixing heights.

Wind speed data for five years has been organized into six wind speed categories, distributed over the 16 wind direction sectors, and displayed in a wind rose plot showing average, seasonal, and diurnal variations. The frequency of occurrence of a particular wind speed class in a particular wind direction as plotted on the wind rose is proportional to the size of the telescope segment. The prevailing wind direction as displayed in Figure 2.25 is from the east. Wind speeds of 1 to 5 meters per second (mps) occur most frequently from this direction. Other wind direction maxima are the east-northeast and the west. Wind speeds in the 5 to 8 mps class most frequently come from the west. Figure 2.26 shows the location of the site and prevailing wind direction relative to surrounding communities. Seasonal wind patterns are displayed in Figure 2.27. Spring and summer seasons are strongly influenced by winds from the east and west, with lighter winds more likely from the east and stronger winds more likely from the west. During the summer, winds are more likely to come from the southeastern quadrant than any other quadrant. During the fall and winter seasons, westerly winds diminish significantly. Winds from the northeastern quadrant dominate in the fall. The distribution of wind speeds in the winter is more uniform but a strong easterly component in the wind direction is apparent.

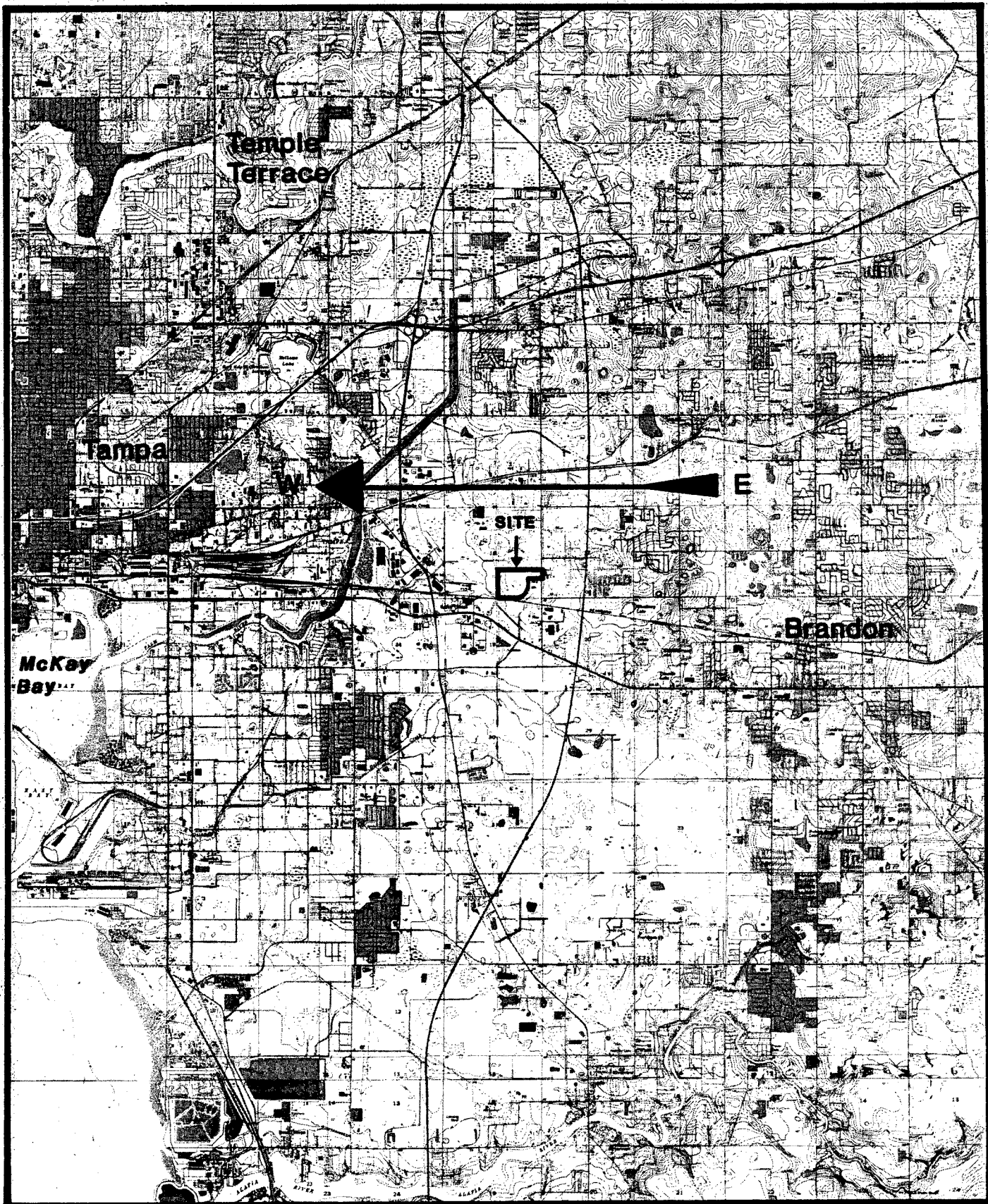
Diurnal wind direction roses are presented in Exhibit B of Appendix 10.1.5. In the combined diurnal wind direction distribution, the west direction as well as the south-southwest through west-southwest directions show a diurnal pattern which shows a maximum frequency of occurrence during the early afternoon and a minimum during the early morning hours. The sectors to the south-southwest to west-southwest are due to Old Tampa Bay located near the airport. The western sector shows the influence of the Gulf of Mexico even though the airport is several kilometers inland. Since the magnitude of the western sector is much larger than the southwestern sectors, the Gulf influence has a greater effect than the Bay area on the regional wind pattern even though the Bay is much closer.

WIND SPEED AND DIRECTION ROSE



HILLSBOROUGH COUNTY
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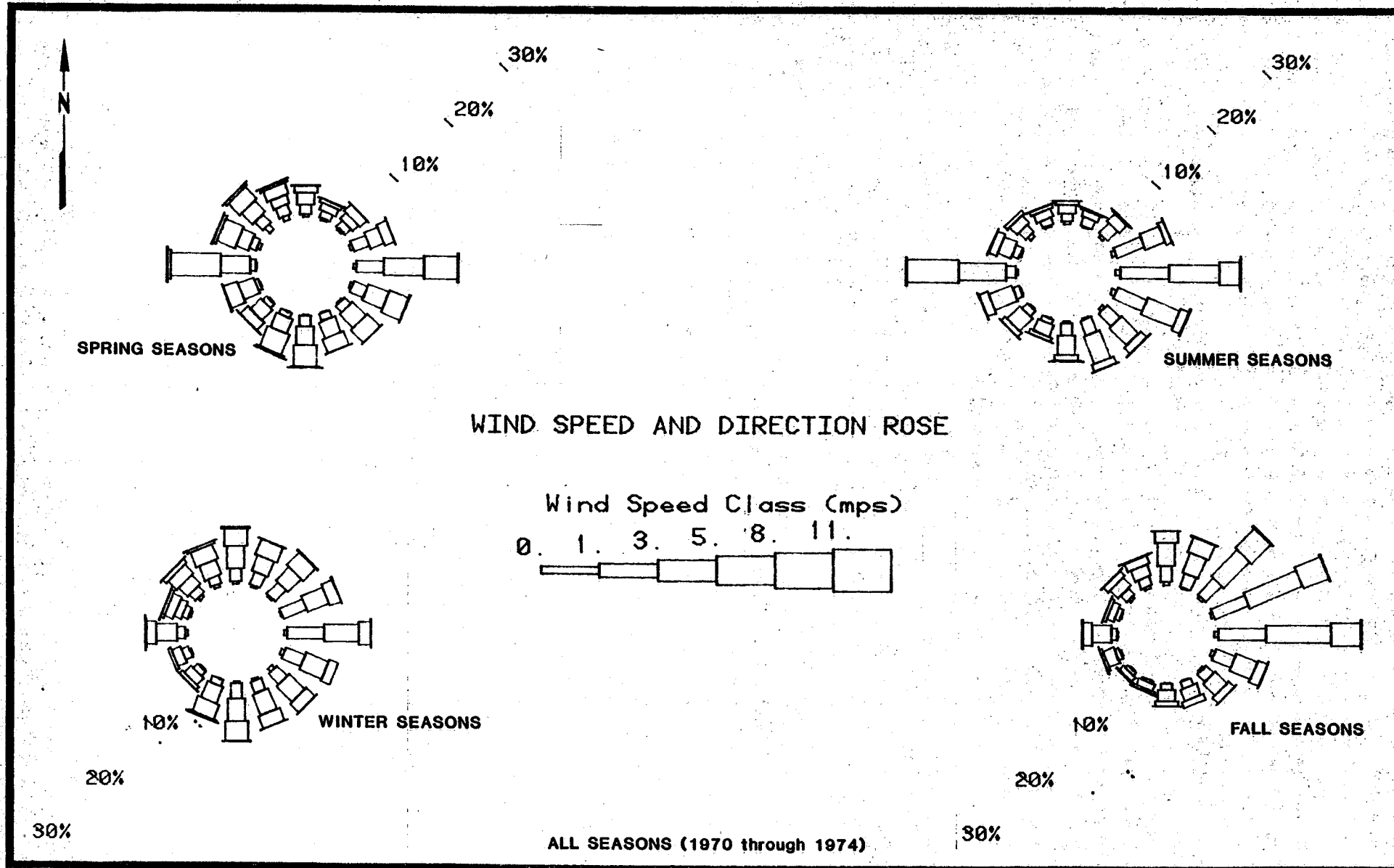
FIGURE 2.25
ANNUAL WIND ROSE (1970-1974)



HILLSBOROUGH COUNTY
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FIGURE 2.26
AREA MAP WITH PREVAILING
WIND DIRECTION (1970-1974)

1 0 1 2 MILES



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 2.27
ANNUAL WIND ROSE

The spring and summer diurnal wind roses show not only the land/sea breeze effects as seen on a daily basis but also shows seasonal variation as the westerly direction exceeds 30 percent during the summer. The fairly strong east-southeast to south sectors show the movement of warmer air northward across the state.

Virtually no land/sea breeze pattern is evident during the fall and winter. The fall is strongly influenced by winds coming from the northeast, as cool air begins to move southward. During the winter, again no clear diurnal pattern is evident but an easterly component to the general seasonal pattern is shown.

The wind speeds and directions for the 5 years of meteorological data are stratified by the stability classes A through F in Exhibit B of Appendix 10.1.5 where Class A stability is unstable and Class F is stable. Classes A and B represent the most unstable stability categories. Each of these cases only occur about 5 percent of the time in that their very nature promotes mixing which in turn promotes a more stable atmosphere. Class A stability occurs during the day when skies are clear and the incoming solar radiation is strong, conditions which are more likely found during the summer. Tampa meteorological data show that Class A stability is strongly associated with light easterly winds. Class B stability occurs during the day when the incoming solar radiation is moderate, conditions typical of partly cloudy days or during the fall when sunlight is less direct. Class B conditions are more frequently associated with moderate westerly winds. During the day when the cloud cover is more complete or the incoming solar radiation is slight, Class C, slightly unstable conditions occur. Winds associated with this case are most likely moderate to strong westerly winds. Neutral stability Class D occurs during overcast conditions day or night or when wind speeds are strong and is the stability category most likely to occur. These conditions are most frequently associated with easterly and westerly winds. Classes E and F represent the slightly stable and stable conditions. These conditions occur at night when the sky is partly cloudy or clear. The slightly unstable case is associated with moderate easterly winds. The stable case is associated with light easterly winds.

Mixing height is the height above the surface through which vigorous vertical mixing occurs. Although the mixing height varies throughout the day the morning and afternoon values presented in Table 2.33 represent the average minimum and maximum heights, respectively. Certain atmospheric conditions make the calculation of mixing height difficult, these include periods of marked cold air advection, significant precipitation, and missing wind speed or temperature data. These periods were not included in the calculation of the average mixing heights presented.

Tampa International Airport meteorological data is representative of conditions found in the Bay area. Climatological data show Tampa to compare very favorably with Plant City, the next closest meteorological station to the proposed site. Good agreement is also seen between the coastal stations at St. Petersburg and Tarpon Springs as well as the inland station at Lakeland. The Tampa meteorological data for the years 1970 to 1974 is therefore representative of the area within 50 km of the proposed site for air quality modeling purposes. The parameters which characterize atmospheric dispersion are well defined for the Tampa area. Local wind patterns associated with the land/bay interactions as well as the larger land/gulf and prevailing easterlies patterns. Thus, one year of onsite meteorological monitoring would not provide any additional information which is not already well defined by the five years of Tampa International Airport data.

2.3.7.2 Ambient Air Quality

Pollutants subject to New Source Review (NSR), and emitted at "significant levels" are subject to ambient air quality monitoring (17-2.500(5)(f)F.A.C.), in order to define background concentrations. These ambient levels are then used as a basis for establishing whether the proposed emissions contribute to the violation of ambient air quality standards. The pollutants subject to this monitoring provision are the criteria pollutants for which ambient standards have been set by the Florida DER and other non-criteria pollutants subject to Prevention of Significant Deterioration (PSD) review. The significant emission levels and proposed emission levels for these pollutants are listed in Table 2.34.

TABLE 2.33
HOLTZWORTH MIXING HEIGHTS FOR THE TAMPA AREA

<u>Period</u>	<u>Morning</u> (m)	<u>Afternoon</u> (m)
Annual	493	1359
Spring	503	1523
Summer	656	1460
Fall	419	1401
Winter	394	1052

SOURCE: Holtzworth, GC; Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States; USEPA AP-101; January 1972.

TABLE 2.34

SIGNIFICANT EMISSION RATES AND FACILITY POTENTIAL TO EMIT
VALUES FOR PSD REGULATED POLLUTANTS

Pollutants	Significant ^a Emission Rates (tons/year)	Potential ^b to Emit (tons/year)
Particulate matter	25	141
Carbon monoxide	100	526
Nitrogen oxides	40	876
Sulfur dioxide	40	730
Ozone (VOCs)	40	58
Lead	0.6	14
Asbestos	0.007	--
Beryllium	0.0004	3.83×10^{-3}
Mercury	0.1	1.52
Vinyl chloride	1.0	--
Fluorides	3	1.75
Sulfuric acid mist	7	22.4
Total reduced sulfur (including H ₂ S)	10	--
Reduced sulfur (including H ₂ S)	10	--
Hydrogen sulfide	10	--
Hydrogen chloride	--	--

SOURCE:

^aChapter 17.2 Part V Table 500.2^bEmission estimates at 100 percent system capacity for Baseline Control
Alternative - ESP 0.025 gr/dscf @ 12 percent CO₂.

Total Suspended Particulates (TSP) and Ozone (O_3) is not subject to monitoring since the source is located in a non-attainment area for these pollutants and therefore is not subject to an NSR under the PSD provisions. The emission rates for TSP and O_3 will be controlled by the adoption of Lowest Achievable Emission Rate (LAER). Pollutants emitted in negligible or less than significant amounts are non-methane hydrocarbons, asbestos, reduced and total reduced sulfur, and vinyl chloride.

Sources may be exempt from air quality monitoring if the impact of a given pollutant falls below the de minimus concentration (17-2.500(3)(e)F.A.C.). A screening analysis was done to identify those conditions and pollutants subject to additional review. This analysis showed a less than de minimus concentration for CO and a potential for significant impact for SO_2 . Lead and fluorides were not a part of the screening analysis. NO_x was not evaluated either because it is evaluated on an annually averaged basis and no scaling factor has been adopted to relate one-hour concentrations to annual concentrations. Subsequently, a refined analysis was done using sequential meteorological data. From this analysis the maximum second high concentrations were compared to the appropriate de minimus concentration level (Table 2.35). Less than de minimus levels were found for NO_x . SO_2 , Pb, and HF have emissions and impacts sufficient to establish a background level to which source impacts must be added to evaluate the air quality in the significant impact area relative to the ambient air quality standards.

The baseline date for SO_2 was established in December 1977 when the TECO Big Bend Power Plant established baseline concentrations for SO_2 .

Florida DER requires that the air quality analysis for this project includes the use of current ambient monitoring data to establish background levels. This approach leads to overestimating the combined air quality impact in that sources established after December 1977 would not only be included in the modeling but also contribute to the existing background.

The Hillsborough County Environmental Protection Commission currently has ambient air monitors within 12 km of the site for all criteria pollutants (Table 2.36). Three SO_2 monitors are within 10 km of the site and lie

TABLE 2.35
De MINIMUS MONITORING GUIDELINE

<u>Pollutant</u>	<u>Averaging Time</u>	<u>Highest 2nd Highest Concentration (ug/m³)</u>	<u>De Minimus Monitoring Guideline (ug/m³)</u>
Total Suspended Particulates	24-hour	3.26	10
Sulfur Dioxide	24-hour	16.9**	13
Carbon Monoxide	8-hour	16.3	575
Nitrogen Oxides	Annual*	1.04	14
Lead	24-hour	0.32**	0.1
Mercury	24-hour	0.035	0.25
Beryllium	24-hour	8.8×10^{-5}	5.0×10^{-4}
Fluorides	24-hour	0.405**	0.25
Vinyl Chloride	24-hour	Negligible	15
Total Reduced Sulfur	1-hour	"	10
Reduced Sulfur Compounds	1-hour	"	10
Hydrogen Sulfide	1-hour	"	0.04

*The annual concentration is based on the highest annually average concentration.
 **Concentration exceeds the de minimus monitoring guideline.

TABLE 2.36

AMBIENT AIR MONITORING DATA FOR HILLSBOROUGH COUNTY

SITE State	ID CO.	SITE NAME	TOTAL SUSPENDED PARTICULATES ($\mu\text{g}/\text{m}^3$)					
			Annual (GM)		24-Hour			
			1982	1983	1982		1983	
					High	2nd High	High	2nd High
1800 082	82	Orient Road	53	54	149	126	132	115
			54	53	166	117	138	115
4360 024	86	311 S. 22nd St.	53	55	133	91	92	83
0370 001	7	Brandon (Rainbow Tr.)	31	--	98	65	--	--
0370 002	7	Brandon	--	33	--	--	86	86
1800 083	93	Highway 41	38	43	96	85	174	113
4360 051	115	Hooker's Point (Lehman)	56	--	169	135	--	--
4360 062	115	Hooker's Point (Maritime)	--	58	--	--	141	90
4360 002	1	Health Dept.	53	56	116	104	90	85
4360 035	63	Davis Island	52	54	110	96	91	78
4360 060	122	Seminole H&E School	45	52	74	63	81	78
4440 001	5	Temple Terrace	35	48	361	151	232	196

TABLE 2.36 (CONT'D)

AMBIENT AIR MONITORING DATA FOR HILLSBOROUGH COUNTY

SITE State	ID CO.	SITE NAME	SULFUR DIOXIDE (ug/m ³)									
			Annual		24-Hour				3-Hour			
			1982	1983	1982		1983		1982		1983	
					1	2	1	2	1	2	1	2
0870 001	7	Brandon	6	3	37	24	10	8	--	--	--	--
1800 083	93	Highway 41	8	8	52	31	76	31			--	--
			9	8	55	39	76	31			--	--
4360 052	120	HCEPC (5135) (170)	21		116	105			545	461		
			25	16	60	38	108	86	147	144	527	493
4360 051	115	Hooker's Point (Lehman)	24	--	117	97	--	--	452	327	--	--
4360 021	81	906 Jackson Street	24	--	113	113	--	--	517	453	--	--
4360 035	63	Davis Island	25	21	103	88	85	77	376	334	327	291
			NITROGEN OXIDES									
			Annual									
			1982	1983								
0370 001	7	Brandon	22	23								
4360 052	120	HCEPC	40	35								
4360 051	115	Hooker's Point (Lehman)	30	--								
4360 055	119	Beach Park	25	29								

TABLE 2.36 (CONT'D)

AMBIENT AIR MONITORING DATA FOR HILLSBOROUGH COUNTY

SITE State	ID CO.	SITE NAME	OZONE (ppm)					
			1-Hour				Exceedences	
			1982		1983		High	2nd High
			High	2nd High	High	2nd High	High	2nd High
4360 035	63	Davis Island	.102	.095	.145	.143	0	3
4360 055	119	Beach Park	.115	.110	.128	.118	0	1
			CARBON MONOXIDE (mg/m ³)					
			1-Hour				8-Hour	
			1982		1983		1982	
							1983	
			High	2nd High	High	2nd High	High	2nd High
4360 052	120	NCEPC	11	10	12	11	6	5
4360 035	63	Davis Island	7	4	7	7	3	3
4360 056	121	Hillsborough Building	14	11	12	11	7	7
4360 060	122	Seminole High School	11	11	13	10	9	6
			LEAD (ug/m ³)					
			Calendar Quarter					
			1982			1983		
1800 082	82	Orient Road	0.3			0.8		
4360 051	115	Hooker's Point (Lehman)	0.2			-		
4360 062	115	Hooker's Point (Maritime)	-			0.6		
4360 002	1	Health Department	0.4			0.4		
4360 035	63	Davis Island	0.2			0.3		
4360 060	122	Seminole Heights School	1.1			1.1		

within or very near the impact area for SO_2 . Two of these sites, Brandon and Highway 41, have bubblers which sample for 24 hours every sixth day. The monitor at the HCEPC office is a continuous monitor and concentrations are at least equal to or greater than those that would be expected at the proposed site. These monitors are sufficient to establish the baseline concentration within the significant impact area for SO_2 and establish whether the proposed emissions would violate any ambient air quality standards.

A discrepancy in reporting the de minimus monitoring guidelines for lead has resulted in the EPA's adopting a 3 month averaging period, to be consistent with the air quality standard, as opposed to the 24-hour averaging period adopted by Florida for the same pollutant concentration. If the monitoring guideline was based on the 3-month averaging period, the proposed impact would be 0.031 ug/m^3 , one third of the de minimus guideline. HCEPC monitors for lead at the Orient Road site. This monitor is one third of the distance from the site than the SO_2 monitor and should also be considered representative of the site.

There are no major fluoride sources in the vicinity of the proposed facility. HCEPC does monitor for fluorides in grass samples, but has not established ambient air concentrations. It is assumed that background levels are low.

Adequate monitoring data exists for the Hillsborough County area. For the pollutants which exceed Florida de minimis monitoring guidelines, ambient concentrations monitored by HCEPC near the proposed site are at least as high as those expected at the site, or in the case of fluorides, background levels are presumed small. Thus, onsite independent air quality monitoring would yield little, if any additional useful ambient air quality data.

2.3.7.3 Measurement Programs

Among other activities, the HCEPC is responsible for monitoring air quality data within the County. HCEPC runs 65 monitoring stations and receives information from other private monitors totaling an air quality network of

83 stations, many of which monitor for more than one pollutant. A complete set of Standard Operating Procedures which provides all aspects of the monitoring activities including installation, calibration, collection, and validation is available from HCEPC. A quality assurance program which governs the network operation is contained in HCEPC's "Air Monitoring Quality Assurance Plan" and published in Environmental Quality the agency's environmental analysis book for Hillsborough County. This plan is summarized below.

Sampler location is determined by the monitoring objectives and siting criteria contained in 40 CFR 58 Appendix D "Network Design for State and Local Air Monitoring Stations." Continuous samplers run 24 hours a day. Manual samplers are run for 24 hours every sixth day. Missing values are carefully documented and makeup days may be required in manual networks to ensure reporting requirements are met. The measurement method for each pollutant is listed in Table 2.37. Each sampler is calibrated on a regular basis. Calibration standards are referenced to the National Bureau of Standards - Standard Reference Materials (NBS-SRM). Calibrations are done at least once a quarter to test the instrument over its full operating range. Final unadjusted calibrations are done prior to maintenance, before instrument shutdown, when biweekly span checks exceed +15 percent error, and after an air quality exceedance. Confidence limits of precision and accuracy are assigned to all measurements with Federally approved reference of equivalent methods/monitors. HCEPC participates in EPA's national performance audit program. EPA's audit covers facilities, equipment, procedures, documentation, and personnel.

2.3.8 Noise

A complete technical analysis of baseline ambient noise conditions was completed for this application and is contained in its entirety in Appendix 10.12. This study includes detailed methodologies which were utilized in order to estimate operational impacts associated with the facility. Appendix 10.12 also includes the correspondence relative to this issue.

TABLE 2.37
AIR POLLUTION MEASUREMENT METHODS

<u>Parameter</u>	<u>Method or Reference</u>
Carbon Monoxide	Title 40 Code of Federal Regulations (40 CFR), Part 50, Appendix C Beckman Model 866; EPA No. RFCA-0876-12
Dust (Microscopy)	EPC - Nikon Polarization Microscope
Dustfall	Journal of Air Pollution Control Association July 66, Vol. 16, No. 7
Nitrogen Dioxide:	
Bubbler	EPA No. EON-1277-026 page 62971 Federal Registry Vol. 42
Continuous	40 CFR, Part 50, Appendix F 1. Monitor Labs Model 8440; EPA No. RFNA-0677-021 2. Bendix Model 8101-B Analyzer
Ozone	40 CFR, Part 50 Appendix D 1. Bendix Model 30002; EPA No. RFOA-0176-007 2. Dasibi Model 1003 AH; EPA No. EQOA-0577-019
Sulfur Dioxide:	
Bubbler	40 CFR, Part 50, Appendix A
Continuous	1. Thermo Electron Model 43; EPA No. QSA-0276-009 2. Philips Model PW9755; EPA No. EQSA-0676-010
Suspended Particulate:	
Total	40 CFR, Part 50, Appendix B
Sulfates	EPC - Turbidimetric Method
Lead	40 CFR, Part 50, Appendix G

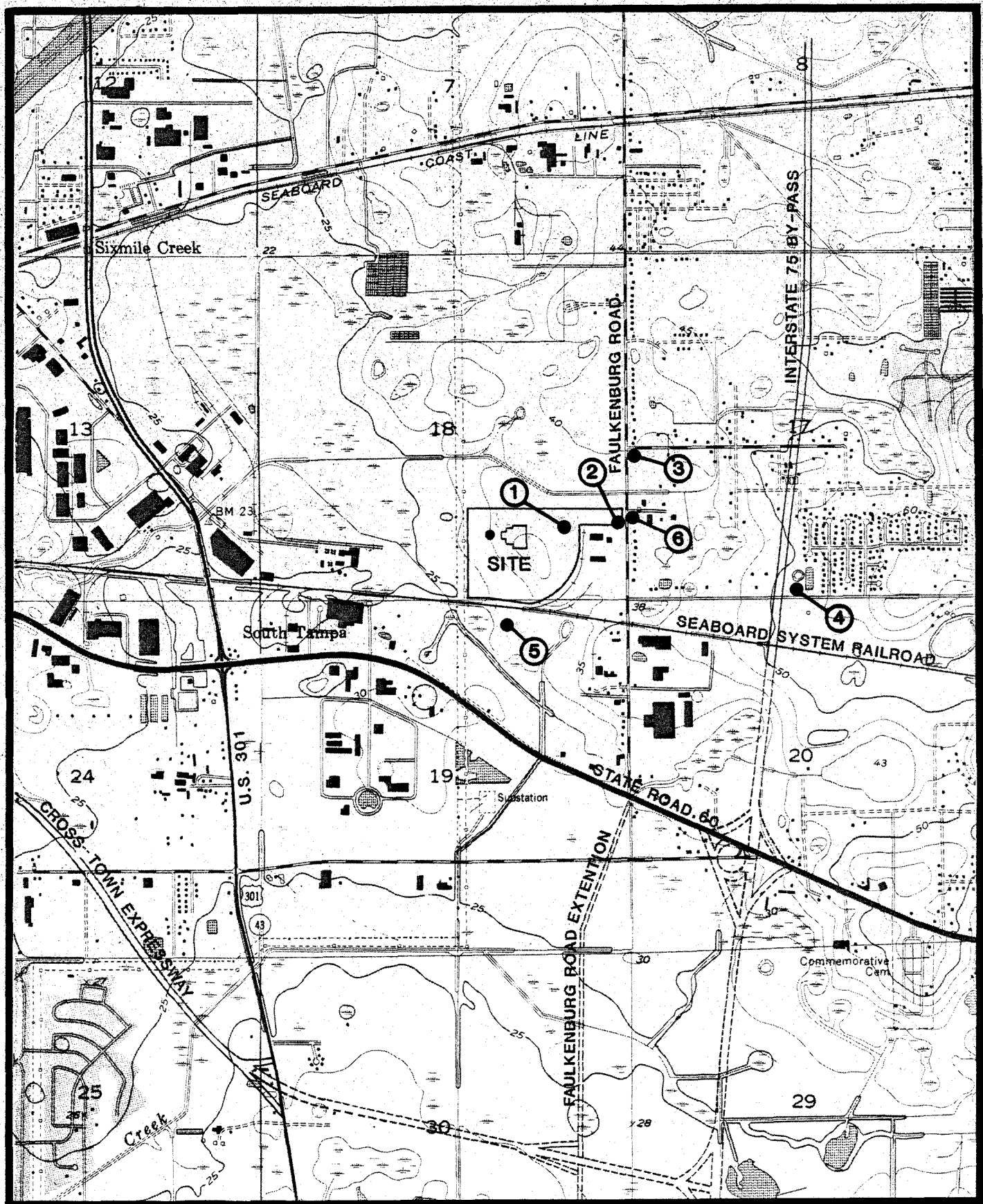
Source: Hillsborough County Environmental Protection Commission;
Environmental Quality; 1981.

Raw data results of 24-hour continuous monitoring performed by the Hillsborough County EPC is presented in Appendix 10.12, as are the results of monitoring completed using a hand-held sound pressure level meter. These measurements were made at predetermined locations that were coordinated with the Florida DER and Hillsborough County EPC.

Existing ambient sound levels were measured at six different locations in the site vicinity in order to establish baseline conditions during day and night-time periods. These baseline conditions monitoring sites are shown as circled numbers on Figure 2.28. Site 1 was selected to collect existing ambient noise levels at the boundary of that portion of the site where development would occur. Site 2 is near the closest residence while remaining on site property. Site 3 is in the vicinity of the closest main residential area to the site and Faulkenburg Road. Monitoring site 4 is within the closest established neighborhood and is in an area zoned R-1 (single family residential). Site 5 is in the Interstate Park of Commerce, on land which is currently undeveloped but which is planned for development (warehousing/light industry). Site 6 was selected because it is at the closest residence to the proposed facility site and site access road.

The noise levels recorded at each of the six sites are presented in Table 2.38. These levels are in decibels (dB). The higher the decibel level, the louder the sound. A change of ten times the energy level of the sound is represented as a 10-dB change in the sound level scale.

The Hillsborough County EPC has criteria for ambient noise levels based on the receiving land use and time of day. Residential, public space and open space areas are assigned the most stringent sound level limits followed by commercial or business areas and manufacturing or industrial areas. Monitoring sites 1 and 5 are within manufacturing/industrial areas, therefore, the sound level limits at these sites are higher than at the other four sites. All other monitoring sites fit the residential, public space and open space category for sound level limits. Limits for this category as shown in Table 2.38 are lower than the limits for manufacturing/industrial areas. A comparison of the measured sound level limits



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FIGURE 2.28
NOISE MONITORING SITE LOCATIONS

1000 0 1000 2000 3000 FEET

TABLE 2.38
NOISE BASELINE DATA SUMMARY
2-3 NOVEMBER 1983

Site	Time	Measured (Leq)	Hillsborough County Noise Criteria Sound Level Limit (Leq)
1 (CDM)	8:00 AM	56	75
	6:00 PM	53	75
	10:00 PM	49	75
2 (CDM)	8:00 AM	60	60
	6:00 PM	56	60
	10:00 PM	56	55
3 (CDM)	8:00 AM	66 ^a	60
	6:00 PM	66 ^a	60
	10:00 PM	50	55
4 (CDM)	8:00 AM	52	60
	6:00 PM	55	60
	10:00 PM	49	55
5 (CDM)	8:00 AM	59	75
	6:00 PM	51	75
	10:00 PM	44	75
6 (HCEPC) ^c	8:00 AM	63 ^{a,b}	60
	6:00 PM	61 ^{a,b}	60
	10:00 PM	55 ^b	55

^aCurrently exceeds Hillsborough County EPC noise criteria.

^b1-hour Leq.

^cHillsborough County Environmental Protection Commission.

SOURCE: HCEPC (1983a), CDM.

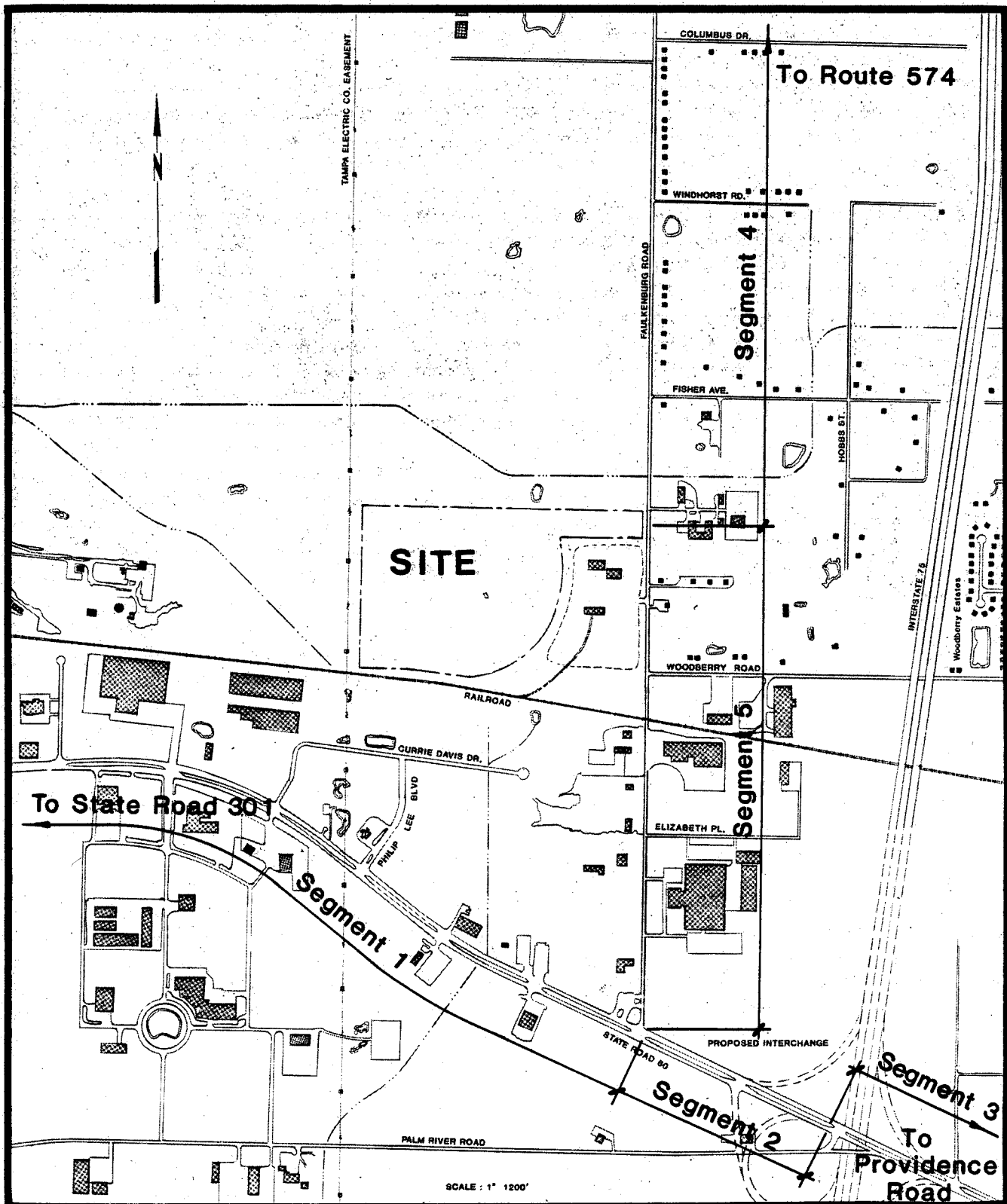
with the County sound level limits shows that limits are currently exceeded at monitoring sites 3 and 6, both categorized as residential, public space, or open space land uses.

2.3.9 Other Environmental Features

Baseline conditions concerning the existing transportation situation near the site are described below and in Appendix 10.13 "Transportation Analysis."

Existing Traffic Conditions. For the purpose of discussion and analysis, the proposed project impact area was divided into five (5) segments as shown on Figure 2.29. This section addresses the existing traffic conditions and roadway features in these segments.

- o Segment One - This segment includes that portion of State Road (SR) 60 from its intersection with SR 301 to the intersection of Faulkenburg Road. The present average daily traffic (ADT) volume of this roadway segment is 44,540 vehicles per day (vpd) as reported on the Traffic Count Map prepared by Hillsborough County. SR 60 is a major east-west roadway servicing this area. Through this section it is a four-lane divided roadway with medium openings and turning lanes at most intersections. Lateral restrictions are minimal and no roadway parking is permitted. While there are no breakdown lanes, there is sufficient room for a disabled vehicle to pull off the travelway. The speed limit along SR 60 is posted at 55 mph.
- o Segment Two - This segment includes that portion of SR 60 from its intersection with Faulkenburg Road to that area where the future interchange with Interstate 75 is planned. The present ADT for this segment is 48,900 vpd. The physical features of SR 60 in this segment are the same as described for Segment One.
- o Segment Three - This segment includes that portion of SR 60 from the area of the future interchange with Interstate 75 to the intersection with Providence Road (approximately three-quarters of a



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**FIGURE 2.29
ROADWAY SEGMENTS
FOR TRANSPORTATION ANALYSIS.**

mile east of the interchange). The present ADT is similar to Segment Two (48,900 vpd) and the roadway's physical features are the same as described for Segment One.

- o Segment Four - This segment includes that portion of Faulkenburg Road from its future intersection with the proposed site entrance north to the intersection with US Route 574. Recent traffic count data from the Hillsborough County Traffic Engineering Department show that the present estimated ADT is 6,060 vpd. Faulkenburg Road is a two-lane roadway with a full 12-foot travel lane in each direction. There are some lateral obstructions within six feet of the pavement surface, e.g., mailboxes, fence posts, ditches, shrubs, and telephone poles. There is room, however, for a disabled vehicle to maneuver off of the travelway along most of the roadway. There are no turning lanes along this segment of roadway. The speed limit along Faulkenburg Road is posted at 45 mph.
- o Segment Five - This segment includes that portion of Faulkenburg Road from its future intersection with the proposed site entrance south to the intersection with SR 60. The present ADT from the Traffic Count Map is 5,090 vpd. The physical features of this portion of Faulkenburg Road are similar to those described for Segment Four. An at grade railroad crossing located about one-quarter of a mile south of the proposed site entrance significantly disrupts the carrying capacity of the roadway for short periods of time.
- o Critical Intersection - The intersection which has the greatest potential for impact by this project is the intersection of SR 60 and Faulkenburg Road.

The effects on these road segments from the proposed resource recovery project are described in Section 5.9 and Appendix 10.13.

GENERAL SITE DEVELOPMENT PLAN

This map pocket contains a copy of the General Site Development Plan certified by the Hillsborough County Board of County Commissioners. Figure 2.5 is a reduced copy of the same development plan.

The notes on the General Site Development Plan refer to the Community Unit District Rezoning Application. A copy of that application is included in the Compliance Document.

The conditions that have been put on the rezoning approval are presented in Appendix 10.2.4 (Volume II-Appendices) of this document.

PROJECT MANAGER
PROJECT ENGINEER
PLUMBING
HVAC
INSTRUMENTATION
ELECTRICAL
STRUCTURAL
ARCHITECTURAL

Date:
Approved by:
Date:
Approved by:
Date:
Approved by:
Date:
Approved by:
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Approved by:
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Approved by:
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Approved by:
Date:
Approved by:
Date:
Approved by:

COOLING TOWERS
(15' HEIGHT)

200'
EASEMENT FOR
"TAMPA ELECTRIC CO."

20' EASEMENT
FOR
HOUSTON TEXAS
GAS & OIL CORP.

TECO TRANSMISSION LINES
TO SUBSTATION
OVERHEAD LINES TO
TECO EASEMENT

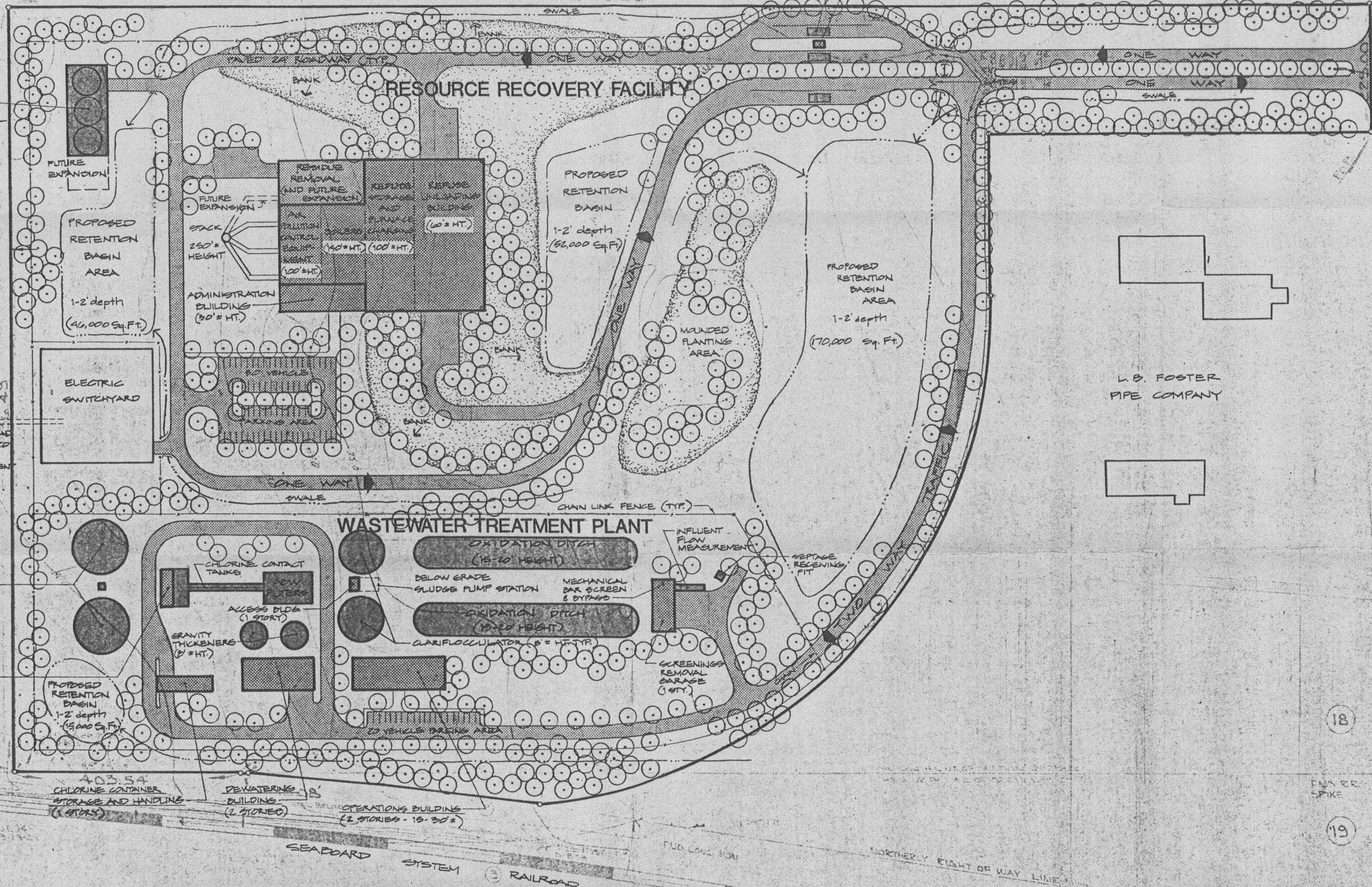
EFFLUENT STORAGE
RESERVOIRS
(20' HT.)

EFFLUENT PUMP
STATION
(15' HT.)

NOTES:

1. THIS GENERAL SITE DEVELOPMENT PLAN IS FOR ILLUSTRATIVE PURPOSES ONLY TO INDICATE DEVELOPMENT INTENT AND THE ABILITY OF THE SITE TO CONFORM TO COUNTY REQUIREMENTS. A DETAILED SITE DEVELOPMENT PLAN WILL BE SUBMITTED BASED ON FINAL DESIGN BY THE ENGINEER AND SELECTED VENDOR.
2. THE LOCATION OF THE WASTEWATER TREATMENT PLANT IS NOT DEFINITE. THE FINAL TREATMENT PLANT LOCATION MAY NOT BE WITHIN THE 50 ACRE PARCEL SHOWN ON THIS PLAN.
3. SECTION, TOWNSHIP AND RANGE AND A METES AND BOUNDS PROPERTY DESCRIPTION ARE PROVIDED ON SHEET 1 OF 2.
4. ALL ADJACENT PROPERTIES WITHIN 200 FEET ARE INDICATED BY SUBDIVISION TITLE, PLAT BOOK AND PAGE IN APPENDIX E OF THE ATTACHED REPORT.
5. A KEY LOCATION MAP IS PROVIDED IN THE ATTACHED REPORT AS FIGURE 1-1.
6. GOOD ENGINEERING PRACTICE (G.E.P.) STACK HEIGHT COULD CALL FOR A STACK OF 300 FEET. HOWEVER, A MORE DETAILED STACK ANALYSIS IS UNDERWAY WHICH WILL INDICATE THE VIABILITY OF A SHORTER STACK.
7. PROPOSED PLANTING SCHEME WOULD CONTAIN DECIDUOUS AND EVERGREEN TREE PLANTINGS IN NATURALIZED GROUPINGS.
8. ALL STRUCTURES & BUILDINGS WILL BE SET BACK A MINIMUM OF 100 FEET FROM ALL PROPERTY LINES & ADJACENT ROADWAYS WITH 2 EXCEPTIONS. ONE WOULD BE THE ELECTRIC SWITCHYARD ON THE SOUTHWEST CORNER OF THE SITE, WHICH HAS A 50 FOOT SETBACK FROM THE TECO EASEMENT WHERE OVERHEAD LINES WILL RUN FROM THE ELECTRIC SWITCHYARD TO THE TECO EASEMENT. THE OTHER WOULD BE THE SCALE HOUSE WHICH HAS A 50 FOOT SETBACK FROM THE NORTHERN BOUNDARY.

TOPOGRAPHIC AND PROPERTY SURVEY BY BRANDON SURVEY, INC. FOR THE COUNTY OF HILLSBOROUGH
DATED 1/10/83 REVISED 2/1/83



HILLSBOROUGH COUNTY FLORIDA

ZONING REQUEST: M-TA to C-U

PETITION FILE NUMBER: 83-274

PUBLIC HEARING DATE: May 14, 1984, cont. to May 29, 1984

This is to certify that this Site Development Plan has been reviewed by the Board of County Commissioners and the following action taken:

APPROVED AS SUBMITTED: _____ APPROVED WITH CONDITIONS
AS NOTED: XXXXX

May 29, 1984

Date of Order

6-11-84

Date

BOARD OF COUNTY COMMISSIONERS

HILLSBOROUGH COUNTY, FLORIDA

DOCUMENT NO. 44-777

Chairman
Board of County Commissioners
Attested to by Clerk to Board of County Commissioners

Application No. _____

Hillsborough County Division of Public Works
Department of Solid Waste
Department of Water and Wastewater Utilities

9/13/84 FACILITY RELOCATION

Date Ch'd. Revision

Designed by: J.E.K. & R.C.

Drawn by: REG

Checked by: PCK

Approved by: EPK

Date: JUNE 1983

Scale: 1" = 100'

GENERAL SITE DEVELOPMENT PLAN

Hillsborough County Resource Recovery Facility
and Wastewater Treatment Plant

CAMP DRESSER & McKEE INC.

Clearwater, Florida

CDM

environmental engineers, scientists,
planners, & management consultants

SHEET NO.

2 OF 2



EXHIBIT D

SOUTH EAST CORNER
OF SECTION 15-29-20

FAULKENBURG

2454.15

ROAD 22 FT.

FACILITY SIGN
FAULKENBURG ROAD
(IMPROVEMENTS TO BE
DETERMINED DURING
FINAL DESIGN)

L.B. FOSTER
PIPE COMPANY

SCALE 1" = 100'

The Plant and Directly Associated Facilities

CHAPTER 3

THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

3.1 BACKGROUND

In Hillsborough County there has been an increased interest in solid waste disposal and the concept of resource recovery. This has been stimulated by an increased awareness of the environmental and siting problems associated with landfill disposal methods, and by the shortages and increased prices of energy and recyclable materials.

The decision to build a resource recovery facility comes after several years of investigation by the County into other methods of resolving this growing problem. These included examination of shredding refuse for landfilling, composting, and resource recovery. Preliminary studies have shown that the concept of resource recovery is feasible for the County and is a key to a positive, successful long-term solid waste management system.

Currently, the Cities of Tampa, Plant City, and Temple Terrace each maintain a solid waste collection system within their respective boundaries. The County controls the collection system in the unincorporated areas utilizing franchise collectors. Residential waste is usually collected twice a week, with more frequent collection, as necessary, for commercial waste.

As discussed in Section 2.2.7.2, the solid waste generated in Hillsborough County is currently disposed of at the Hillsborough Heights Landfill. Approximately two thousand tons of solid waste are deposited at this site daily (equivalent in energy value of 2,000 barrels of oil), six days a week. In previous years, other city and County landfills were used, but are now closed. The Hillsborough Heights Landfill replaced the adjacent Taylor Road Landfill in February 1980. The City of Tampa operated an incinerator until December 31, 1979, when it was closed because of air and water pollution problems. When the City facility ceased operation, those

wastes were diverted to the Taylor Road Landfill. In April 1981, the County's Northwest Landfill was closed and its wastes were diverted to the Hillsborough Heights Sanitary Landfill.

Because of capacity limitations and legal restrictions concerning the Hillsborough Heights Landfill, which is mandated by DER to close by October 31, 1984, the County initiated actions to site, design, and permit a new sanitary landfill by February 1984. The new Southeast County Landfill, which is presently under construction, will be used initially for raw waste disposal and then as both an ash residue disposal site for the proposed resource recovery system and for the disposal of non-processible waste, which must bypass the proposed resource recovery facility.

The City of Tampa has contracted for the design, construction and operation of a resource recovery facility at the site of the non-operative Tampa incinerator at McKay Bay. This facility will be designed to burn 1,000 tons per day of solid waste generated primarily within the incorporated boundaries of Tampa.

Hillsborough County is, therefore, pursuing the implementation of its own resource recovery facility to service the solid waste disposal needs of its growing unincorporated areas. The Hillsborough County Board of County Commissioners has endorsed resource recovery as the long-term solution to Hillsborough County's solid waste disposal problems. There have been many alternatives evaluated for various components of this project. The site and design alternatives are discussed in Chapter 8.

The Hillsborough County Resource Recovery Project is based on the engineering concept of combusting municipal solid waste using mass-burn technology, recovering the heat energy in the form of steam, and converting that steam energy to electricity for sale. After evaluating several technologies, the County has found that the proposed resource recovery facility incorporating a mass-burn technology operated by a full-service vendor under contract to the County (the owner of the plant would be the County) would best fit its present and foreseeable needs. A contractor will be selected through a Request for Proposal (RFP) procurement process, currently underway.

Commercial-scale resource recovery first began in the United States in the late 1960s, but European countries have been recovering energy from solid waste by this means for over 30 years. Denmark converts 70 percent of its solid waste to energy, Switzerland 40 percent, and Sweden 30 percent. Right now the United States is converting less than 2 percent, but this figure is expected to increase to 10 percent by the mid-1980s. More and more communities in the United States are building resource recovery facilities; the technology is tested and proven. In terms of the energy it can produce, a ton of solid waste equals approximately one barrel of oil.

On April 15, 1982, the Hillsborough County Board of County Commissioners authorized establishment of the County's Resource Recovery Program, and on April 28, 1982, the Commissioners entered into a contract with Camp Dresser & McKee Inc. (CDM) for the planning and implementation of a Resource Recovery Facility serving the unincorporated areas of the County. At that time, the Board approved the management team that would guide this long-term (5 year) project to completion. This management team includes the consultant team (engineers, investment bankers, bond counsel and financial advisor) and Hillsborough County project management staff and decision-makers. A Resource Recovery Project Oversight Committee was also established to help guide the project through key decision points, and to provide policy recommendations to the Board of County Commissioners through the County Administrator. The Committee, which consists of senior County staff members, reviews and makes recommendations on key issues such as site selection, facility size, financing approach, vendor selection, and final contracts. A member of the governments from the Cities of Temple Terrace and Plant City participate as non-voting members on the Oversight Committee.

On October 27, 1982, the Board of County Commissioners approved the selection of this site recommended by both the County's consulting engineers, Camp Dresser & McKee and the Resource Recovery Project Oversight Committee. The site embodies a central location; good road access; a compatible land use; and favorable environmental conditions. By selecting a site near the County's waste generation center, transportation times and costs are minimized.

Site selection by Hillsborough County came after many months of detailed study by Camp Dresser & McKee Inc. and County staff. Air, traffic, noise, water, and aesthetic issues were examined in detail. A specific siting methodology was developed to evaluate the suitability of candidate sites for a resource recovery facility. The basic approach used consisted of a progression of data collection and reviews in increasingly greater detail. In the early phase of the study, a total of 35 potential sites were identified representing all areas within Hillsborough County. Following field investigation, this list of potential sites was narrowed to 23 for further screening. These twelve sites were eliminated because their actual field conditions were unsuited for construction of a resource recovery facility.

The remaining 23 candidate sites received a detailed evaluation and rating through the use of specific siting criteria developed by the consulting engineers. These criteria included engineering, zoning, and environmental considerations. Based on this analysis, four candidate sites were selected for additional evaluation. On September 29, 1982, the Board of County Commissioners instructed Camp Dresser & McKee to perform additional detailed studies on these sites and expressed a preference at that time for a site near Faulkenburg Road and another near the Tampa Electric Company Gannon Station generating plant off Port Sutton Road.

After completing these studies, Camp Dresser & McKee recommended that Hillsborough County select the Faulkenburg Road site for construction of its Resource Recovery Facility. While each of the four candidate sites could have been developed for the facility, the consultant's studies indicated that the Faulkenburg Road site could be developed with the least relative cost compared to the other three sites and also with the fewest negative impacts. The area adjoining the site is zoned light industrial, M-1A and heavy industrial, M-1 with a growing number of commercial and industrial interests nearby.

Two facilities are proposed for the 50.4 acre Faulkenburg Road site - a resource recovery facility and an advanced secondary wastewater treatment plant (Northwest Brandon Subregional). The resource recovery facility will

provide an efficient, environmentally-sound, long-range solution to the County's solid waste disposal problems. The facility will be part of a comprehensive County Solid Waste Disposal and Resource Recovery System which will include two transfer stations and the Southeast County Landfill. The wastewater treatment plant will treat wastewater that the County currently pays the City of Tampa to treat. The subregional wastewater facility is also expected to treat flows from several potential industrial concerns, including the proposed resource recovery facility. This plant will help to alleviate the area's sewage treatment problems and, at the same time, supply all of the cooling water needs of the proposed resource recovery facility. The layout of these facilities is presented in Figure 2.5 of Section 2.1.2.

Since the WWTP will be a discretely functioning, albeit interrelated, feature on the site, the components and processes of the WWTP are discussed in a separate section added to the end of this chapter (see Section 3.10).

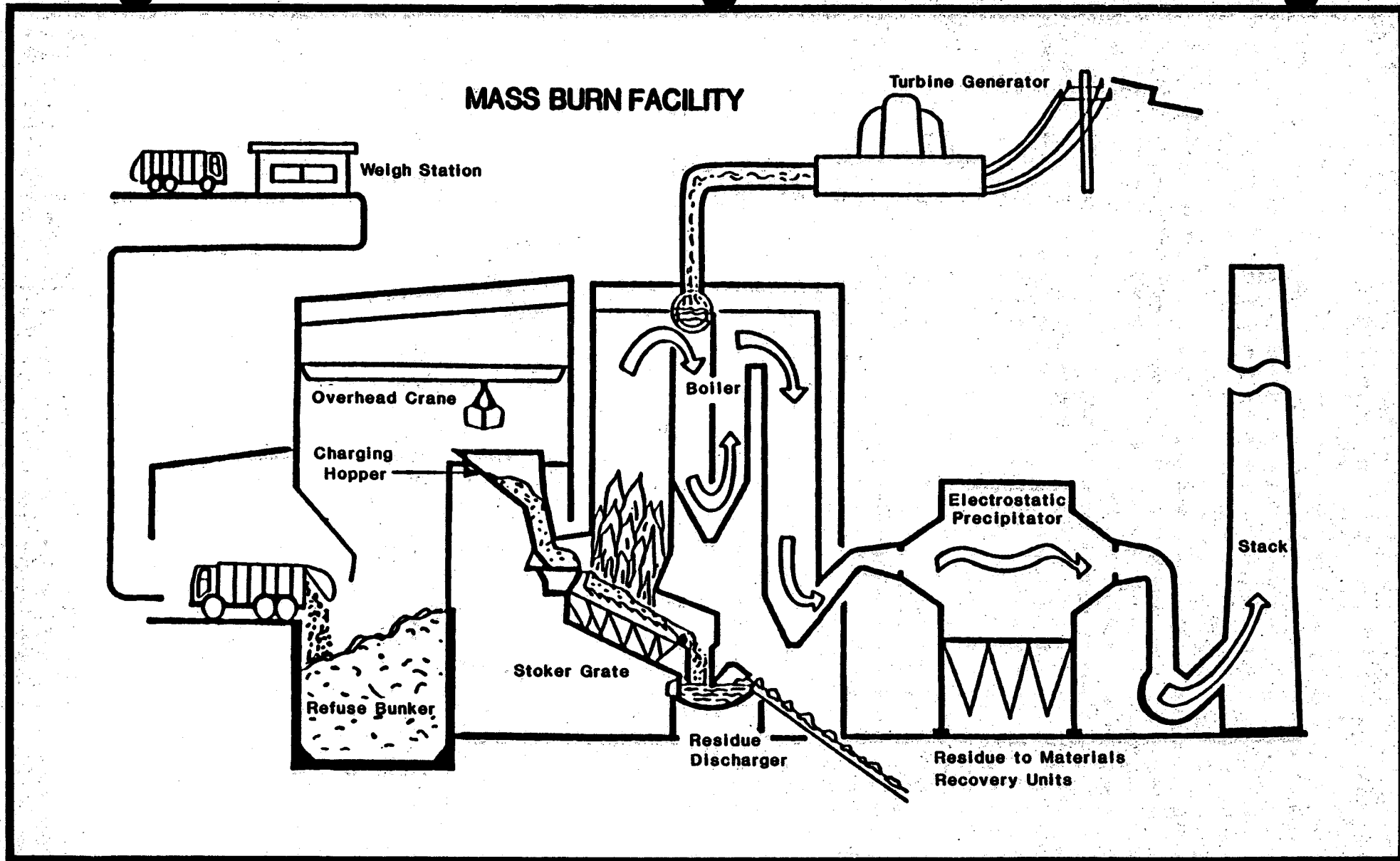
Hillsborough County is currently seeking proposals from qualified firms and organizations for the design, construction, startup, acceptance testing, operation and maintenance of a solid waste resource recovery facility to serve the unincorporated areas of the County. The Board of County Commissioners has officially stated that the County will own the project. The contractor will provide a full-service arrangement, including design, construction, acceptance testing, and 20 years of continuous operation, for a "mass-burn" type resource recovery facility with a continuous design rated capacity of 1,200 tons per day using three combustion/steam generation units each with a continuous design rated capacity of 400 tons per day. Additionally, the layout of the project will allow the addition of a fourth combustion/steam generation unit. Initial project construction will include a tipping area and refuse storage pit sized to handle 1,600 tons per day (continuous design rated capacity) and the stack shall have four (4) flues. The project will have one steam turbine-generator which shall generate electricity (about 450 Kwh/ton) to be delivered for sale to Tampa Electric Company (TECO). Power lines from the project's electrical switchyard will connect TECO's powerline right-of-way which abuts the

western boundary of the project site. Revenues from energy sales will be shared by the County and Contractor over the life of the operating contract.

Since the proposed facility will utilize mass-burn technology, there will be no preprocessing of wastes at the facility prior to combustion (except for some limited size reduction of oversized items). A schematic diagram of a typical resource recovery facility is presented in Figure 3.1. MSW will be truck-delivered to the facility and ash residue removed by the same mode of transport. Under a 1600 tpd configuration, four 400 tpd units would be used in the facility. MSW would be dumped into the refuse bunker directly from transfer trailers and packer trucks inside the building. All waste will be stored inside the building, so no waste will be visible from the outside. Two overhead cranes will mix the MSW in the bunker and load the charging hoppers as required.

Oversized items would be separated from the other refuse by the overhead crane. A rotor shear (shredder) may be utilized to reduce the size of material. After size reduction, this material would be charged into the furnace.

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 efficiency of the ESP has been established as achieving an emission limitation for particulate matter of 0.025 gr/dscf corrected to 12% CO₂. (A complete analysis, demonstrating the ESP as LAER for particulate matter and BACT for the other criteria pollutants is contained in Appendix 10.1.5 (see Volume III-Air Quality)). The flue gas will be drawn through the ESPs by an induced draft fan which would be located between the stack and the ESPs.



**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 3.1
SCHEMATIC OF TYPICAL RESOURCE
RECOVERY FACILITY**

Bottom ash from the furnace and flyash from the precipitator will be mixed prior to removal from the facility. Ash resulting from the combustion of MSW will comprise 10 percent of the volume and 25 percent of the weight of the MSW processed by the facility. The ash will be quenched with water to about 30 percent moisture prior to transport to a landfill.

As noted above, while the proposed facility will have a maximum design rated capacity of 1600 tpd, its initial design rated capacity will be about 1200 tpd (comprised of three 400 tpd units). Each boiler unit operates independently from the others. It will, therefore, be possible to routinely shut down one unit for periods of maintenance and inspection.

3.2 SITE LAYOUT

3.2.1 Layout

The general site development plan (Figure 2.5), shows the conceptual building layout and plant perimeter on the site. All structures will be set back a minimum of 100 feet from all property lines and adjacent roadways. Although the resource recovery facility and wastewater treatment plant will remain separate with individual fencing and parking, the overall facility design and layout will be coordinated (i.e. roadways, fences, retention basins, buffers, signs, etc).

The wastewater treatment plant has been layed out to effectively utilize the existing sloping land within the plant hydraulic profile to minimize pumping. Shallow groundwater restricts construction below grade. Therefore, some portions of the facility which would normally be below grade will be constructed above grade.

The natural site drainage is to the west. Site grading will respect existing drainage patterns where possible. However, substantial site grading will be required to construct a resource recovery facility with multiple level vehicle access. Maximum side slopes for site fill will be

three horizontal to one vertical (3:1) and special revegetation techniques will be required to minimize erosion and siltation.

Maximum roadway grades of 3 percent for site access will be used to reduce required truck shifting and associated noise. Maximum roadway grades of 6 percent are suggested for site egress.

The setback allows adequate space for stormwater collection through the use of surface swales along roadways. Additional infiltration of stormwater will be encouraged through use of these swales. A more complete description of the on-site drainage system is provided in Section 3.8.

The roadways will be designed with minimum turning radii of 35 feet to accommodate truck traffic, a divided entrance road/one-way system for safety, a 14 foot lane width for two lane roads, and a 20 foot roadway width for one-way/divided roads.

The present 22 foot road width of Faulkenburg Road will be modified near the site by the construction of roadway turning lanes and other improvements to handle the anticipated truck traffic.

Parking spaces have been provided for the facility beyond those required by the zoning regulations due to the site's location (not readily accessible by mass transit), and to accommodate potential visitors and shift overlaps. Automobile parking will be separated from truck circulation and parking to minimize potential conflicts. The roadway design speed will be 30 mph. Truck scales will be placed to reduce the potential for excessive truck speeds.

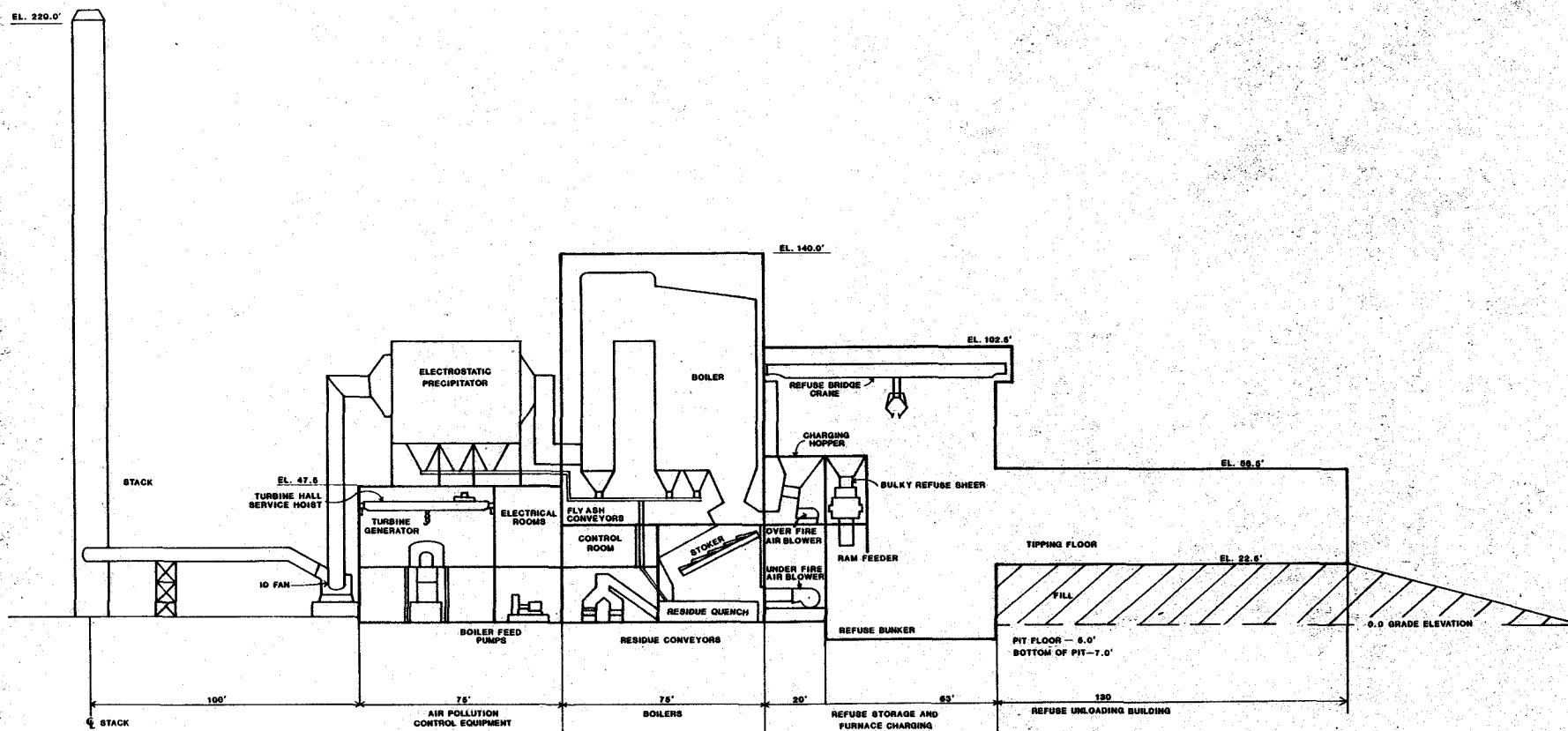
The entire site will be graded and landscaped. A planted buffer (minimum 50 foot width) will be developed along the site property lines along with earthen mounds to provide screening of the facility. The proposed fencing has been set back from the property line to be incorporated into the buffer planting. Planting materials will be limited to large evergreen and deciduous trees within the buffer planting. Buffer plantings will be developed in naturalized groupings, not in straight lines, creating an

irregular edge rather than a formal straight line so that the adjacent open lands can blend with the open lands of the proposed facilities as illustrated on the General Site Development Plan (Figure 2.5). This provides an informal, natural appearance to the open lands surrounding the facility.

Substantial mass planting of large trees on the banks close to the resource recovery facility is desirable to reduce the overall visual impact of the structure. However, due to facility height, no planting can effectively screen all of the site structures. The control of building facade configuration and texture in the form of large blank panels or horizontal lines to mask sense of scale would be desirable. The site layout, grading, and plantings are shown on the General Site Development Plan.

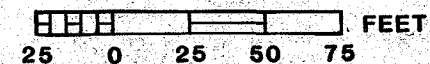
3.2.2 External Appearance

The proposed resource recovery facility consists of two contiguous buildings, the administration building and the processing building (see Figure 2.5). The administration building is about 30 feet high, 110 feet long and 30 feet wide. It will contain offices and is located into the southeast corner of the processing building. The processing building is rectangular measuring approximately 360 feet by 260 feet. It varies in height depending on the processing function housed in that portion of the building. At the eastern side, it is about 60 feet high for refuse unloading activities. Immediately to the west of this portion the building height increases to about 100 feet where it houses refuse storage and furnace charging. Continuing westward across the building, the height increases to 140 feet over the boilers and finally decreases to about 48 feet for the generators and electrical rooms. Above this section of the building, however, are three large electrostatic precipitators for air pollution control which effectively raise the height of this area to about 100 feet. The facility profile is shown on Figure 3.2. The width of the building is reduced from 178 feet (refuse unloading, refuse storage and furnace charging) to 129 feet for the boilers, generators and electrical rooms.



**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 3.2
FACILITY PROFILE**



The net effect of these conditions is a stepped appearance which helps to reduce the visual impact of the structure by modifying the massing. This will be most apparent in views from the north and south where the profile will be visible. From the east along Faulkenburg Road, the attempt at reducing the mass is perceivable as the building steps up away from the street.

The visual appearance of the proposed facility is an important criterion which will be taken under consideration in the selection of a vendor. As stipulated in the Request for Proposals for a Solid Waste Energy Recovery Facility (Hillsborough County, April 1984)," The Project shall be aesthetically pleasing and architecturally compatible with the surrounding area..." The vendors are encouraged"... to give the facility an office building appearance."

As presented in Appendix 10.2.4, one of the conditions that has been put on the rezoning by the Hillsborough County Board of County Commissioners includes:

"The resource recovery plant shall be completely enclosed and shall be of a color which blends well with its natural background. The stack shall be of a color which blends with the sky unless prohibited by aircraft operational safety requirements."

3.3 FUEL

The Resource Recovery Facility will utilize municipal solid waste collected from the unincorporated areas of Hillsborough County, as the fuel feed stream. Being heterogeneous by nature, generalizations can be made as to its heating value, moisture content and ash content of the municipal solid waste. However, these factors vary continually.

The term, "municipal solid waste" applies to all of the solid wastes generated within Hillsborough County. Solid wastes to be disposed of and

processed at the facility are divided into the following classifications which indicate their general characteristics and their source of generation:

1. Residential Wastes. Mixed domestic household wastes (including yard wastes) generated by individuals or families in single or multiple family dwellings.
2. Commercial Wastes. Wastes generated by the commercial and retail sector of the County. The physical characteristics of these wastes are similar to residential wastes, consisting primarily of combustible materials in the form of paper and food wastes from offices, restaurants and retail establishments.
3. Institutional Wastes. Wastes generated by hospitals, schools, and churches. These wastes have characteristics similar to residential and commercial wastes.
4. Industrial Wastes. Wastes generated by industrial process and manufacturing operations, excluding any wastes classified as hazardous or infectious by federal and state regulations. These wastes also include general housekeeping and support activity wastes associated with industry.

All calculations, analyses and performance data for the facility have been based on the as-fired solid waste higher heat value of 4500 BTU per pound with a 28 percent moisture content by weight. Table 3.1 and Table 3.2 present, respectively, the as-received reference solid waste composition and reference waste ultimate analysis to be utilized.

The facility shall be equipped with an automatic weighing station to weigh and record the quantity of solid waste delivered to the facility. The solid waste will be delivered in standard, municipal type, packer vehicles, open-bodied dump trucks, and transfer trailers with capacities up to 75 cubic yards. The facility will be open to receive delivered solid waste six days per week, 52 weeks per year.

TABLE 3.1
REFERENCE SOLID WASTE COMPOSITION

<u>Waste Category</u>	<u>Nonimal Percentage By Weight</u>
Combustibles	51
Moisture	28
Non-Combustibles	21
TOTAL	100

TABLE 3.2
REFERENCE SOLID WASTE ULTIMATE ANALYSIS

<u>Component</u>	<u>Nominal Percentage By Weight</u>
Moisture	28.2
Total Inert	20.8
Carbon	25.6
Hydrogen	3.4
Oxygen	21.3
Nitrogen	0.6
Sulfur	0.1
TOTAL	100

The facility shall include a totally enclosed tipping floor with twelve tipping bays each sixteen feet in width. Back up barriers will be provided at each tipping bay to prevent vehicles from entering the solid waste storage area. The storage of the delivered solid waste shall be in a completely enclosed storage pit with the floor elevation below the tipping floor. The pit shall be sized for a minimum storage capacity of three days of solid waste; i.e. 4,800 tons of solid waste at a density of 450 pounds per cubic yard. The storage and handling area will be under negative air pressure and shall supply the combustion air during facility operation which will minimize odors outside of the refuse storage area and refuse unloading building.

A solid waste size reduction system consisting of a rotary shear will be provided to reduce the size of the bulky waste which could block the charging hopper to the combustion/steam generating units.

Two overhead solid waste handling cranes will be installed to charge the combustion units and the rotary shear, and maintain the solid waste storage area. The cranes will be of the travelling bridge type, employing a polyp type grapple. Each crane will be capable of meeting the solid waste handling requirements of the entire facility.

3.4 AIR EMISSIONS AND CONTROLS

3.4.1 Air Emissions Types and Sources

As noted previously, the proposed energy recovery facility is a new facility to be located in Hillsborough County. At ultimate size, the facility as planned would contain four boilers each with a rated capacity of 400 tpd of MSW for a total of 1600 tpd. The flue from each of the boilers will be encased in a single stack. The refuse bunker and the residue storage area will be enclosed and under negative pressure as combustion air will be taken from these areas. There will be no on-site storage of either refuse or residue except within these controlled areas. Loading and unloading of trucks will take place within these bunkers. Trucks entering and leaving the site will be covered and travel on paved

roads. Evaporative emissions from the cooling tower will be equivalent in quality to water from advanced secondary treatment. A discussion of biological emissions from the cooling tower is contained in Section 5.1.4 of this application. Thus, the only source of emissions from the facility will be through the stack.

A complete description of the development of the stack emissions is contained in Section 4.0 of Appendix 10.1.5 "Prevention of Significant Deterioration" (See Volume III-Air Quality). An emission inventory for the proposed facility is contained in Table 3.3. A complete DER Form 17-1.202 (1), "Application to Operate/Construct Air Pollution Sources," can be found in front of Volume III-Air Quality.

3.4.2 Air Emission Controls

Air pollution control technologies proposed to control particulate matter and trace metals are: electrostatic precipitator (ESP), fabric filtration system (baghouse), and wet venturi scrubber. The technologies proposed to control SO_2 and acid gases (H_2SO_4 , HCl , and HF) include: dry scrubber/ESP, ESP/wet scrubber, and dry scrubber/fabric filter. These systems and their operating characteristics are fully described in the BACT/LAER analysis in Section 6 of the PSD appendix (See Volume III-Air Quality).

3.4.3 Best Available Control Technology (BACT)

The BACT analysis, presented in the PSD Permit Application, Section 6.0, evaluates the environmental, economic, and energy aspects of alternative control techniques and methods. All of the criteria pollutants except particulate matter and ozone are attainment (or unclassified) and hence subject to BACT. Particulate matter is non-attainment in the source area and hence subject to LAER, Lowest Achievable Emission Rate. The control device, which meets the requirements of LAER for particulate and BACT for the other criteria pollutants, is the electrostatic precipitator at 0.025 grains per dry standard cubic feet (gr/dscf) corrected to 12 percent CO_2 . The complete discussion of the BACT and LAER selection process is presented in the PSD, Appendix 10.1.5 (Volume III-Air Quality).

TABLE 3.3
EMISSION RATES FOR THE PROPOSED FACILITY

<u>Pollutant</u>	<u>Emission Rates*</u>	
	<u>#/ton</u>	<u>g/s</u>
Total Suspended Particulates	0.483	4.46
Sulfur Dioxide	2.5	23.1
Carbon Monoxide	1.8	16.6
Nitrogen Oxides	3.0	27.7
Lead	0.048	0.444
Mercury	5.2×10^{-3}	0.048
Sulfuric Acid Mist	7.68×10^{-2}	0.710
Beryllium	1.31×10^{-5}	1.21×10^{-4}
Fluorides	0.06	0.554
Non-Methane Hydrocarbons	0.2	1.85
Total Reduced Sulfur	neg.	neg.
Reduced Sulfur Compounds	neg.	neg.
Vinyl Chloride	neg.	neg.
Asbestos	neg.	neg.
Hydrogen Chloride	4.1	37.9

*Emission rates based on a throughput equal to 110% of design capacity.

3.4.4 Design Data for Control Equipment

Design data for control equipment are not available at this time, because a furnace/boiler supplier has not been selected yet. Typical design parameters for mass burn resource recovery facilities were utilized in the BACT/LAER analysis and are presented in Section 6.0 of the PSD appendix.

3.4.5 Design Philosophy

The proposed control technology, electrostatic precipitator at 0.025 gr/dscf corrected to 12 percent CO₂, is designed to capture particulate matter entrained in the flue gas from the furnace/boiler. The particulate matter is collected in a dry form to avoid wastewater disposal, corrosion, and stack gas reheat problems. The ESP is also a fully automated system with very low operations and maintenance requirements in comparison with other air pollution control devices.

3.5 PLANT WATER USE

During normal operation of the resource recovery facility, all plant water would be drawn from the co-located Northwest Brandon Subregional Wastewater Treatment Plant (WWTP) and all wastewater discharge would go directly to the WWTP. Potable water would be used in small quantities in the personnel areas of the plant, washrooms, etc. No plant water would be drawn from or discharged directly to any surface or groundwater body. The quantities of water used and discharged as presented in this section are approximate amounts and subject to change pending the specific features of the selected vendor. Alternative sources of water are discussed in Chapter 8.

3.5.1 Heat Dissipation System

3.5.1.1 System Design

Cooling water will be utilized in a closed loop system which employs water cooled condensers to condense the low pressure steam discharged from the turbine. Cooling water will circulate through the condensers and waste

heat will be dissipated from the condenser cooling water by passage through a wet mechanical draft cooling tower.

The cooling tower system has adequate design capacity to provide heat rejection capability required to condense the low pressure steam exhausted from the turbine when all plant boilers are operating at full, rated design capacity. Should the steam turbine generator be not in service at any time in which the boilers are producing high pressure steam, a separate, by-pass condenser will be provided to accept the full, rated design capacity of high pressure steam from the plant boilers and condense the steam. The cooling tower system will also provide for heat rejection in the event that full condensing of high pressure steam is required. Through the use of the by-pass condenser system, plant refuse processing capacity would not be diminished during periods of full or partial turbine generator outage.

Consumptive water use will be limited to losses from the cooling tower system in the form of evaporation and drift. Any other water discharged from the plant will be discharged by pipeline directly to the co-located Northwest Brandon Subregional Wastewater Treatment Plant.

The location of the cooling tower system is shown on the Site Development Plan (Figure 2.5). The cooling tower blowdown will be directed along with boiler blowdown and the boiler demineralization backflush water to the residue quench tank. During normal operation, water would only be discharged from the residue quench tank in such quantity as is removed in the wet ash. Any water discharged from the residue remover during shutdown or cleanout would be piped directly to the co-located WWTP.

The cooling water from the condenser is pumped to the cooling tower system where it is cooled by evaporation. Heat removed from the cooling water is transferred to the atmosphere due to evaporation. Loss of water from cooling ponds will not occur since cooling ponds will not be utilized in the system.

No water intake structure, in the conventional sense will exist in the resource recovery plant system, since all water will be taken by pipeline

from the WWTP. Similarly, no water will be discharged from the resource recovery plant system, except by pipeline to the onsite WWTP, where it will be treated for reuse.

3.5.1.2 Source of Cooling Water

All cooling tower make-up water will be obtained through a direct pipeline link with the Northwest Brandon Subregional Wastewater Treatment Plant. Cooling water will be about 800,000 gallons per day of treated effluent from the WWTP treated to that quality required by standards for water used in spray irrigation of areas accessible to the public. The WWTP will produce a more than adequate supply of treated effluent to be used by the resource recovery facility. Table 3.4 presents the projected quality of water available from the WWTP.

3.5.1.3 Dilution System

Since all cooling water intake and discharge will be part of a closed loop cooling water circulation system between the resource recovery plant and the co-located WWTP, no dilution of the cooling water will occur, other than mixing with incoming WWTP flows. The WWTP will treat all water prior to discharge. No plant outfall will be utilized.

3.5.1.4 Blowdown and Trash Disposal

Liquid flows from blowdown systems will occur at three locations; 1) blowdown from the boiler drums, 2) blowdown from the cooling towers, and 3) blowdown from the boiler feedwater demineralizers. All blowdown flows will be collected in the blowdown tank and discharged to the residue quencher/discharger to be eventually disposed of with the residue.

Since no intake structures are required, no intake structure trash disposal will be required.

TABLE 3.4

PROJECTED TREATED WASTEWATER TREATMENT PLANT EFFLUENT ANALYSIS

<u>Parameter</u>	<u>Anticipated Average Concentration (mg/l)</u>
BOD	20
Total Suspended Solids	5
Fecal Coliform	Not Detectable
Chlorine Residual (ppm)	1.0
pH (pH units)	6.5 - 8.5
Calcium Hardness	150
Magnesium Hardness	150
Sulfates	150

3.5.1.5 Injection Wells

No injection wells are included in the overall design of the facility.

3.5.2 Domestic/Sanitary Wastewater

Sanitary waste flows will be generated within the plant only in the personnel service areas, i.e. washrooms, etc.

The plant will employ about 58 people in the course of normal operation, with fluctuating staff increases from time to time as contractors and other "specialty" staff are retained for work in the plant on a "task specific" basis. Visitors are expected at the plant, but an accurate estimate of the number of persons has not been made at this time.

The liquid (sanitary) waste stream produced (estimated to be about 2,000 to 4,000 gallons per day) by personnel within the facility will be an insignificant amount when compared to the total facility water consumption. This flow is made more insignificant by the fact that it is piped directly to the co-located Northwest Brandon Subregional Wastewater Treatment Plant which is treating a much greater sanitary flow. This facility plan will provide for adequate treatment of the sanitary flow from the resource recovery facility.

3.5.3 Potable Water Systems

The existing potable water service to the site is a twelve (12) inch City of Tampa water main that runs along Faulkenburg Road. The existing twelve (12) inch main provides water at a static pressure of 40-45 psi. According to the County Department of Water and Wastewater Utilities this water main has sufficient capacity to supply the potable water needs of the facility which are estimated to be about 2,000 to 4,000 gallons per day.

3.5.4 Process Water Systems

The process water source will be 800,000 gallons per day of effluent from the co-located wastewater treatment plant. Table 3.4 shows the projected quality of the WWTP effluent. The energy recovery facility will use the effluent for both cooling tower and boiler water makeup and discharge about 5,000 gallons per day back to the WWTP. The WWTP will treat the effluent to boiler water standards, and blowdown from the energy recovery facility will be sent to the co-located wastewater treatment plant.

3.6 CHEMICAL AND BIOCIDES WASTE

Both anti-corrosion and anti-fouling agents will be used at the facility in the boilers and in the cooling tower. Blowdown will be treated at the co-located wastewater treatment plant. The exact flow diagram of the chemical waste system will be developed by a yet to be selected vendor. There are no discharges from chemical processing, water treatment or waste piles that may enter the local environment as a result of plant operation.

3.7 SOLID AND HAZARDOUS WASTES

3.7.1 Wastes (Including Ash)

The residues of combustion shall consist of noncombustible by-products, fly ash and siftings. The residue removal system will be designed to remove these materials from the combustion system for disposal. The bottom ash and siftings from the combustible units shall be water quenched and dewatered. Redundant capacity for the main residue conveyors will be provided.

Fly ash removal conveyors will be supplied to convey fly ash from the boilers and electrostatic precipitators to the residue water quenches. Provisions will be made for separate removal of fly ash if required in the future.

Pre-treatment?

The residue removal system will consist of totally enclosed truck loading areas with two (2) loading bays. The system will incorporate a bifurcated chute to serve the two loading bays. Residue will be hauled from the facility by truck to the Southeast County Landfill. The residue to be delivered to and disposed of at the designated landfill will meet all local, state and federal regulations which govern such disposal. The residue will contain no more than 4% combustible material by dry weight content and no more than 0.75% putrescible material by dry weight content.

No other solid wastes will be produced under normal facility operating conditions except for minute amounts of solid waste, primarily office trash. Since the plant is a facility for the processing of solid waste, the facility will dispose of its own office trash.

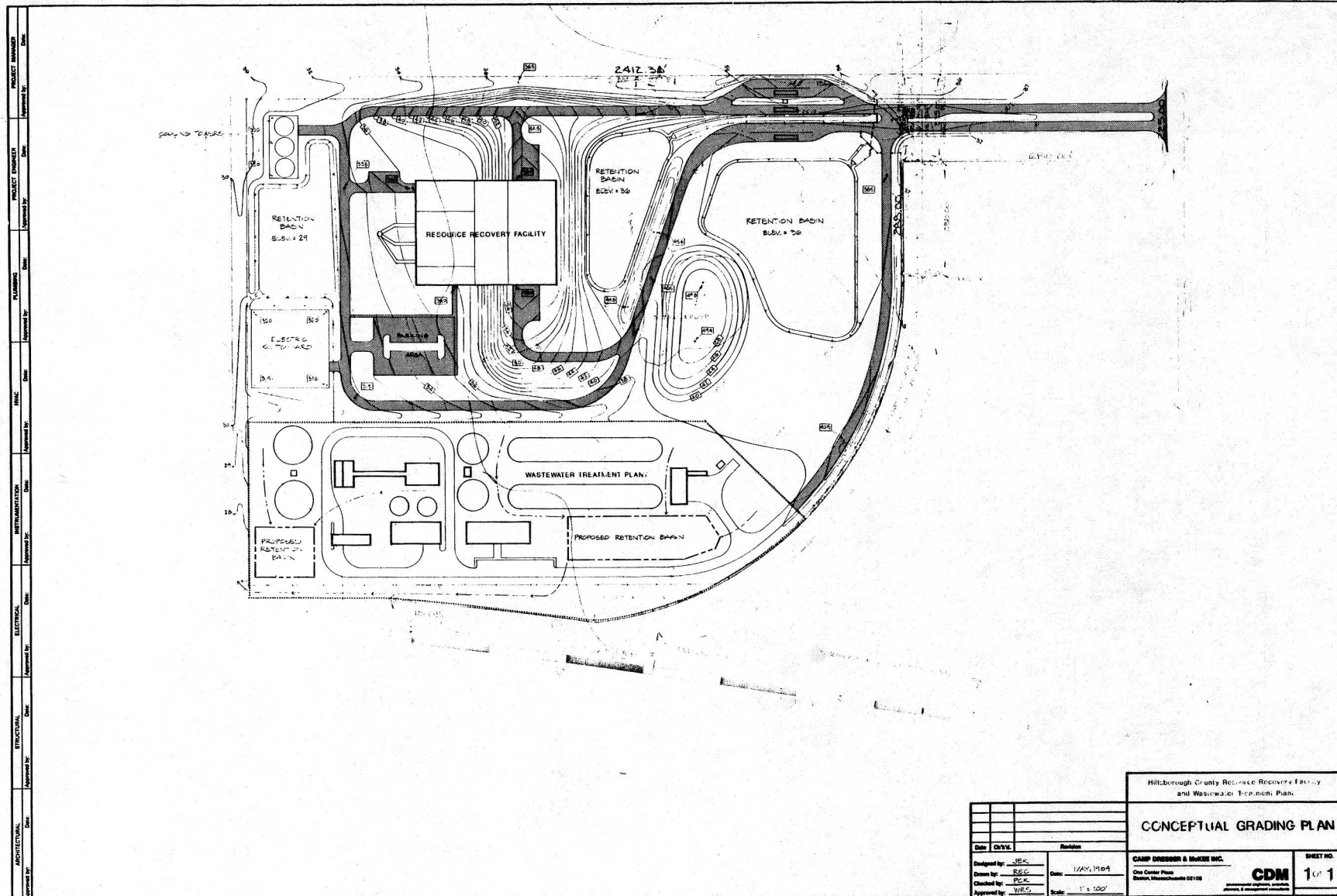
It is not anticipated that recovery of any materials from the residue will be practiced, but the equipment supply contractor has the option of providing recovery equipment at a later date.

3.7.2 Hazardous Wastes

No hazardous waste will be generated on-site, nor will any be accepted for processing with the solid waste, therefore there are no hazardous wastes requiring disposal. The identification of any apparently hazardous materials by the crane operators and scale house personnel is addressed in Section 5.4.2.

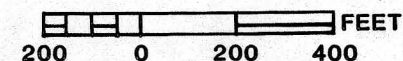
3.8 ON-SITE DRAINAGE SYSTEM

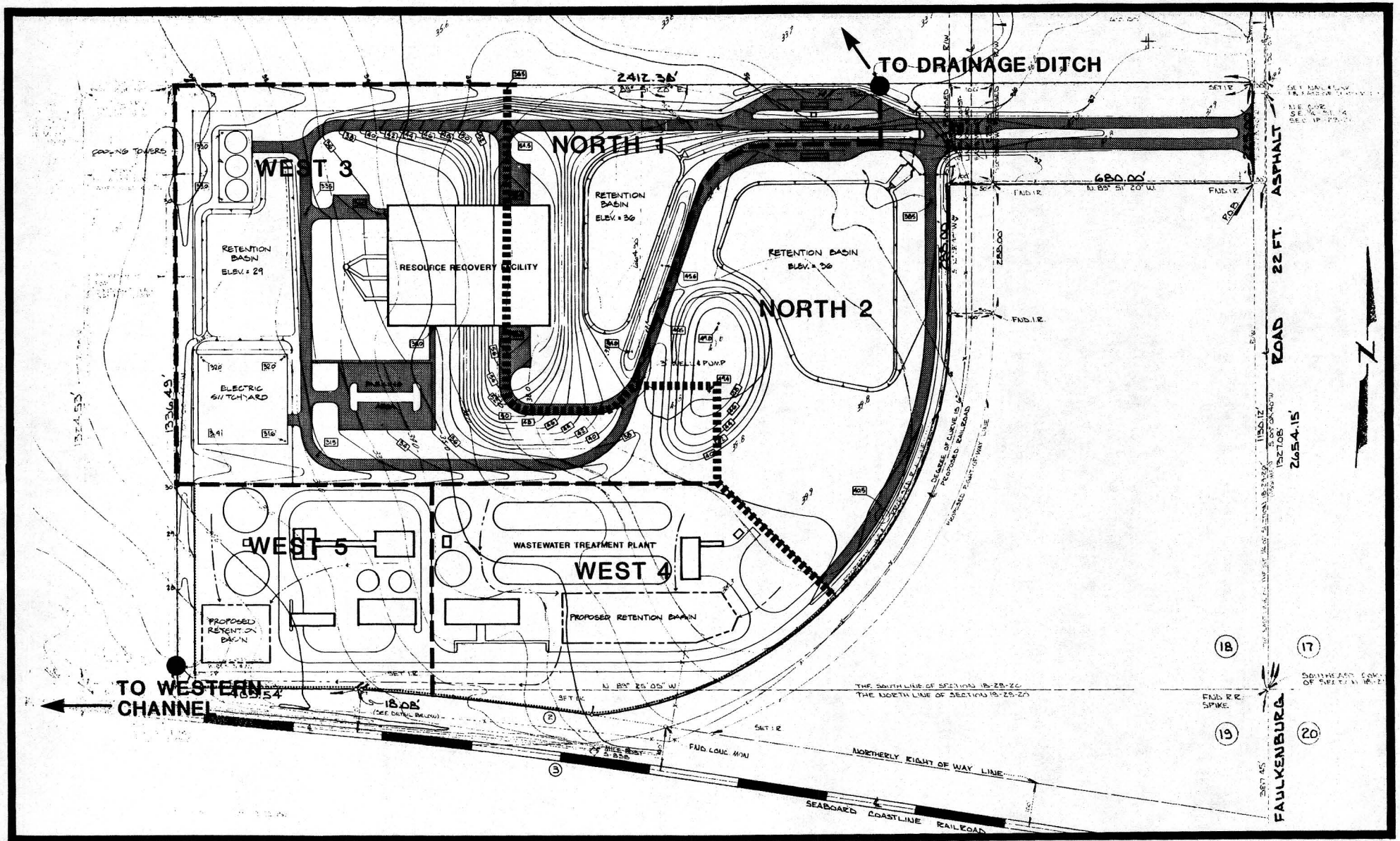
The conceptual grading plan for the site is shown on Figure 3.3. The primary tool for management of on-site drainage is a set of five retention/detention basins and two discharge points located as shown on Figure 3.4. The drainage areas and detention basins sizes are shown in Table 3.5. The details of the basin design are available in Appendix 10.14. The area draining to each basin has also been delineated on Figure 3.4.



**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 3.3
CONCEPTUAL GRADING PLAN**





HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 3.4
POST-DEVELOPMENT
DRAINAGE AREAS

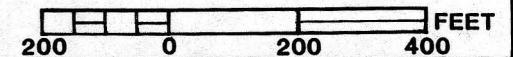


TABLE 3.5
DRAINAGE AREAS AND DETENTION BASIN SIZES

<u>Subbasin</u>	<u>Subbasin Drainage Area (acres)</u>	<u>Detention Area (ft²)</u>	<u>Storage Volume (acre-feet)</u>
North 1	8.3	25,000	1.43
North 2	13.9	120,000	5.51
West 3	13.8	50,000	2.87
West 4	8.3	28,000	1.28
West 5	6.1	25,000	1.15

Source: CDM

During the initial construction phase, West 3 Basin will be much larger than as shown on Figure 3.3 in order to provide treatment capacity prior to discharge for the volume of water to be removed from the site during the dewatering operation (See also Appendix 10.15). This basin will be operated to assure that the discharge from the basin is less than 50 Jackson turbidity units (JTU) above background.

In a letter dated September 26, 1983 from Gary W. Kuhl, P.E. Executive Director of the Southwest Florida Water Management District (SWFWMD) to Mr. Hamilton Owen of the Power Plant Siting Section of DER, Mr. Kuhl noted that, "A permit for temporary discharge into the ditch that leads to the Bypass Canal will not be required. This was discussed in an earlier meeting with the consultant." The full text of the letter is included as Exhibit B to Appendix 10.14.

On-site transport of stormwater to the discharge points will take place in stabilized grassed drainage swales. The site discharges to receiving waters:

- (1) a drainage ditch running east-west about 250 feet north of the boundary of the site; and
- (2) a channel flowing in a northwesterly direction from an area about 250 feet west of the boundary of the site.

The design criteria for the basins includes a stipulation that the post development peak flow rate from the site in a 25-year storm of critical duration must not exceed the pre-development peak flow rate in a 10-year storm of critical duration. The analysis described in Appendix 10.14 assigns a limiting discharge of 25 cfs to the area draining to the northern ditch and 35 cfs to the area draining to the western channel.

The capacity of both receiving channels is estimated to be more than adequate to handle the planned peak discharge rates of 25 cfs and 35 cfs. The northern drainage ditch is a fairly large channel, estimated during site inspection to be about ten feet deep and six to seven feet wide.

Appendix 10.14 contains a summary table of ditch capacity for various flow depths. A flow of 25 cfs is well within the range that can be accommodated in the ditch.

The channel running along the western boundary of the site is shallower and wider than the northern ditch. Site inspection revealed that portions of the western channel were obstructed by heavy vegetation which may limit channel capacity. Channel capacity was estimated at 65 cfs based on the combined capacity of twin 30-inch diameter culverts located just to the north of the Seaboard System Railroad.

Eventually the ditch and the channel intersect and flow southwestward toward the Tampa Bypass Canal. The canal functions to provide flood control.

Although minimal information was available on the quality of water in the two receiving channels, CDM performed some analyses. The existing data base is presented and discussed in Section 2.3.4.1 of this document. In general, water quality in both streams is degraded as compared to water quality in the Tampa Bypass Canal. Levels of nitrogen compounds are higher in the streams than in the canal, with the exception of nitrate-nitrogen. High turbidity and suspended solids levels were seen in the ditch bordering the northern boundary of the site.

Table 2.26 in Section 2.3.2.1 summarizes the results of analysis for selected water quality parameters for wells in the vicinity of the site. For all wells, the levels measured for each parameter are clearly within established state and federal primary and secondary standards.

Groundwater in the vicinity of the project site is used for potable water supply. The majority of the wells draw from the Floridan aquifer and a much smaller percentage utilizes the surficial aquifer. The Brandon well field removes the greatest amount of groundwater for potable supply.

Water retained in the basins either percolates to the underlying groundwaters or evaporates. In most areas, the surficial aquifer is

underlain by clay that acts as a confining unit separating the surficial aquifer from the Floridan aquifer.

The designs for the stormwater retention/detention basins are based upon criteria and rules developed by Hillsborough County and the Florida Department of Environmental Regulation. The requirements of these criteria are that: (1) the post-development peak flow rate from the project site in a 25-year storm of critical duration must not exceed the pre-development peak flow rate in a 10-year storm of critical duration; (2) the post-development runoff volume discharged during a 25-year 24-hour rainfall will not be increased beyond the pre-developed volume naturally running off during that same rainfall; and (3) the facility must retain and discharge by percolation through soil, evaporation, or evapotranspiration a volume equivalent to the first one-half inch of runoff, so that the capacity to store an additional one-half inch is again provided within 72 hours following a storm event (F.A.C. Rule 17-25).

3.9 Materials Handling

No heavy equipment such as large cranes, plant components such as boilers, or other voluminous materials such as limestone for an FGD system will be transported to the site, unloaded, stored, or moved around the site during normal operation or maintenance of the facility. All equipment will be inside a building, and all maintenance will be carried out within the building. The room where the steam turbogenerator is housed will have an overhead crane for maintenance of the turbogenerator. The solid waste and residue will be hauled in trucks. Sections 2.3.9 and 5.9 and Appendix 10.13 describe and analyze the impact of the truck traffic.

3.10 ASSOCIATED FACILITIES

The 50.4 acre site to be occupied by the energy recovery facility will also be occupied by the Northwest Brandon Subregional Wastewater Treatment Plant (WWTP).

The wastewater treatment plant is planned to be operational by September 1986. As currently scheduled, the WWTP, therefore, would be operational about 16 months prior to the start-up date of the energy recovery facility. As noted previously in Section 3.1 of this Chapter, the WWTP can and will operate effectively regardless of the status of the energy recovery facility. The WWTP will not have to rely on the energy recovery facility for disposal of its effluent. Other methods such as land application will be available for effluent disposal/discharge.

Final design of the WWTP is planned for December 1984. At that time, the Hillsborough County Water and Wastewater Department would apply for its construction permits. As permits for the construction and operation of the WWTP are applied for or received they will be forwarded to the Power Plant Siting Section for insertion into Appendix 10.4.3 (Volume II) of this Application for Power Plant Site Certification.

The WWTP is illustrated on Figure 2.5 General Site Development Plan in Section 2.1.2. The WWTP is currently in the final design phase. During this phase, a specific treatment facility will be recommended. The proposed facility will be capable of providing an effluent treated to meet the mandated discharge requirements of Florida Department of Environmental Regulation (FDER).

At the present time, the County purchases an average of 2.0 million gallons per day (mgd) of treatment plant capacity from the City of Tampa. This flow would be treated by the new WWTP along with that from several industrial concerns and the proposed resource recovery facility. This would remove the industrial waste from other County facilities avoiding some undesirable mixing of municipal and industrial waste.

In light of the above considerations, an initial capacity of 3.0 mgd is proposed for the WWTP. Effluent quality would be responsive to needs for cooling water at the proposed resource recovery facility and to meet DER requirements for land application by spray irrigation of areas accessible to the public.

More specifically, the treatment facility as shown on the General Site Development Plan may contain the following processes or unit operations in the sequence of flow through the total treatment works:

- | | |
|--|--|
| Screening | - Removes coarse material such as boards, and plastic bottles. These are collected as a waste product for incineration or burial. |
| Grit Removal | - Vortex-type degritters which offer efficient grit removal over a wide range of effluent flows will be employed. This prevents excessive wear on downstream equipment. |
| Odor Control | - A wet scrubber system will be used to remove hydrogen sulfide and other odors. |
| Extended Aeration
Secondary Treatment | - The wastewater is mixed and provided with ample oxygen so that bacterial decomposition of the waste takes place in an oxygen-rich environment. Wastes are organically broken down into simpler compounds. |
| Final Clarifiers | - The wastewater passes slowly through a tank. This allows the solid material, including the bacterial mass and other microorganisms to settle to the bottom of the tanks for withdrawal. Excess solid material (waste sludge) must then be processed and disposed of. |
| ABW Filters | - The wastewater is filtered through automatic back-wash (ABW) filters so that finer and lighter solid material not removed in the clarifier is captured. |
| Chlorination | - High level disinfection. Chlorine is applied to destroy bacterial and other potentially harmful organisms that may have passed through the filter. |

Effluent Pump Station - Chlorinated, treated wastewater, (plant effluent) and Storage can then be pumped (lifted) into a storage tank prior to disposal or reuse.

Thickeners - Waste sludge from the clarifiers is thickened. This is to remove more water and reduce the volume.

Dewatering - Dewatering will be provided to remove liquid from the thickened sludge to form a semi-solid cake suitable for further processing or utilization/disposal.

After these processes, there are two products for disposal - the highly treated wastewater and the dewatered waste sludge. The sludge can be landfilled, land applied or composted and used as a soil amendment. The wastewater may be used at the resource recovery facility, land applied, or reused by other local industries. In land application, various land areas would be needed, depending on soil conditions. Effluent disposal is being investigated as part of the preliminary design of the WWTP.

Chapter 5 fully describes the operational impacts of the WWTP as they relate to the energy recovery facility. The impacts of the energy recovery facility on the WWTP are also discussed.

Effects of Site Preparation and Plant and Associated Facilities Construction

Chapter 4

CHAPTER 4

ENVIRONMENTAL EFFECTS OF SITE PREPARATION, AND PLANT AND ASSOCIATED FACILITIES CONSTRUCTION

Before presenting the environmental effects of site preparation and construction of the proposed facilities, a description of the construction phases and activities is provided. This description is an overview of the anticipated construction scenario.

CONSTRUCTION PHASES AND ACTIVITIES

The Hillsborough County Resource Recovery Facility's field construction period will be approximately 24 months. This 24-month construction period will follow a six-month period of final process, civil, and structural design procedures and major equipment design and purchase. Following complete construction, there will be approximately six months of personnel training, equipment testing and calibration. The complete design, construction and shakedown schedule will extend over an approximate thirty-six month period from awarding of contract to full plant operation.

The principal construction phases will include site preparation (site clearing and preparation, excavation, pile driving and backfilling), construction of the facility (foundations, building and process equipment erection, electrical and mechanical systems installation, instrumentation), and finalization (road construction and paving, final grading, painting, landscaping and cleanup). Completion of the final construction activities will possibly extend into the shakedown period.

The expected progression of field construction activities is presented in Figure 4.1. This figure indicates the activities involved in construction of the resource recovery facility and the estimated time required for completion of each activity.

SITE PREPARATION

Site Cleaning and Access Road

Retention Basins

Fill for Tipping Floor

Denaturing for Bunker

Pile Installation ¹

FACILITY CONSTRUCTION

Refuse Bunker

Boiler House

Power House

Administration and Residue Building

Switch Yard

Stack

Cooling Tower

Tipping Room

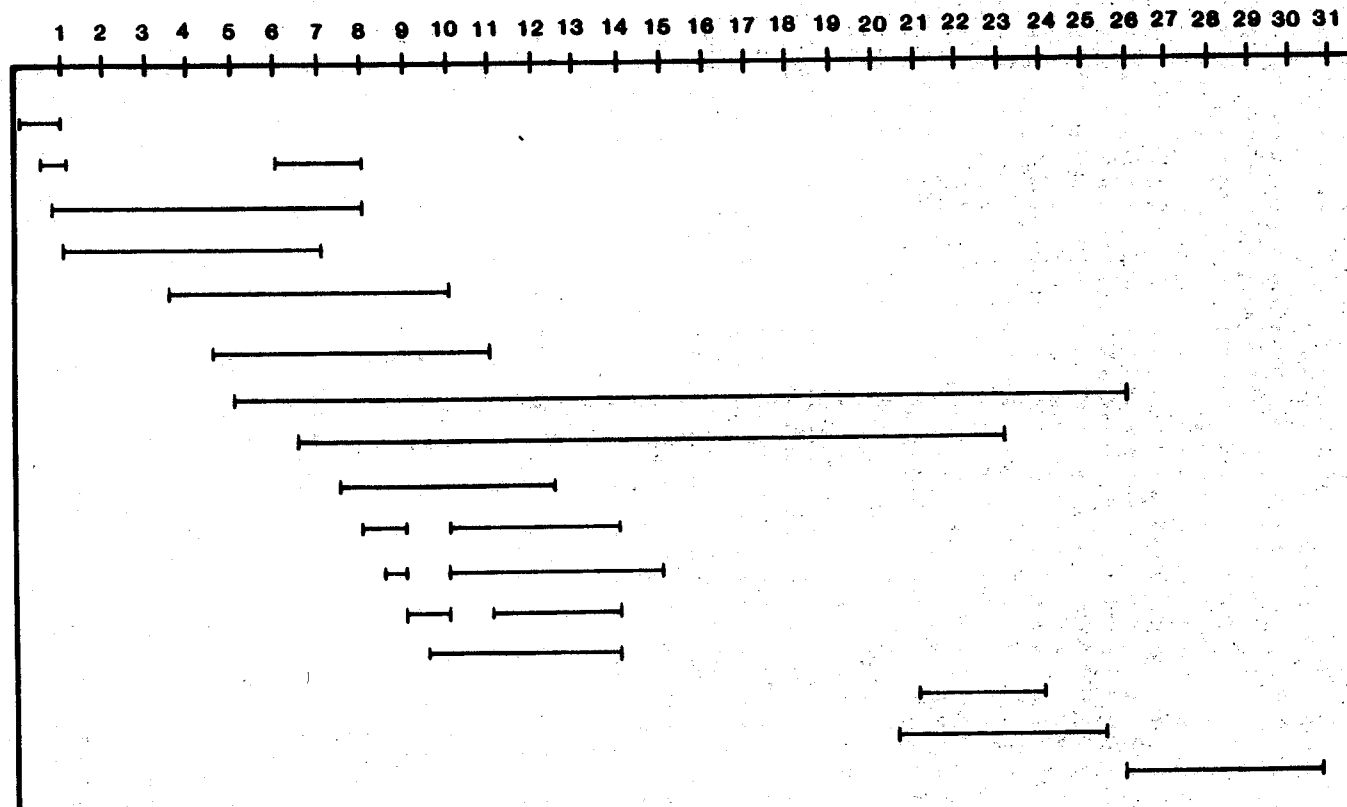
FINALIZATION

Scale House Installation

Landscaping and Access Road

Start-up and Acceptance Testing

Months



¹ Includes capping of piles and backfilling

Site Preparation

The initial phase of construction will involve the demolition of on-site structures (a small farm shed) and the clearing of trees located in the northwest section of the site. This activity will be followed by construction of the west retention basin, initial placement of excavated material in the tipping floor area and site access road subgrade preparation.

Upon completion of the west retention basin, dewatering procedures for refuse bunker excavation will commence. Refuse bunker excavation will start once the groundwater level begins to drop. Following the initial six feet of excavation, sheet pile driving will begin for further excavation of the refuse bunker. Dewatering activities will continue until the concrete walls for the refuse bunker have been placed and cured to an elevation above the existing groundwater level. This dewatering is not expected to continue beyond a six-month period. The water withdrawn during this dewatering activity will be discharged into the completed west retention basin to minimize site runoff during construction. This water will also be utilized for dust control when necessary.

The driving of steel sheet piles will be required for the refuse bunker excavation greater than six feet in depth. This pile driving activity will be conducted from approximately the eighth to the fourteenth week of construction.

As required, permanent and temporary drainage structures will be built during various phases of construction to control surface water runoff. The surface runoff collected in these drainage ditches will be directed to retention basins to minimize adverse impacts on adjacent off-site water courses. For this reason, all retention basins will be constructed in the early stages of construction.

The excavation activities for all on-site facility's will extend from the fourth to thirty-fourth week of construction. Over this thirty week period there will be two breaks in excavation activities totaling an estimated

twelve weeks. Therefore, the total on-site excavation will require approximately eighteen weeks. Excavation will be required for three retention basins, foundations for on-site structures and portions of the site access roadway. These excavation activities for the resource recovery facility will involve approximately 13.5 acres, or 27 percent of the entire 50.4-acre site. Areas included in this excavation estimate are the three retention basins, the area for the switchyard, building areas, cooling tower and all roads up to the limit of the backfill.

Erosion will be controlled by various methods depending on the extent and type of excavation and grading. During construction, exposed areas will be left bare for as little time as practical. Typical means of erosion control will include sodding, netting or mulch seeding. Due to the general flat topography of the site, minimal erosion is anticipated during construction. The greatest potential for erosion will be on the sideslopes of the elevated tipping floor area. The previously stated method for erosion control will be utilized in this area.

Coincident with the excavation activities will be the placement of backfill required for the elevation of the tipping floor and its associated access ramps. Approximately 18 percent of this required backfill material will be obtained from the necessary on-site excavations. The remaining quantity, approximately 104,000 cubic yards, will be hauled in from an off-site borrow area. The transportation of this fill material to the site will require an estimated average of forty-five trucks (assuming sixteen cubic yard capacity) per day, five days a week, over the total 29-week backfill phase of construction. During this period of construction, the greatest impact on the level of traffic entering and exiting the site will occur. Backfilling procedures required for the raised tipping floor will result in an estimated total of 90 large semi trucks per day passing through the entrance/exit of the site. Each truckload of fill will generate two truck trips per delivery, one entering the site full and the other leaving the site empty. The use of larger capacity trucks would reduce the number of truck trips accordingly.

Following preliminary subsurface explorations, it was recommended by the geotechnical engineers that drilled shafts be utilized for heavily loaded foundations (stack, boiler and powerhouse) due to soil conditions encountered on the site. The use of drilled shafts will minimize noise levels commonly associated with pile driving. For lighter foundation loads (administrative and residue house, cooling towers and switch yard), drilled or driven piles may be used. Foundation pile installation activities, for the entire resource recovery facility, will commence in approximately the sixteenth week of field construction and should continue for an estimated twenty-two week period.

Construction of the Facility

The placement of concrete for pile caps, slabs and walls is estimated to begin in the twenty-first week and continue for a 28-week period. This concrete placement phase of construction is expected to peak between the twenty-fifth and thirty-fifth week of field construction. During this peak phase of concrete placement it is expected that an approximate average of 50 cubic yards of concrete will be placed per day, five days a week, over this 10-week period. To transport this quantity of concrete to the site during this period, an estimated seven trucks will be required per day (assuming eight cubic yards per truckload).

The erection of steel superstructures for on-site facilities is expected to commence during the thirtieth week of construction and continue for a period of approximately 20 weeks. These steel superstructures will range from a height of about 47.5 to 140.0 feet above existing ground elevation and cover an estimated area of 1.4 acres.

As indicated in Figure 4.1, the installation of major equipment (boilers, grate system, electrostatic precipitator, turbine generators, cooling towers, steam and process piping) will require the greatest time of all construction phases. In most cases, the installation of this equipment will begin while the steel superstructure of each respective building nears completion. Major equipment installation is expected to span a period of 65 weeks. This activity will begin in approximately the thirty-ninth week and continue until the end of the plant construction.

Scales and scale house will be installed near the completion of facility construction. This late installation will reduce the possibility of damage incurred by heavy construction vehicles passing over the installed scales while traveling along the access road. Scale house and scales installation is expected to occur during the eighty-fifth week and require approximately 12 weeks for completion.

Finalization

Completing the entire construction period of the resource recovery facility will involve such activities as paving of the access road, painting and general landscaping. Activities which are not critical to the startup of the facility, such as painting and landscaping, are expected to continue into the shakedown period of facility implementation.

The final activity which is still considered part of the construction schedule is facility startup and acceptance testing. The facility will be tested under various operating conditions and monitored to determine if the facility complies with environmental standards so that long-term operating permits can be issued. The basic work force includes the facility's operating staff and various specialists and regulatory personnel. This final phase should be completed within five months.

EQUIPMENT REQUIREMENTS

During routine construction activities, it is anticipated that approximately six to ten major pieces of equipment will be actively operating throughout the site. This average equipment requirement will vary as dictated by the facility construction schedule. The very early and final stages of construction will typically have reduced equipment requirements. The peak construction period, covering the period from the eighth to fifty-seventh week, will require the most varied types and greatest amount of equipment to be operating on the site.

Exact equipment to be utilized during construction will largely depend on the specific general contractor chosen to construct the resource recovery facility. The general contractor may choose to rent specialized equipment during various phases of construction. If rented equipment is utilized for a specific phase of construction, the general contractor will typically complete all activities requiring this rented equipment rather than staging that particular phase of construction.

Typical equipment to be utilized in the construction of the proposed resource recovery facility is outlined in Table 4.1. These equipment requirements do not include the necessary vehicles to haul backfill (for the elevated tipping floor) from off-site, concrete for building slabs and walls, or the general traffic associated with the workforce entering and exiting the site.

ON-SITE ACTIVITIES OF POTENTIAL ENVIRONMENTAL CONCERN

In order to understand and estimate the magnitude and location of various types of potential environmental impacts it is important to reasonably define those activities which could be of concern. Therefore, the types of construction-related activities which could occur during each of the three major construction phases were reviewed. The results of this review are presented in Tables 4.2 and 4.3. The combination of activities for each construction phase, with the anticipated type and location of equipment on-site, is outlined within the two tables.

For the site preparation phase of construction, the period of greatest impact for noise and emissions is not expected to occur at the same time as the period of greatest dust generation. Based on the anticipated construction schedule for the resource recovery plant, the greatest impact during site preparation, in terms of noise and emissions, is expected to occur at approximately the twelfth week while dust generation is expected to be greatest in the thirty-third week. The greatest impacts from facility construction and finalization are predicted to occur during the forty-first and ninety-sixth weeks, respectively.

TABLE 4.1

ESTIMATE OF
CONSTRUCTION EQUIPMENT REQUIREMENTS

<u>Equipment</u>	<u>Estimated Quantity</u>	<u>Equipment</u>	<u>Estimated</u>
<u>EARTHMOVING</u>		<u>IMPACT</u>	
Dozers	2	Pneumatic Tools	10
Front End Loader	2	Jack Hammers	2
Backhoe	2		
Scraper	1	<u>MISCELLANEOUS</u>	
Trucks	7	Vibrators	3
Grader	1	Pumps	6
Paver	1	Compressors	2
		Generator	2
<u>MATERIAL HANDLING</u>		Welders	4
Cranes	4	Saws	3
Derrick	1		
Pile Driver	1		
Concrete Pump	1		
Fork Lift	1		

Source: CDM

TABLE 4.2

**CONSTRUCTION ACTIVITIES IMPACTING NOISE AND EMISSIONS
FROM CONSTRUCTION EQUIPMENT**

Construction Phase	Activities Occuring Simultaneously	Anticipated Operating On Site	Relative Location of Equipment On Site ¹
SITE PREPARATION	Sheet Pile Driving for Refuse Bunker	1 Pile Driver 1 Front End Loader	Localized Spaced 500 Ft. Along Access Road
	Dewatering of Refuse Bunker Excavation	6 Pumps	
	Refuse Bunker Excavation	2 Backhoes 7 Trucks	
	Placement & Compaction of Fill for Tipping Floor	2 Dozers 3 Trucks	
FACILITY CONSTRUCTION	Concrete Placement ¹	1 Pump 2 Saws 3 Vibrators 3 Trucks	Localized Spaced 500 Ft Along Access Road
	Structural Steel Erection	2 Cranes 1 Derick 4 Pneumatic Tools 2 Welders 1 Compressor	Localized Within A 200' Radius
	Major Equipment Installation	2 Cranes 1 Fork Lift 2 Generators 6 Pneumatic Tools 1 Compressor 2 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

^{1/} Assumes daytime pour. A 24 hour a day pour would shorten the duration.

TABLE 4.3
CONSTRUCTION ACTIVITIES IMPACTING FUGITIVE DUST

Construction Phase	Anticipated Areas to be Exposed Simultaneously	Estimated area of Land Cleared (Acres)
SITE PREPARATION	Two Large Eastern Retention Basins	4.8
	Backfill Embankment	5.7
	Access Roadway Stripped to Subgrade	4.6
	Miscellaneous (Staging Area, Employee Parking, Materials, Lay Down Area, Etc.)	4.0
FACILITY CONSTRUCTION	Backfill Embankment	5.7
	Access Roadway Stripped to Subgrade	4.6
	Miscellaneous (Staging Area, Employee Parking, Materials, Lay Down Area, Etc.)	4.0
FINALIZATION	Estimated Area to be Exposed at One Time Due to Landscaping and Final Grading	6
	Miscellaneous (Staging Area, Employee Parking, Etc.)	4.0

In the facility construction phase, a major portion of equipment will be operating at elevated heights during building erection and facility equipment installation. The operation of construction equipment at elevated levels will increase the construction-related noise relative to operating the equipment at groundlevel. The construction equipment anticipated to be in operation at heights from 100 to 140 feet above existing ground are four pneumatic tools, one compressor, two welders and one generator. In addition six pneumatic tools, one generator, one compressor, two welders, one pump, three vibrators, two saws and one derrick are assumed to be in operation at heights up to 100 feet. Because the noise would be attenuated over the 1,700 feet to the nearest residence, the actual impacts would be minor. The remaining other equipment listed for all construction phases in Table 4.2 is expected to be based and operating near or at ground level.

Other features unique to the planned construction activities that could potentially affect the environment are discussed, as appropriate, in the following sections. The material presented to this point provides an overview of key construction-related activities of potential environmental concern.

ENVIRONMENTAL EFFECTS

4.1 LAND IMPACT

4.1.1 General Construction Impacts

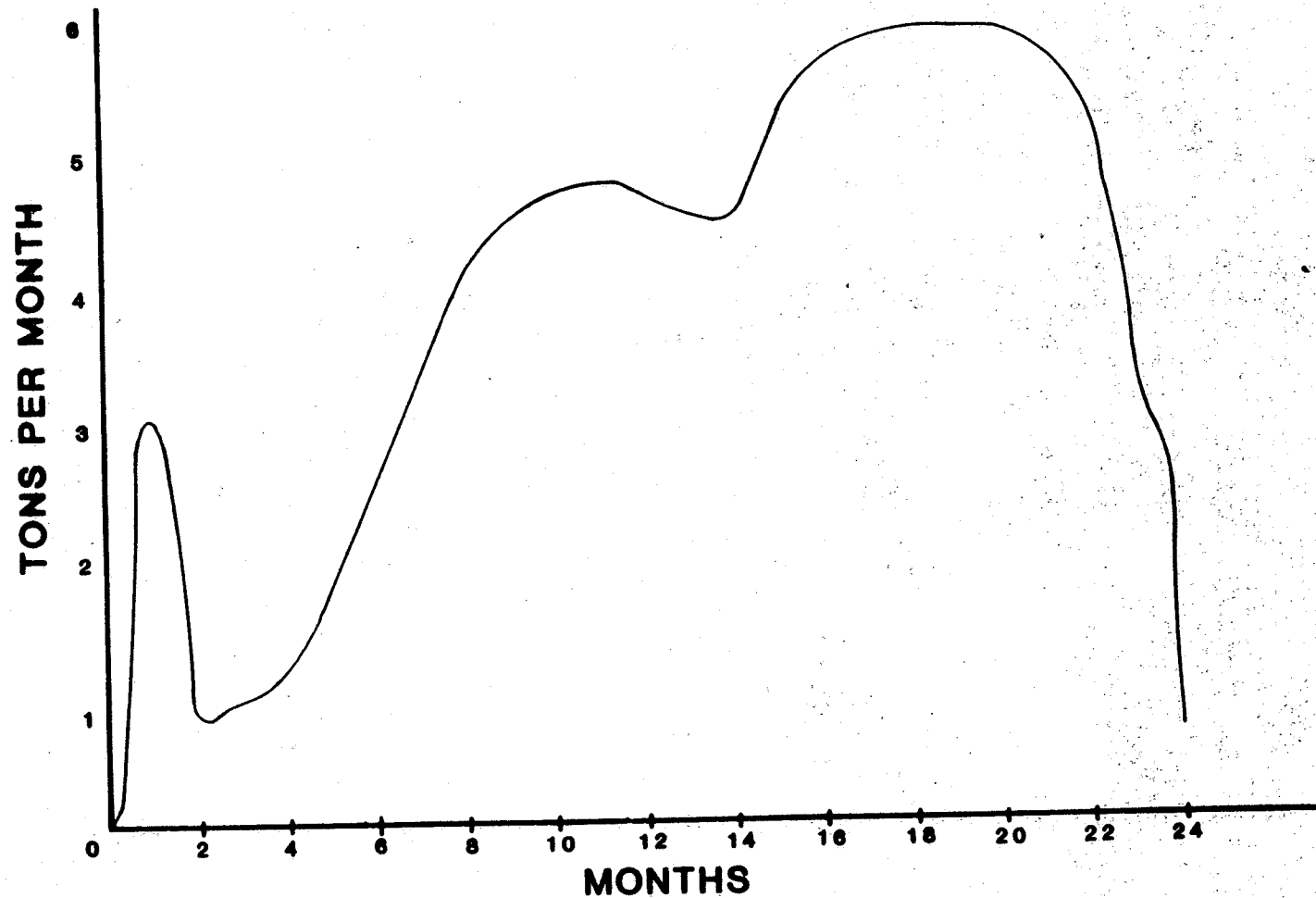
4.1.1.1 Impact on Solid Waste Generation and Disposal

During the construction of the resource recovery facility a variety of solid wastes will be generated and must be disposed of periodically throughout the duration of construction. These wastes will include vegetation matter, wood, paper products, concrete, scrap metal and lumber, and miscellaneous oils and fluids required for equipment operation.

The site clearing procedures will generate debris which include vegetation matter and wood. Approximately forty trees and associated vegetative ground cover will have to be removed prior to plant construction. Existing on-site structures, which include a small shed and fencing, will be demolished during this initial construction activity. Slash and wood debris generated during the removal of trees and existing structures will be burned on-site or hauled to the County landfill for disposal.

Small quantities of waste oils and solvents may be generated on-site as a result of equipment maintenance and various construction activities. Waste oil will be generated at a rate of about one drum (55 gallon barrel) every two to three months. Typically, fewer waste solvents would be generated than waste oils except during certain phases of equipment installation, e.g. piping and electrical systems where solvent generation could be twice that of oil. Drums of waste oils and solvents will be stored on pallets within a bermed area. They will be properly labelled and covered with a weather-proof canvas or plastic drop cloth. Neither waste oils or solvents will be stored on-site for longer than 90 days. Transport and disposal of these wastes will be by properly licensed contractors.

Over the twenty-four month duration of plant construction it is estimated that the work force will generate a total of 95 tons of solid waste. Whenever practical, recoverable materials, such as metal and oils, will be removed from this waste stream. It is anticipated that roll-off containers will be utilized for the collection and haul of non-recyclable materials to the County landfill. The estimated generation of solid waste over the course of construction is presented in Figure 4.2. The pattern of waste generation follows the type and level of activities occurring on-site. An initial peak is associated with site preparation and clearing. After site preparatory activities, waste generation drops followed by higher generation rates which generally coincide with construction and installation activities.



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 4.2
ESTIMATED SOLID WASTE
GENERATED DURING CONSTRUCTION

4.1.1.2 Staging, Material, Lay-Down, and Work Force Parking Areas

Due to the large number of construction activities taking place on the site, the staging, materials lay-down and storage, and work force parking areas must be designated to those areas where construction activities are minimal. It has been assumed that the wastewater treatment plant, to be located in the southern section of the site, will be under construction or completed while construction of the resource recovery facility begins. For this reason sufficient areas south of the resource recovery facility will not be available for construction staging and employee parking. An area north of the resource recovery facility will be utilized as a materials lay-down area due to its proximity to the facility and site entrance. This location will minimize the level of traffic near the locus of construction and reduce handling distances for stored materials. Staging, as well as additional material lay-down areas, will be designated to an area adjacent to the main facility. This will keep the staging area as close to the actual facility construction area as possible. General work force parking and a construction office will be located in the northeast corner of the site adjacent to the access roadway. Locating this area near the entrance will minimize the work force traffic interference with major construction activities taking place in the central portion of the site. These construction support areas are indicated on Figure 4.3.

4.1.1.3 Land Disturbance

A fairly detailed discussion on the construction activities that will disturb existing terrain is presented in the section entitled Construction Phases and Activities. A review of this discussion reveals that at least four major activities occur during construction that will disturb existing terrain. These activities are listed below:

1. Initial site clearing and construction of access road
2. Phased construction of retention basins
3. Excavation for refuse bunker
4. Fill placement for tipping floor

The quantitative features of all these activities were previously described. It should be noted that all four of these terrain-disturbing activities are typical for the construction of a project of this nature.

4.1.2 Roads

This section of the application does not apply to this project. Access to the project site will be off Faulkenburg Road which is a County Road. The only roads to be constructed are those which will be on the site and used to support facility functions. There will be no public access roads constructed as a result of this project.

4.1.3 Flood Zones

This section of the application does not apply to this project. None of the structures planned as part of this project will be within the 100-year flood zone. Refer to Figure 2.6 for information on the limits of the 100-year flood zone in the vicinity of the site.

4.1.4 Topography and Soils

The site topography will be altered by the proposed project. Retention basins will be constructed and the five basins planned will cover a total of approximately five to six acres and have an average depth of one to two feet. The areal features of these basins are shown in Figure 4.3.

As construction progresses, more and more of the site area will be covered with impervious surfaces, e.g. roads and buildings. When completed, the site will comprise a maximum of 593,000 square feet of impervious surfaces. Approximately 252,700 square feet will be covered by buildings and other facility components and the remaining 339,600 square feet will be covered by roads and parking lot surfaces.

The major modifications to subsurface conditions will result from the construction of the refuse bunker and the installation of piles. The bunker will be seven feet deep, 264 feet long and 63 feet wide. Construction of this bunker will require excavation slightly beyond the limits of the bunker's final design dimensions. The deepest excavation is planned to be about ten feet below existing grade. Sheet piling will probably be used to open and shore up the excavated area. Load bearing piles will be installed underneath those areas of the main structure having the heaviest loads, e.g. the boiler and the stack. The exact number, type, spacing and length of the piles has not yet been defined. This information will be developed with final design.

The creation of impervious surfaces will change the site drainage features and percolation rates. The analysis summarized in Appendix 10.14 indicates that the addition of impervious surfaces to over twenty percent of the site area will result in a twenty to forty percent increase in the rate of peak discharge from the site. The creation of impervious surfaces also increases the total volume of runoff, but this increase is less than ten percent.

The scheduled construction of the retention basins is such that any excess, potentially sediment-laden runoff generated during construction activities at other site locations will be diverted to basin number 3 (see Appendix 10.14). Due to the already high groundwater level the basins will probably at times perform as infiltration-evaporation basins. Groundwater conditions in the area of the proposed facility are such that the water table is often within a foot of the ground surface. As the basins are filled, the groundwater table may rise to intersect the basin bottom. Water retained in the basins would still percolate away, however, as the flow lines would follow a horizontal path.

Certain mitigative measures to control soil erosion and air pollutants during construction will be undertaken by the developer. The following measures are conditions of the rezoning approval imposed on the developer by Hillsborough County:

- a. designated haul routes will be used on-site to channel main traffic over a path which can be stabilized;
- b. chemical stabilization will be undertaken over heavily traveled primary haul route sections;
- c. mid-weekly cleaning of dirt off Faulkenburg Road adjacent to the site will be undertaken;
- d. wherever possible, selective clearing will be used to allow natural seeding to stabilize the disturbed soil and berms to minimize wind erosion;
- e. all dirt roads will be watered as necessary;
- f. asphalt roads will be developed as soon as practical;
- g. clearing of land within the development will be staged to reduce land opened and exposed to windy conditions; and
- h. mulching, landscaping and sodding will be undertaken as soon as possible after final grading is completed.

Planned construction activities and modifications to the site's drainage features should not result in any direct or indirect subsidence or sink hole formation problems. Planned back filling will increase the load on soils and could result in some minor settlement due to surcharging. This, however, is a design issue which can be accounted for.

The bearing capacity of various portions of the site will be improved with the use of piles to support heavy structures and associated components. No long-term problems are associated with this change in site subsurface conditions.

The construction activities described which will affect the site's topography will have some potentially negative aesthetic impacts. Due to the relatively undeveloped and industrial nature of adjacent areas, visual impacts should be very limited since there are no existing viewsheds which could be adversely affected. Most of the activities described in this section will occur at or below grade resulting in very limited visibility from nearby roadways and the closest residential area. However, backfilling to bring existing grade up to the planned tipping floor elevation will result in activities occurring at twenty feet above existing ground levels. The backfilling operation and resulting mound will be visible from nearby residences. This will result in a minor visual impact.

4.2 IMPACT ON SURFACE WATER BODIES AND USES

4.2.1 Impact Assessment

None of the major activities described in the Instruction Guide (DER Form 17-1.211(1)) which could have an impact on surface water bodies and uses, will be associated with this project. No construction activities are planned to occur in or near surface water bodies, there are no intake or discharge structures for cooling water (cooling water will be provided by the co-located WWTP and condensing towers), and no excavations are planned for cooling ponds or ditches.

However, there are two project activities which could affect nearby surface waters. One involves the discharge of stormwater runoff during both construction and operational periods. The other, occurring during refuse bunker construction, is the planned discharge of groundwater withdrawn during the dewatering operation. Due to the planned mitigation measures neither activity is seen as a problem area.

Construction activities, especially those involving the movement of earth, clearing of land and changes in topography, typically result in increased site runoff during storm events. Additionally, since surface vegetation is disturbed or removed and steeper slopes are created, this increased runoff has more erosion potential and can become sediment-laden. However, as

noted above, no surface waters are located near the construction sites. In addition, detention basins are planned which will hold stormwater prior to discharge. The design detailed in Appendix 10.14 ensures that all active portions of the site are drained into a basin and that basin depth and spillway height are sufficient to ensure attenuation of peak discharge and retention of the first one-half inch of runoff.

During the initial construction phase, the basin located in the northwest portion of the site will be much larger than as is shown on the final site grading plan. The increased basin volume will provide storage capacity for the attenuation and treatment of the pumped discharge occurring during the dewatering operation (See appendix 10.14). The basin will be operated to assure that the turbidity of all discharges to off-site areas is less than 50 Jackson turbidity units above background.

During both the construction and operational phases of the project, detained water will discharge both to the ditch running along the northern boundary of the site and the channel running along the western boundary of the site. The basins have been designed to limit the volume and rate of discharge so that they do not exceed the values determined for the pre-developed site. The capacity of both channels is adequate to accept the design discharge rate. The quality of any discharges will be such that the existing water quality in the receiving waters will not be degraded.

4.2.2 Measuring and Monitoring Programs

The water sampling program conducted for this project has been described in Section 2.3.4.2. This program was conducted to establish baseline conditions from which potential impacts during construction may be measured and evaluated.

As indicated in the preceding section, impacts from the planned construction of this project are expected to be minimal. Mitigation measures for control of surface runoff and erosion, along with the early construction and use of final retention basins, will effectively eliminate any adverse impacts to surface waters during construction.

The planned dewatering program will also incorporate mitigation measures which will effectively eliminate the potential for adverse impacts. The initial dewatering activities may result in the withdrawal of some sediment-laden water. However, this water will be retained in the retention basins and will only be discharged once suspended solids are at an acceptable level, which has been indicated by the Hillsborough county EPC as a turbidity level which does not exceed 50 JTU above background. Once the dewatering operation has proceeded for a few days the water quality of the withdrawn water should be compatible with that in the drainage swale. When this occurs, direct discharge will be possible.

Water pumped during dewatering will be detained and then discharged offsite as soon as practical. This will prevent return groundwater flow into the dewatering system.

4.3 GROUNDWATER IMPACTS

4.3.1 Impact Assessment

Site preparation will not have any significant effect upon the chemical quality of the local groundwaters. The necessity of site dewatering prior to and during construction of the refuse storage bunker will result in a physical effect to local groundwaters in that the surficial water table will be lowered during dewatering operations.

Specific impacts evaluated in this section include:

- o quantity of water to be pumped during construction of refuse bunker;
- o levels of drawdowns which may be expected near the property boundaries;
- o measures required to mitigate the drawdown near the property boundaries.

In order to evaluate the impacts that this construction dewatering might have, an analytical evaluation of the groundwater flow system and the dewatering facilities was developed and utilized. This analysis is presented in its entirety in Appendix 10.15, and was based upon the following assumptions:

- o The outside dimensions of the refuse bunker were approximated to be seven feet deep, 264 feet long and 63 feet wide. Excavation for the bunker would be to a 10 feet depth.
- o Construction dewatering would be required for an estimated two to three months.
- o Dewatering well spacings would be at intervals typically employed by foundation contractors, assumed to be five feet for this analysis.
- o Unless otherwise noted, water pumped from the dewatering system would be discharged off-site to prevent return groundwater flow into the dewatering system.
- o Sheet piling would be used to open and shore up the excavation such that the walls of the excavation would remain vertical during construction.

Site geology was simplified to a "3-layer" system:

- | | | |
|------------------------|---|---------------------------|
| o sand and clayey sand | - | surficial aquifer |
| o clay | - | aquitard (confining unit) |
| o limestone | - | floridan aquifer |

The required excavation at 10 feet below ground elevation is considered relatively shallow. As a result, the associated dewatering program would affect only the upper aquifer. Because dewatering the site would only, in theory, affect the upper deposits (sand, clayey sand, and clay) the conceptual model of the groundwater system considered the average thickness of

each unit, 10 feet for the sand and 4.6 feet for the clayey sand. The underlying clay was determined to have such low hydraulic conductivity (5×10^{-4} ft/day) that it was considered as essentially impermeable for the purposes of modeling groundwater drawdown responses.

Basically, impacts to the groundwater table would be limited for drawdowns which would occur within the top two subunits (the sand and clayey sand) of the surficial aquifer.

Recharge rates were assumed to vary from 0.4 to 2.5 inches per month, depending on the season during which construction occurs. This recharge would have to be removed from ground "storage" during the period of construction.

The results of the analysis indicate that projected drawdowns at the property boundary would not exceed about 3.5 feet under "worst case", e.g. low recharge, conditions. The four scenarios which were modeled and the results are displayed in Table 4.4. This table shows the assumed effect of site dewatering at the 400-foot distance from the centerline of the dewatering wells. Estimated pumping rates needed to achieve site dewatering under wet and dry conditions at the end of various time periods are given in Table 4.5.

Initially it is assumed that pumped groundwater will be discharged to an on-site retention basin which will provide adequate detention time for particulate matter to settle out prior to discharge. Once turbidity of withdrawn water has decreased to acceptable levels, water pumped from the dewatering system would be discharged directly off-site. Off-site discharge will be to the drainage ditch located about 250 feet north of the site boundary. The potential effects of such a discharge are discussed in Section 4.2.1 (Surface Water). The Hillsborough County Environmental Protection Commission regulations require that no discharges to surface waters exceed 50 Jackson Turbidity Units (JTU) above background (Section 18, Chapter 67-1504 of the Hillsborough County Environmental Protection Act).

TABLE 4.4

PROJECTED DRAWDOWN LEVELS AT FAULKENBURG ROAD SITE
DURING CONSTRUCTION DEWATERING

<u>Scenario</u>	<u>Drawdown at 400 Feet</u>
7 days (dry)	0.0 feet
7 days (wet)	-0.25 feet
90 days (dry)	3.5 feet
90 days (wet)	1.5 feet

SOURCE: CDM

TABLE 4.5

ESTIMATED INSTANTANEOUS GROUNDWATER DEWATERING DISCHARGE RATES
(gallons per minute) UNDER CONDITIONS OF LOW AND HIGH GROUNDWATER RECHARGE

	<u>Low Recharge (0.4 in/month)</u>	<u>High Recharge (2.5 in/month)</u>
Initial	230	235
1st Day	150	150
7th Day	35	40
30th Day	16	20
90th Day	6	15

SOURCE: CDM

It should be noted that Section 40D-6.0551(3) of the Southwest Florida Water Management District (SWFWMD) Rules states that a permit shall not be required to -

"temporarily dewater an area within the limits of a work of the District for construction, alteration, or repair of buildings, or other foundations and roadways, or during installation, alteration, or repair of utility pipelines, cables, culverts, and catch basins, when such temporary dewatering will be for a period not exceeding six (6) months; provided however, that the District shall be advised in writing prior to commencing such activity. A permit shall be required prior to continuation of dewatering activities beyond the initial six (6) months period."

Correspondence with SWFWMD has indicated that a permit would not be required for this project because the duration of temporary dewatering would be less than six months, and any exceedence of the SWFWMD drawdown criteria would have no measurable effect upon private wells in the area.

SWFWMD officials have expressed interest in providing assistance to the County for a network of monitoring wells which could develop valuable data on surficial aquifer characteristics to the district as part of the broader, separate, region-wide program.

The planned site clearing activities will have a temporary, but minor effect on local site runoff and recharge characteristics. However, based upon the site's currently undeveloped condition and planned erosion and runoff control measures, effects on groundwater quality should be insignificant. Additionally, there should be no influence on groundwater quality as a result of the planned dewatering activity. The short-term nature and relatively shallow depth of the dewatering program should not result in the lateral migration of groundwater to the extent that local groundwater quality characteristics would change.

4.3.2 Measuring and Monitoring Programs

The modeling techniques utilized in the assessment of possible effects from the planned dewatering system are summarized in Section 4.3.1. A more detailed description can be found in Appendix 10.15 to this application.

On-site data were obtained in order to assess possible dewatering impacts. The specifics of the data obtained are described in Section 2.3.1 and Appendix 10.5.1.

Because the impact analysis of this chapter concluded generally that impacts from the planned construction of this project are expected to be minimal, no specific construction monitoring programs are proposed at this time, with the possible exception of groundwater monitoring during dewatering initially proposed by the Southwest Florida Water Management District (SWFWMD) and which is discussed in Appendix 10.5.2. The proposed construction dewatering monitoring program would consist of a system of perimeter wells installed to monitor the hydraulic gradients during dewatering activities. The planned location of the monitoring wells would be established after additional discussions with SWFWMD.

As presented in Appendix 10.1.2, a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge has been applied for from U.S. EPA Region IV. This permit is specifically requested by the County for the construction dewatering aspect of the project. Any groundwater or surface water monitoring required as part of the NPDES permit will be performed.

4.4 ECOLOGICAL IMPACTS

4.4.1 Impact Assessment

As a result of actual facility construction, site grading for drainage, preparation of retention basins and final site landscaping almost the entire site will be modified from its existing state. While the ecological features of the site will be modified as a result of construction, there

are many factors which need to be considered when assessing the significance of potential effects. First of all, the site has been previously disturbed for agricultural purposes. Also, there is very little ecological diversity on-site. There are no flora species of unique interest on-site and any fauna displaced by construction can find similar and adequate habitats adjacent to the site. Finally, landscaping will involve revegetation with species that will provide a more diverse and possibly more productive habitat than currently exists.

The discharge of water pumped from the dewatering system should not have any adverse effects on the ecosystem in or near the receiving drainage channel. The quality of the water discharged should have no effect on flora and fauna species within the drainage channel. The quantity of water to be discharged will be fairly significant during the first seven days of dewatering. However, the predicted volume will not exceed the hydraulic capacity of the "downstream" drainage system. Some streambank flora species may be inundated during the first few days of dewatering. However, because of the water/moisture tolerance typical of these species and the short-term duration of exposure, there should be no adverse effects.

The increased velocity of water flows in the drainage channel should be minor when compared to flow experienced during major storm events. Therefore, adverse effects to benthic organisms should be minimal as a result of discharging pumped water from the dewatering system. In order to insure there will be minimal effects from the dewatering discharge, the initial seven-day period of the dewatering operation should not be scheduled during the traditional wet season.

The overall effect on the local ecosystem (both on and off-site) from construction activities will be very minor. While the existing habitats on-site will be greatly altered by facility construction, the similar adjacent ecological habitats make any impacts relatively minor because small animals and birds could move off-site. In addition, final revegetation and landscaping could possibly improve the ecological productivity of this site.

As part of the landscaping effort, certain conditions of the rezoning approval have been imposed on the developer by Hillsborough County. These conditions are presented in detail in Section 3.2 "Site Layout". In terms of required plantings, the boundary areas will include buffering consisting of trees, such as silk oaks and live oaks on 25-foot centers, and long-leaf pines or slash pines on 10-foot centers. All trees will be a minimum of three-inch caliper at the time of planting. The resource recovery buildings will be screened by plantings such as crepe myrtle, southern wax myrtle, weeping elm, viburnum, or evergreens, which will be a minimum of four feet tall at the time of planting. Plants for buffering shall equal the standards for Florida No. 1 as given in "Grades and Standards for Nursery Plants" Part I, 1963 and Part II, State of Florida Department of Agriculture.

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 Emission Rates

Construction activities have the potential for causing localized, short-term adverse air quality impacts. Possible impacts include:

- o fugitive dust emissions from land clearing and site preparation activities, and
- o mobile source emissions from construction equipment at the construction site.

Using the estimated equipment utilization given in Table 4.2 and the estimated area of stripped land in Table 4.3, maximum emission rates were calculated for each phase of the construction activity for total suspended particulates (TSP), sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon

monoxide (CO). Although emissions will continue throughout all phases of construction, the greatest impact from fugitive dust emissions will occur during the site preparation phase when approximately 13.5 acres of the site will be exposed. The greatest impact from the mobile sources will occur during the facility construction phase when the amount of equipment on site is the greatest.

Emissions were developed by employing average emission estimates presented in Table 4.6. This table contains the emissions of the criteria pollutants for standard equipment employed in the construction of such a facility. The methodology consists of:

- o Determining the maximum construction area during the activity
- o Considering all equipment necessary to perform the maximum construction activity.
- o Estimating the total emissions produced by the equipment needed to perform the activity.

Emissions of fugitive particulate matter were also determined for the construction activity.

The emission rate for fugitive particulate matter produced from the construction area, was obtained from the The Compilation of Air Pollutant Emission Factors; AP-42 (USEPA, 1977) for fugitive dust sources. The emission estimates for the mobile sources were obtained from the emission rates contained in Table 4.6 and are listed in Table 4.7.

Factors not incorporated into the development of the emission rate for fugitive dust are soil moisture, soil particle grain size, ground water level, and mitigating measures. These factors, if included, would contribute to lower emission estimates since the study area has a greater precipitation - evaporation index than the area used to develop the emission factors, and the soil is a medium to fine grained sand with a

TABLE 4.6

**COMPARISON OF EXHAUST EMISSIONS FOR HEAVY-DUTY GASOLINE AND
DIESEL-POWERED CONSTRUCTION EQUIPMENT AND VEHICLES AND LIGHT-DUTY VEHICLES**

	<u>Wheeled Tractor</u>	<u>Motor Grader</u>	<u>Wheeled Loader</u>	<u>Roller</u>	<u>Wheeled Dozer</u>	<u>Scraper</u>	<u>Off-Highway Truck</u>	<u>Miscellaneous</u>	<u>Emissions from an average heavy-duty vehicle operating in 1985</u>	<u>Emissions from an average light-duty vehicle operating in 1985</u>
Diesel-Powered Construction Equipment:										
Carbon Monoxide (g/hr)	973	97.7	251	83.5	335	660	610	188	23.7	34
Exhaust Hydrocarbons (g/hr)	67.2	24.7	84.7	24.7	106	284	198	71.4	3.48	9.2
Nitrogen Oxides (g/hr)	451	478	1090	474	2290	2820	3460	1030	398	32
Particulates (g/hr)	61.5	27.7	77.9	22.7	75	184	116	63.2	32	14.6
Sulfur Dioxide (g/hr)	40.9	39.0	82.5	30.5	158	210	206	64.7	56.1	10.8
Gasoline-Powered Construction Equipment:										
Carbon Monoxide (g/hr)	4320	5490	7060	6080	(1)	(1)	(1)	7720	200.7	23.7
Exhaust Hydrocarbons (g/hr)	164	186	241	277	(1)	(1)	(1)	254	13.9	2.03
Nitrogen Oxides (g/hr)	195	145	235	164	(1)	(1)	(1)	187	9.3	1.72
Particulates (g/hr)	10.9	9.4	13.5	11.8	(1)	(1)	(1)	11.7	24.2	12.8
Sulfur Dioxide (g/hr)	7.03	7.59	10.6	8.4	(1)	(1)	(1)	10.6	7.2	2.6

(1) Exhaust emissions produced from gasoline models not given

SOURCE: USEPA, AP-42, Third Edition (1977)

TABLE 4.7

EMISSION RATES FOR CRITERIA POLLUTANTS
DURING CONSTRUCTION

	Fugitive Dust		Mobile Sources	
	Short Term (lb/day)	Annual (tons/yr)	Short Term (lb/day)	Annual (ton/yr)
TSP	101.	60.6	4.95	5.15
SO ₂	-	-	5.73	5.96
CO	-	-	16.5	17.2
NO _x	-	-	90.9	94.5

Source: CDM

very low silt content. Additionally, the ground water level is about one foot from the surface contributing to the amount of moisture in the soil. Except for installing a comprehensive watering program, no credit was taken for those certain things noted above that would reduce predicted particulate emission rate.

4.5.2 Mitigating Measures for Particulate Emissions

The construction site is located in a TSP nonattainment area. Although the ambient air monitors located near the site show no violations of standards, the background concentrations are still high. Thus even a small impact of particulate matter could cause an adverse air quality impact. Based on the emission estimates in Table 4.7 the potential for a short term impact exists. Since these emissions are typical of those found with other construction activities and particulate emissions in this area are of concern, DER suggested developing emission reduction measures.

Construction requirements for fill and concrete will result in truck traffic along the site access road. This makes the currently unpaved road a source of particulate matter. Several mitigating measures are available to reduce these emissions. Routine watering of the roadway would provide a reduction of roadway emissions of about 50 percent. A watering truck is usually on site for various other activities. Partial dedication of this truck or the addition of a second truck could be accomplished. Surface treatment with penetrating chemicals would provide a 50 percent reduction depending on the frequency of application. The application of penetrating chemicals is more costly than a routine watering but fewer applications are required. The purchase of chemicals, time to mix the chemicals, and the partial use of a watering truck or some other vehicle would contribute to the costs. Soil stabilization alone can achieve a 50 percent emission reduction by binding up surface soil. The advantage to soil stabilization is that the roadway becomes more drivable. Soil stabilization is done once, as soon as the roadway is developed. Additional emission reductions could be obtained if oil or penetrating chemicals were spread over the stabilized area. Paving achieves the greatest reduction in emissions, 85 percent, and represents the most stringent emission limitation. Road

paving can be done either by soil compaction and adding base coarse material or by soil stabilization with an asphalt cap, whichever is most appropriate for the site.

Good construction practice requires a developed access road for the number of trucks hauling fill. Since a road capable of handling heavy trucks must eventually be built, any dust control measure less than building the access road up to base coarse level, would have to be torn up. Thus the development of the access road is not an excess cost but part of good construction, its early construction is cost effective, and is the recommended method for reducing particulate emissions.

General site emissions, particulate emissions across open and active construction areas, are best controlled by a comprehensive watering program. This method can reduce emissions by 50 percent. Other methods used to control emissions are not practical because soil is usually in a state of transition. An excess amount of penetrating chemicals would be required. Binding agents would continually be broken up. Since a watering truck is available onsite for other construction activities, its added utilization should not represent a significant cost.

Completed cut and fill areas which are vegetated or covered with chemical binders can reduce particulate emissions by 65 to 80 percent. Since these areas are not active and would not receive traffic, vegetation can grow undisturbed and chemical binders need only infrequent applications. Embankments brought up to grade and no longer subject to construction activity should be immediately landscaped or vegetated. Till piles or embankments requiring future activity should be treated with a readily available binder.

Good site maintenance practice should be observed. Although not quantifiable, covering trucks carrying fill or loose material and watering down the access road can greatly reduce dust problems. The practices are not costly and what extra effort may be required usually is greatly outweighed by the benefit.

4.6 IMPACT ON HUMAN POPULATIONS

The construction of this proposed project will result in both positive and negative effects on the local and regional population. Positive effects are primarily regional in nature and result from construction jobs created, material purchases and associated tax revenues. Negative effects are typically more localized to the project site and result principally from construction activities. This section presents a review of potential positive and negative impacts on human populations.

4.6.1 Sensitive Receptors

Sensitive receptors are defined as individuals or organizations/institutions located close enough to the project site to be potentially affected by construction impacts. A fairly comprehensive review of the land use and demographic features of the area surrounding the site is presented in Section 2.2.

As indicated in Section 2.2 major land uses adjacent to the site include farm land and various mixed industrial activities. These land uses are not considered sensitive receptors for the purposes of this analysis.

The closest sensitive receptors to the project site are the single family residences located on Faulkenburg road near the vicinity of the proposed site entrance. These residences are about 100 to 150 feet east of the site and almost directly across from the entrance road to the facility, about 1,700 feet from the proposed energy recovery facility and about 2,170 feet from where the stack is expected to be located.

Other sensitive receptors include residentially developed portions of Faulkenburg Road located northeast of the site. This residential area is located about 2,400 feet from the proposed facility and 3,000 feet from the proposed stack location.

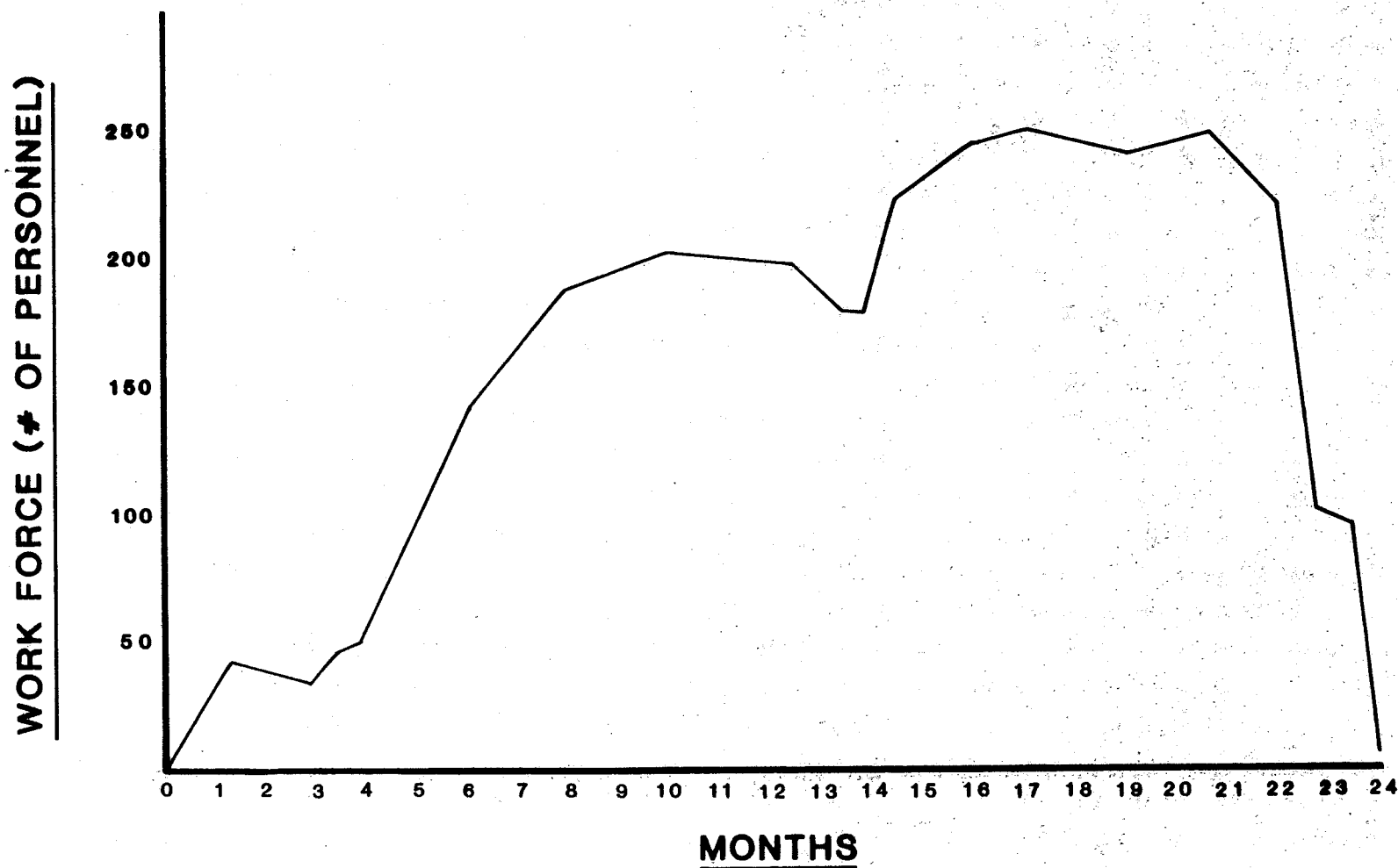
The nearest established neighborhood, Woodberry Estates, is located off of Woodberry Road, east of Interstate 75, about 2,600 feet east of the site boundary. This neighborhood is located approximately 4,200 feet from the proposed facility and about 4,650 feet from the proposed stack location.

There are no schools, hospitals, churches or other potentially sensitive activities in the vicinity of the site. Where appropriate, this analysis has focused on the four Faulkenburg Road residences as the receptors most sensitive to potential construction-related impacts.

4.6.2 Work Force

The total construction work force is expected to average between 150 and 160 personnel over the construction phase of the facility. The initial phase of construction (site clearing, access road and excavation of west retention basin) will require a work force of less than 100, while peak phases will require approximately 250 persons. From the eighth to the twenty-second month of the construction schedule, the work force should average between 200 and 230 personnel. The estimated work force requirements over the entire duration of facility construction are presented in Figure 4.4.

Work Shifts. The majority of activities required for the construction of the resource recovery facility will take place on an eight hour per day shift, five days a week. Dewatering of the refuse bunker excavation, which will not exceed a period of six months, is expected to require 24 hour per day operation of the dewatering pumps. The placement of concrete for the refuse bunker may require a period of continuous pour. The requirements for a period of 24 hour per day placement of concrete will be determined based on final design and method of construction to be utilized. All remaining construction activities outlined in Figure 4.1 will be conducted on an eight hour per day shift basis.



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 4.4
ESTIMATED WORK FORCE REQUIREMENTS
DURING CONSTRUCTION

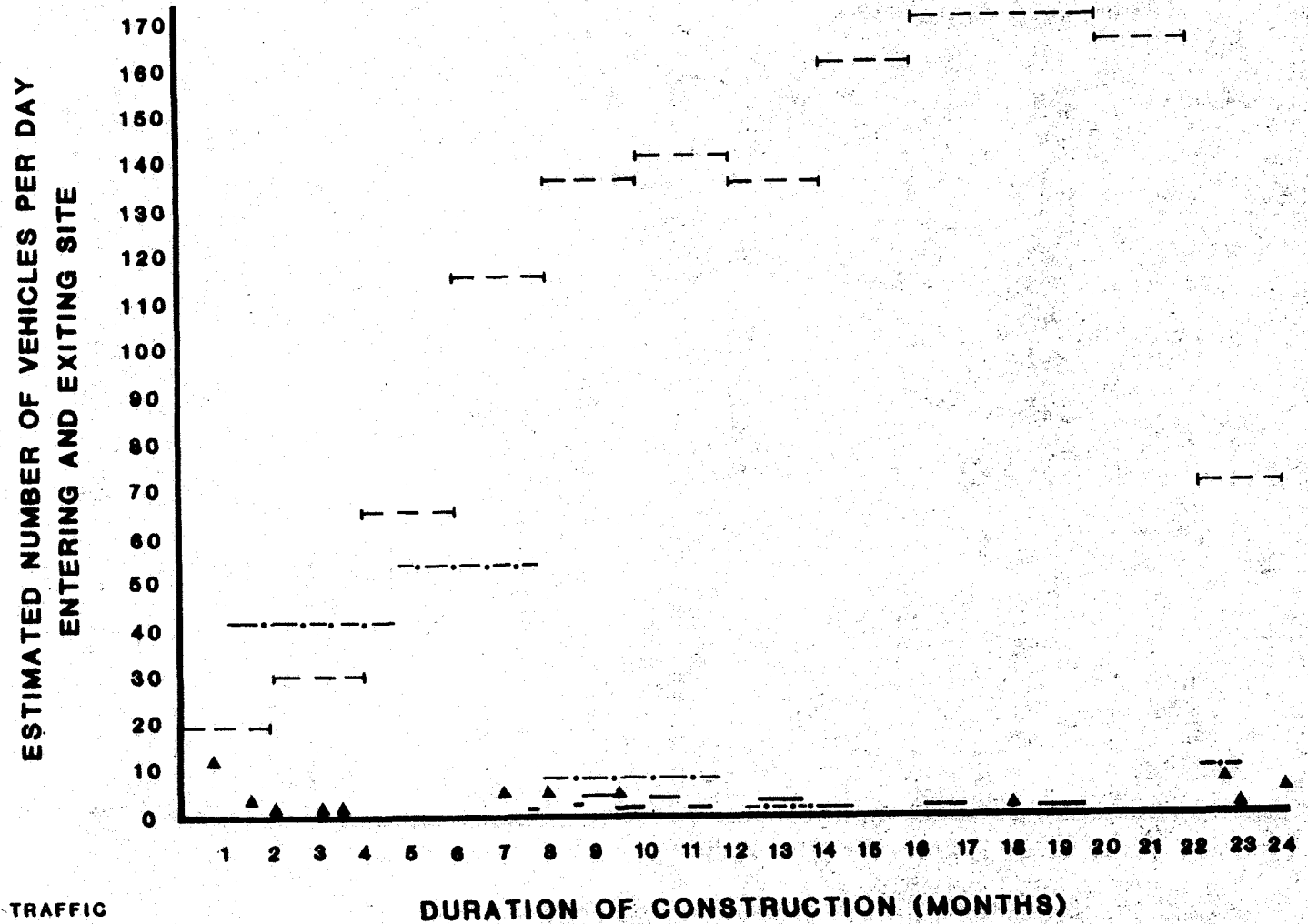
Work Force Revenues. Operation of the plant will require a staff of about 58 people (7 administrative, 41 operations and 10 maintenance personnel). As it is the intent of management to hire locally whenever possible, the payroll as a result of their employment is a benefit to be counted. An estimated annual payroll of \$2 million will put 40 million in present worth dollars into the local economy over a 20-year period.

On a short-term basis, the plant construction will provide the benefits of a \$100,000,000 construction project in the area. This will provide jobs for local construction labor, as well as input to the local economy through the purchase of construction materials and services. Direct economic benefits will be generated in the region by site preparation, construction of the resource recovery facility, and the manufacture of the equipment and other capital goods installed at the facility. Indirect economic benefits will also occur. These benefits include increased sales and jobs in industries supplying the construction firms, or in retail establishments which sell goods or services to workers employed by construction of the facility.

Work Force Availability. Most of the work force for this project will be provided by the available labor pool in the Tampa Bay regional area. No major relocation of construction workers and families is anticipated. Therefore, no impact on available housing, schools or other community support assets is expected.

4.6.3 Traffic Associated with Construction

Construction of the Hillsborough County Resource Recovery Facility will impact the level of traffic at the site entrance/exit located on Faulkenburg Road. This traffic impact is associated with the number of vehicles which will enter and exit the facility site per day over the duration of construction. The four general categories of traffic which will enter and exit the site include vehicles associated with the general work force, delivery of construction equipment, construction materials and furnace and general equipment for installation. The traffic anticipated over the duration of construction is indicated in Figure 4.5.



LEGEND: GENERAL CATEGORIES OF TRAFFIC

WORK FORCE ————

CONSTRUCTION EQUIPMENT ▲

CONSTRUCTION MATERIALS -.-.-.-

FURNACE & GENERAL EQUIPMENT _____

**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 4.6
TRAFFIC ASSOCIATED WITH
PLANT CONSTRUCTION**

Traffic associated with the general work force is expected to have the greatest impact on the Faulkenburg Road site entrance. This daily traffic volume, consisting mainly of passenger vehicles, will closely follow the work force requirements for the construction of the plant. The estimated number of vehicles expected to enter and exit the site under this general category was determined by assuming that seventy percent of the work force will drive to the site and the remaining thirty percent will be passengers. These vehicles will typically enter the site at the start of the work day and exit following completion of the day's construction activity. Minimal construction worker traffic is anticipated during the hours of construction activity.

The traffic resulting from the delivery of necessary construction equipment to the site is anticipated to have minimal impact over the duration of construction. The majority of this equipment will be brought to the site during the site preparation phase of construction. The derrick and cranes will be delivered to the site prior to the building phase of construction. Once this equipment is transported to the site it will remain on-site until construction activities associated with the equipment are completed. The traffic associated with the delivery and removal of construction equipment from the site is indicated as point impacts in Figure 4.5 due to the short duration of traffic (assuming one day for a piece of equipment to be delivered or removed from site).

Transporting necessary construction materials to site will result in the greatest increase in truck traffic during project construction. The major items included under this category are the delivery of backfill for the tipping floor area, concrete, structural steel, pavement and miscellaneous building materials. The traffic impact resulting from the transportation of concrete to the site during the peak phase of concrete placement will be coupled with the hauling of backfill to the site for the tipping floor area. These two activities, concrete and backfill placement, are expected to result in the highest level of traffic entering and exiting the site, with the exception of work force traffic. During a thirteen week period, the twenty-first to thirty-fourth week of construction, an estimated 52 trucks per day will enter and exit the site for these two construction activities.

Truck traffic associated with construction activities will typically occur between the hours of 8 AM and 5 PM. Minor peaks in truck traffic volume from construction activities can be expected to occur for about an hour during mid-morning and for another hour starting shortly after lunch. At other periods during the day, truck traffic should be generated at a fairly uniform rate.

As indicated, truck traffic will reach its peak when concrete and backfill placement activities coincide. When this occurs, the average truck traffic volume should be about five to seven truck trips per hour with daily peaks of about ten to fifteen trips per hour. This increase represents only five percent or less of existing hourly traffic volumes on Faulkenburg Road.

The level of traffic anticipated as a result of hauling major equipment for installation is not expected to be of great impact. This equipment will be delivered prior to, as well as during, the scheduled time for installation to insure that it is on-site and ready for installation. The estimated level of traffic associated with transporting this equipment to the site over the duration of construction is indicated in Figure 4.5.

Of the four general categories of construction traffic, commuting workers have the greatest potential for creating adverse effects. The daily volume from this source is the greatest of all categories considered. Additionally, the schedule of arriving and departing construction workers somewhat coincides with existing peak traffic periods on local roadways.

The maximum number of construction workers expected will be about 250 at any one day. As indicated, with an allowance for car pooling, absenteeism, and other modes of transport it is expected that vehicles of commuting employees will represent a number equal to 70 percent of the workforce. Therefore, it is expected that during maximum construction periods 175 vehicles will be added to local roadways from commuting construction workers in both the morning and afternoon peak traffic periods. This will reduce the available capacity of the roadway but will not result in any unacceptable roadway capacity problems. (A more detailed analysis of existing, future, and project operations traffic conditions is presented in Section 5.9 and Appendix 10.13).

4.7 IMPACT ON LANDMARKS AND SENSITIVE AREAS

There are no landmarks or sensitive areas within the site limits or within the immediate vicinity of the site, therefore no impacts on landmarks and sensitive areas are anticipated.

4.8 IMPACT ON ARCHAEOLOGICAL AND HISTORIC SITES

An archaeological and historical survey of the site was conducted in April 1983 for the Hillsborough County Department of Solid Waste by Dr. J. Raymond Williams et al. During this survey no evidence of archaeological features of significance were found. The results of this survey are presented in Appendix 10.8.

In a correspondence dated June 21, 1983, George W. Percy, Chief of the Bureau of Historic Preservation, Division of Archives, History and Records Management (DAHRM) stated that, "It is, therefore, the opinion of this office that the proposed project is unlikely to affect any significant archaeological or historic resources, and may proceed without further involvement with this agency." The entire correspondence is included in Appendix 10.8.

In light of the historical survey and the DAHRM correspondence, no impact on archaeological or historic sites are expected due to construction activities.

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. These features include site dewatering for refuse bunker construction, and the generation of solid and liquid waste as a result of construction activities. Current site dewatering plans, described in Section 4.3 and Appendix 10.15 will require a lowering of the

ground water table for a period not to exceed six months. The impacts associated with this activity are described above in Section 4.3. and these effects are not expected to be significant.

During construction certain quantities of solid and liquid waste will be generated. This waste may take the form of discarded packaging materials, refuse produced by construction workers, earth spoils, sanitary wastes, or waste oils. Proper handling and disposal of these wastes onsite is essential to maintaining the aesthetic and ecological integrity of the site and surrounding areas.

4.10 BENEFITS FROM CONSTRUCTION

The primary benefits from construction of the proposed resource recovery facility are related to the employment of construction workers (and, therefore, the creation of jobs) and the benefits to personal income due to work force revenues. These benefits are discussed in Sections 4.6.2 "Work Force".

4.11 VARIANCES

No variances from standards or guidelines are anticipated.

Effects of Plant Operation

Chapter 5

CHAPTER 5

EFFECTS OF PLANT OPERATION

This chapter describes (1) the operational interaction of the plant and associated facilities with the environment, and (2) Hillsborough County's plans and programs for monitoring the environmental impacts resulting from plant operation. In the discussion of environmental effects, effects that are considered unavoidable but are temporary or are subject to later amelioration are clearly distinguished from those which are determined to be irreversible or unavoidable. In addition, mitigation efforts are described which serve to reduce or eliminate the associated environmental impacts.

To the extent practicable, the impacts of operation of the facility are quantified, and the source of each impact is described. In addition, impacts due to failure of control devices are estimated, where appropriate. Finally, this application discusses the relationship between local "short-term" and "long-term" effects.

5.1 EFFECTS OF THE OPERATION OF THE HEAT DISSIPATION SYSTEM

As described in Chapter 3, cooling towers will be used onsite. There will be no thermal discharges and therefore 316 Demonstrations are not applicable.

5.1.1 Temperature Effects on Receiving Body of Water

This section as described is not applicable to the project, because effluent discharge from the resource recovery facility will be to the planned, co-located Northwest Brandon Subregional Wastewater Treatment Plant (WWTP) which will be designed to handle the quantity and quality of facility discharges.

5.1.2. Effects on Aquatic Life

This section as described is not applicable to the project, because effluent discharge from the resource recovery facility will be to the co-located wastewater treatment plant.

5.1.3 Biological Effects of Modified Circulation

As described in Section 3.5 "Plant Water Use," the proposed facility will use potable water from the existing water supply main in Faulkenburg Road and will use effluent from the co-located WWTP for process water. Discharges from the resource recovery facility will be to the wastewater treatment plant. No water body will be directly affected by the operation of the facility. Stormwater runoff is discussed in Section 5.3.4.

5.1.4 Effects of Offstream Cooling

The cooling towers of the proposed facility will use 800,000 gallons per day of treated effluent from the co-located Northwest Brandon Subregional Wastewater Treatment Plant as make-up water--water used to "make-up" for water lost to evaporation. The WWTP will provide secondary treatment of the influent wastewater followed by filtration and high-level disinfection. This level of treatment will ensure the provision of a high quality effluent which is suitable for reuse in the proposed facility's cooling towers. Chlorination of the effluent stream will be provided in conformance with Chapter 17-6 of the Florida Administrative Code: 1.0 mg/l total chlorine residual after 15 minutes contact time at maximum daily flow, or after 30 minutes contact time at average daily flow; whichever provides a higher level of public health protection.

During the cooling process, approximately 0.015 percent of the make-up water is lost as droplets in the exhaust, called the cooling tower "drift". Therefore, approximately 120 gallons per day would be lost as drift. The drift will be of approximately the same quality as the treated wastewater used as make-up water. Once the droplets of water comprising the drift are vented from the tower, they are carried away from the facility. The

distance traveled is dependent on the size of the droplets formed. Aerosol particles or droplets larger than 600 microns in diameter (approximately 70 percent of the drift mass) would be expected to settle within 400 feet of the tower. Smaller particles would be carried further (Furlong, 1974). At the proposed energy recovery facility, the nearest major residential area is located over 3000 feet to the east of the towers, so that almost all particles or droplets will have settled out, or will have been diluted. In addition, prevailing winds are from the east, so that the drift will be moved predominantly into the wooded area to the west of the site, an optimal buffer.

To determine what levels of viruses and bacteria could be expected to be emitted from the proposed resource recovery facility's cooling tower, a computerized literature search was conducted to identify all data available on this topic. Two data bases were searched which access a combined total of over 7500 journals, books, reports, conference proceedings and research papers, a total of approximately 100,000 records. Only a limited number of articles and reports were found to exist which specifically addressed the use of treated wastewater as cooling tower make-up water, and these studies were conducted at large power plants rather than resource recovery facilities. The results of these few studies conducted are discussed in the following paragraphs.

Levels of total bacteria have been measured directly at the exit vent from a cooling tower which uses secondary effluent by Adams, et al. (1980). These results are not completely comparable to the proposed facility in that a lower level of wastewater treatment was practiced, and treated wastewater was held in a cooling tower basin prior to use. Such holding can result in the regrowth of some organisms. Both of these differences would result in higher counts of bacteria than would be expected by the proposed facility.

As measured by Adams, et al. (1980), total bacterial counts exiting the vent of a cooling tower on four occasions ranged from 299 to 1220 particles/m³. Rogozen, et al. (1981), sampled emissions from two cooling towers which used municipal wastewater from the Burbank Water Reclamation Plant as

make-up water. This plant treats wastewater to a level similar to that which will occur at the Hillsborough County resource recovery facility.

One of these towers, the Burbank Olive 1, was also sampled by Adams, et al.. The Rogozen work attempted to sample stack emissions isokinetically (where air enters the sampler at the same velocity as it leaves the stack). At the Olive 1 tower the exit velocity was 10.4 meters per second and the total volume of air sampled was 770 cubic meters. No fecal coliform or fecal streptococci bacteria were detected. Total coliform bacteria were greater than or equal to 1.6 most probable number (MPN) of organisms/m³. E.coliphage were enumerated at 0.07 plaque forming units (PFU)/m³. At the Magnolia 4 tower, which also used wastewater from the Burbank Plant, no bacteria or viruses were detected during isokinetic sampling.

In order to determine potential health impacts resulting from aerosolization of virus particles; the approach most commonly taken especially in Florida is to monitor levels in the cooling tower intake waters. It is correctly reasoned that if no viruses are detected in the intake water, none will be found in the tower drift. Analyses for viruses have been conducted on chlorinated effluents from both pilot and full-scale treatment plants in central Florida and the Tampa Bay area which have treatment trains similar to that of the proposed WWTTP.

Virus testing was conducted over a 3 day period at the Sand Lake Road pilot wastewater treatment facility (Wellings, 1983). This pilot plant employed a shallow bed dual media automatic backwash filter with pre- and post-chlorination, alum, and alum plus polymer. While the influent wastewater contained from 262 to 397 PFU/l, chlorinated effluent (free chlorine residuals from trace to 1.7 ppm) contained no detectable virus. During testing, however, the automatic backwash unit was not employed, so that only a shallow bed dual media filter was actually tested -- an optimal situation for virus removals.

At the McCloud Road Plant, sampling was conducted from June 21 to June 27, 1983 (Wellings, 1983). Influent densities ranged from greater than 383 PFU/liter to greater than 539 PFU/liter. Again, no viruses were

detected in the chlorinated effluent. As shown in Table 5.1, virological sampling at two full-scale facilities in St. Petersburg which employ a treatment train similar to that of the proposed wastewater treatment plant, show virus levels from non-detectable to 1.63 PFU/liter.

The proposed facility should produce an effluent stream containing no virus particles. Thus, the drift emanating from the proposed facility will not present a virological health hazard to residents of nearby areas. The Pinellas resource recovery facility is using a similar cooling system and there have been no reported problems. Additionally, the Tampa facility will use treated effluent in its cooling system. To assure the absence of viruses in the make-up water of the proposed project, a monitoring program will be instituted as described in the following section.

5.1.5 Measurement Program

A virological and bacteriological monitoring program will be conducted at the co-located Northwest Brandon Subregional Wastewater Treatment Plant.

Samples of influent and chlorinated effluent will be collected daily for one week during compliance testing. Sufficient sample volumes will be collected to allow the accurate qualification of virus particles. Samples will be analyzed for total bacteria, total and fecal coliform bacteria, fecal streptococci and total virus particles (as plaque forming units). Analysis techniques specified in Standard Methods for the Examination of Water and Wastewater (APHA, 1982) and the U.S. Environmental Protection Agency will be followed. Virus groups found in the effluent stream will be identified, in addition to obtaining a total virus count.

Once construction of both facilities is completed, monthly sampling of the circulating cooling waters will be conducted. This program will be undertaken for the first year of operation to assure that no viruses are detected. These samples will also be analyzed for the indicator bacteria mentioned above. If unacceptable levels are found, corrective measures will be taken immediately.

TABLE 5.1

RESULTS OF VIROLOGICAL TESTING - CITY OF ST. PETERSBURG
(Plaque Forming Units per Liter)

	<u>Southwest Wastewater Treatment Plant</u>				<u>Northwest Wastewater Treatment Plant</u>	
	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1980</u>	<u>1981</u>
January		0.002	0.000	0.033		0
February		0	0.010	-		0
March		0	0.021	>0.638	0	0
April		0	0.003	0.013	1.63	0
May		0.013	0.000	0.003	0.013	0
June	0.008	0.116	0		0	
July	-	0.166	0.003		0	
August	-	0.070	0.003		0	
September	-	0.021	-		0	
October	0	0.022	0		0	
November	-	0.003	0		0	
December	0	0.013	0		0	

5.2 EFFECTS OF CHEMICAL AND BIOCIDAL DISCHARGES

5.2.1 Industrial Wastewater Discharges

There will be no offsite industrial discharges to surface waters from the operation of the resource recovery facility. Effluent from the resource recovery facility will go directly to the co-located Northwest Brandon Subregional Wastewater Treatment Plant. All applicable state and federal discharge regulations and water quality standards for industrial wastewater including chemical and biocidal wastes, and oil and grease will be achieved. The Northwest Brandon Subregional WWTP will be designed for Class I reliability to safeguard against plant upsets.

5.2.1.1 Impact of Blowdown and Waste Discharges on the WWTP

Effluent discharge from the resource recovery facility will consist primarily of sanitary wastes generated by the facility's employees. The effluent will also include cooling tower and boiler blowdown, and washwater drained from the refuse bunker and ash handling system. Blowdown is the aqueous wastewater collected from the bottom portions of boilers and cooling towers.

3 MGD 5000 gpd 3000
The quantity of blowdown discharged from the facility is expected to be minimal since blowdown will be reused in the ash dischargers for residue quenching. The quality of cooling tower and boiler blowdown will be dependent upon both the influent water quality (supplied by the Northwest Brandon Subregional WWTP) and the maximum contaminant concentration tolerable in the recirculating loops. In general, the concentration of solids leaving the cooling tower and boiler loops as blowdown water will be magnified due to evaporation. Washwater drained from the refuse bunker and ash handling system and discharged from the resource recovery facility may exhibit high BOD and COD levels, and contain both organic and inorganic suspended and dissolved solids. Wastewater discharges from the resource recovery facility to the WWTP must meet the maximum concentration and other restrictions shown on Table 5.2.

TABLE 5.2

MAXIMUM CONCENTRATIONS AND RESTRICTIONS
FOR RRF WASTEWATER

<u>Material Characteristic</u>	<u>Maximum Allowable Concentration/Value</u>
Arsenic as As	0.05 ppm
Barium as Ba	5.0 ppm
Boron as B	1.0 ppm
Cadmium as Cd	0.02 ppm
Chromium as Cr ⁺⁶	1.0 ppm
Chromium (total)	3.0 ppm
Copper as Cu	2.0 ppm
Lead as Pb	0.3 ppm
Manganese as Mn	1.0 ppm
Mercury as Hg	0.005 ppm
Nickel as Ni	1.0 ppm
Selenium as Se	0.02 ppm
Silver as Ag	0.01 ppm
Zinc as Zn	3.0 ppm
pH	5.5 - 8.5
Temperature	104°F

The total combinations of the above cannot exceed 10 mg/l.

All of the following shall be excluded from the treatment works unless certain conditions of pretreatment concentrations and volumes have been especially described and approved by the County:

Antimony	Tin
Beryllium	Uranyl ion
Bismuth	Rhenium
Cobalt	Strontium
Molybdenum	Tellurium

Cyanides or cyanogen compounds capable of liberating hydrocyanic gas on acidification in excess of 1 mg/l by weight as CN are prohibited.

The maximum TDS is 5,000 mg/l.

Because the WWTP will be designed to treat wastewater generated by a variety of potential sources including industries, landfill leachate, septage, and grease wastes, resource recovery discharges will not adversely impact the operation or effectiveness of the plant. In addition, because the quantity of effluent discharge from the resource recovery facility represents a very small portion of the total wastewater flow treated at the WWTP (less than one percent), the high concentration of dissolved solids which may be present in the effluent will be diluted prior to treatment.

5.2.1.2 Impact of WWTP Effluent on the Resource Recovery Facility and Other Reuse

The concentration of dissolved solids in the WWTP effluent will be acceptable for all types of effluent disposal with the exception of boiler make-up at the resource recovery facility and possibly some industrial reuse applications. In order to prevent scale build-up and metal corrosion, dissolved minerals and suspended material will be removed from the boiler make-up water using a treatment process such as reverse osmosis and/or ion exchange. This treatment will take place at the resource recovery facility. Additional treatment which may be required for industrial reuse, however, must be provided by the individual industries.

5.2.2 Cooling Tower Blowdown

As discussed in Section 3.10, the co-located Northwest Brandon Subregional WWTP will be permitted and operational prior to the construction of the resource recovery facility. The ultimate capacity of the Northwest Brandon Subregional WWTP (projected year 2000 average daily flow is 6.8 MGD) will be far in excess of the total water demand of the resource recovery facility. Consequently, disposal of treated wastewater effluent at the resource recovery facility will not be the sole means of effluent disposal. Alternative methods of effluent disposal will include industrial reuse, land application and potential future surface discharges. Because the WWTP will be on-line prior to the resource recovery facility, alternative means of effluent disposal will be employed during the interim period prior to start-up of the resource recovery facility. Most of these alternative

effluent disposal systems will most likely continue in operation after the initiation of the effluent disposal program at the resource recovery facility. In addition, effluent storage facilities will be provided at the WWTP site for emergency situations such as a shut down of the resource recovery facility.

5.2.3 Measurement Programs

There will be periodic monitoring of the energy recovery facility discharges to the WWTP. As noted previously, the maximum concentrations and restrictions for the discharge were shown on Table 5.2. The frequency of monitoring of the wastewater discharges has not been established at this time.

5.3 IMPACTS ON WATER SUPPLIES

5.3.1 Surface Water

The proposed facility will obtain its process water from treated wastewater onsite. Cooling tower blowdown and other plant industrial and sanitary wastewater discharges will be to the planned Northwest Brandon Subregional Wastewater Treatment Plant, whose start-up and operation will be prior to the start-up and operation of the resource recovery facility. There are, therefore, no long-term impacts to surface water associated with the operation of the proposed resource recovery facility.

5.3.2 Groundwater

Except for some short-term impacts associated with a temporary lowering of groundwater levels during construction, as described in Section 4.3, there are no significant impacts to groundwater quality or quantity associated with the normal operation of the proposed facility.

The concrete refuse storage bunker will be sealed to prevent leachate from escaping to the surrounding soil and groundwater, and to prevent groundwater from seeping into the bunker. The refuse storage bunker will be

pitched to allow collection and removal of any liquids which may accumulate on the bottom. Collected leachate will be discharged to the headworks of the co-located Northwest Brandon Subregional Wastewater Treatment Plant. In light of these plans, the impacts associated with leachate and runoff on ground and surface water quality, and on terrestrial and aquatic environments are expected to be insignificant.

The surficial aquifer water level varies seasonably but is usually within a few feet of the ground's surface which ranges in elevation from 28 to 41 feet. The refuse bunker will be constructed so that its base will be below the water level in the surficial aquifer. Thus, the bunker will be surrounded/immersed in groundwater. Leakage of groundwater into the bunker would be likely in the remote event of a crack or failure in the bunker's planned water-tight impermeable seal. Leakage out of the bunker would not occur unless groundwater levels in the area changed drastically.

There is a significant probability that any impacts associated with a contamination event, however remote, which may occur to the surficial groundwater system (i.e., surficial sands and confining clay units) would be improved by the adsorptive capacity of subsurface materials which have relatively higher proportions of clays. The subsurface materials may exhibit a higher cation exchange capacity (CEC) which would tend to "bind-up" or adsorb a relatively higher proportion of contaminants and thus retard their migration within the groundwater matrix.

The direction of regional groundwater flow in the Floridan aquifer is generally toward the southwest. However, the direction of flow within the surficial aquifer will be more variable and dependent upon topography, drainage, elevation of the water table, and the influence of groundwater pumping within the vicinity. Accordingly, the probable direction of surficial groundwater flow is expected to be generally toward the southwest corner of the site. Any release of chemical contaminants from the facility to the groundwater at the site is not expected to result in any significant impact to groundwater quality of the more sensitive groundwater resources of the Floridan aquifer for three primary reasons:

1. The bottom of the refuse bunker will lie within the surficial materials (sand, clayey sand), and any release of chemical contamination would be confined to these surficial materials and would not affect the Floridan aquifer.
2. The Floridan aquifer and the surficial aquifer are separated by a clay confining unit of relatively low permeability which generally has a thickness of about 10 feet across the site. All indications are that this unit is continuous and possibly thicker in the vicinity of the site (see Section 2.3.1.2 for discussion and mapping). This would provide an effective barrier between the surficial material and the Floridan aquifer.
3. The potentiometric surface of the Floridan aquifer lies generally within this confining unit, which means that a contaminated plume would be prevented from downward vertical migration into the Floridan by the upward vertical component of hydrostatic head exerted by the confined Floridan aquifer. Once a contaminant plume has descended to an equilibrium level above or within the confining unit, further plume movement would generally be restricted to lateral migration with little or no vertical mixing within the lithologic matrix.

5.3.3 Drinking Water

There is an existing 3-inch well onsite which will be plugged and abandoned in accordance with the rules and requirements of the Southwest Florida Water Management District (SWFWMD). The closest private wells in the vicinity of the site have been located and are not expected to be affected in terms of quality or flow, either during site dewatering/construction or during the operational life of the proposed facility. An existing 12 inch water main in Faulkenburg Road will supply potable water to the site.

Complete well inventories for the areas shown on Figure 2.22 have been provided by SWFWMD and are contained in Appendix 10.9.

5.3.4 Leachate and Runoff

Runoff collected in the stormwater retention/detention basins following the start-up of the resource recovery facility operations will be collected from vegetated areas, paved surfaces, and rooftops. These areas are delineated on Figure 3.3. All refuse or residue storage areas will be enclosed so that no runoff will occur from these surfaces. Ground and surface water quality is thereby protected from materials that would have been carried away by runoff from storage areas.

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.

5.3.5 Measurement Programs

No water quality sampling programs are proposed by the County at this time. There are not expected to be any adverse impacts to surface or groundwater due to the operations of the facility based on the analysis presented in this chapter and the baseline conditions presented in Chapter 2.

5.4 SOLID/HAZARDOUS WASTE DISPOSAL IMPACTS

5.4.1 Solid Waste

This section discusses impacts created by the disposal of solid wastes on the site not already covered in Section 5.2 or 5.3. This section also discusses the potential benefits to be gained from the recycling of solid wastes. The section concludes with a description of the impacts on directly affected offsite landfill operations.

Section 2.2.7 described the existing Hillsborough County Solid Waste Management System. Existing and future quantities of solid waste generated in the County were also presented.

The proposed resource recovery facility will have a net beneficial impact on solid waste disposal in Hillsborough County. The estimated processible solid waste quantities expected to be delivered annually to the resource recovery facility through the year 2010 are shown in Table 5.3. If these quantities of solid waste were to be landfilled rather than burned, they would require about 666,000 cubic yards of landfill space (including cover) in 1987; increasing annually to about 1 million cubic yards of landfill space in 2010. Instead, by achieving a 90 percent volume reduction through burning, the ash residue to be landfilled would require only about 100,000 cubic yards of landfill space in 1987; increasing annually to about 153,000 cubic yards of landfill space in 2010. Therefore, the potential savings in landfill capacity is considerable (about 17.5 million cubic yards over a 24 year period). There would therefore be a beneficial effect on offsite landfilling operations.

Although a materials recovery system is not expected to be incorporated into the facility, there will be provisions made and adequate space for the future installation of such a system. At a minimum, space will be provided to accommodate the installation of a magnetic belt for ferrous removal, associated conveying systems, enclosed ferrous storage area and enclosed loading area. If materials recovery is implemented, additional savings in landfill capacity would be created.

5.4.2 Hazardous Waste

This section, as described, is not applicable to the proposed energy recovery facility, since there will be no handling or disposal of hazardous wastes at this facility.

The facility will accept only municipal solid waste which includes residential, commercial, and non-hazardous industrial (e.g., office and package wastes) wastes. Public and private users of the facility will be instructed on these limitations. Signs will be posted at the weigh in station providing information on wastes accepted at the facility. Additionally, routine visual inspections by the personnel at the weigh in station will monitor types of wastes received. The crane operator will visually inspect

TABLE 5.3

PROJECTED ESTIMATED ANNUAL QUANTITIES OF PROCESSIBLE WASTE
FOR THE UNINCORPORATED AREA OF HILLSBOROUGH COUNTY

(Thousands of Tons per Year)

<u>Year</u>	<u>Tons</u>
1987	332
1988	341
1989	350
1990	359
1991	369
1992	376
1993	384
1994	395
1995	400
1996	408
1997	416
1998	423
1999	432
2000	439
2001	445
2002	450
2003	458
2004	465
2005	472
2006	480
2007	487
2008	494
2009	500
2010	507

waste in the bunker while he is mixing. This would allow the detection of large potentially hazardous materials such as drums or gas cylinders to prevent charging into the furnace.

A chemical and EP toxicity analysis of the combined ash residue will be conducted after commencement of operation to determine toxicity or hazard (includes both combustion residue and APC device residues).

It will be the responsibility of the facility operator to determine if the ash residue is classified as hazardous according to EPA and DER regulations. Experience at other similar facilities has shown that the mixed bottom and fly ash can pass the EP toxicity test; i.e., considered a non-hazardous waste material. This waste material would be suitable for disposal in a permitted Class I sanitary landfill.

A chemical analysis of the combustion residue will be conducted after commencement of operation to ensure compatibility for disposal in a sanitary landfill.

5.5 SANITARY AND OTHER WASTE DISCHARGES

Solid waste generated by plant operations (employee refuse, packing material, etc.) will be collected from receptacles located throughout the plant and fed into the main solid waste stream for processing. Materials not suitable for incorporation into the solid waste stream will be separated for offsite disposal to a proper facility. All sanitary wastewaters will be collected and discharged to the headworks of the co-located wastewater treatment plant. Therefore, no impacts associated with sanitary and other waste discharges are anticipated during plant operations.

5.6 AIR QUALITY IMPACTS

5.6.1 Impact Assessment

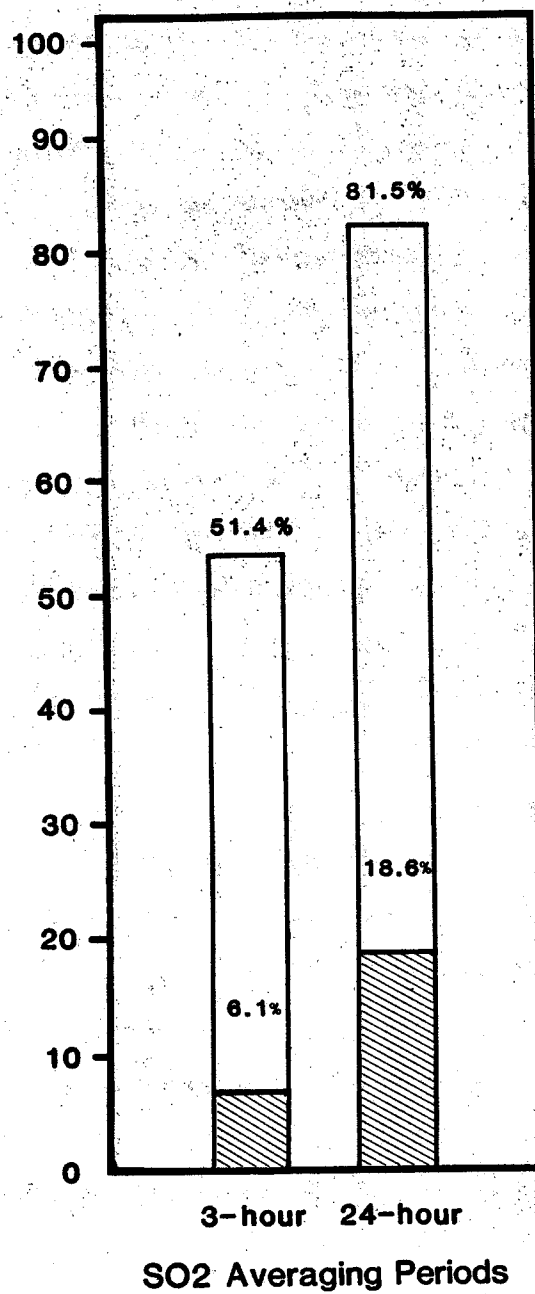
The air quality modeling analysis was conducted in three phases. The screening analysis identified the boiler operating condition which has the

greatest air quality impact and defined the pollutants and downwind locations which have the potential for concentrations greater than the significant impact limits. The screening model runs were made using the Industrial Source Complex (ISC) dispersion model and 26 worst case meteorological conditions. The refined modeling analysis was conducted using the source impacts and receptor grid defined in the screening analysis. The refined modeling analysis identified the pollutants which had a greater than significant impact, and defined the significant impact areas (SIA) for those pollutants. The refined modeling was done using ISC and five years (1970-1974) of Tampa International Airport surface and upper air meteorological data. The additional impact analysis was done for only those pollutants and averaging periods which had a greater than significant impact and for only those grid receptors located in the SIA. The emission inventory used in this analysis consisted of 1) sources permitted under Prevention of Significant Deterioration provisions and 2) other major SO₂ sources located within 30 km of the site, or sources located within 50 km of the site having significant impact within the SIA. Each phase of the modeling analysis was discussed with and approved by Florida DER. A detailed discussion of the proposed air impacts is contained in Section 7.0 of Appendix 10.1.5 "Prevention of Significant Deterioration" (see Volume III-Air Quality).

The air quality standards are not violated until a receptor exceeds the standard twice in any given year. The highest value of the second highest concentrations (HSH) is chosen from the proposed impacts, additional source impacts, and the monitoring data to allow for a single short-term (24 hours or less) violation. Naturally, a single annual average is calculated for each receptor, so the highest annual concentrations were used for comparison.

A comparison of the proposed SO₂ impacts to the PSD increment is shown in Figure 5.1. No comparison is made for TSP since the site is located in a particulate non-attainment area and is evaluated under the New Source Review requirements, not PSD. The 3-hour and 24-hour SO₂ averaging periods exceeded the significant impact limits. Therefore, the increment for these periods had to include other PSD sources. As shown on Figure 5.1, the proposed source will consume less than 19 percent of the total increment.

**PSD Increment
Consumed (%)**



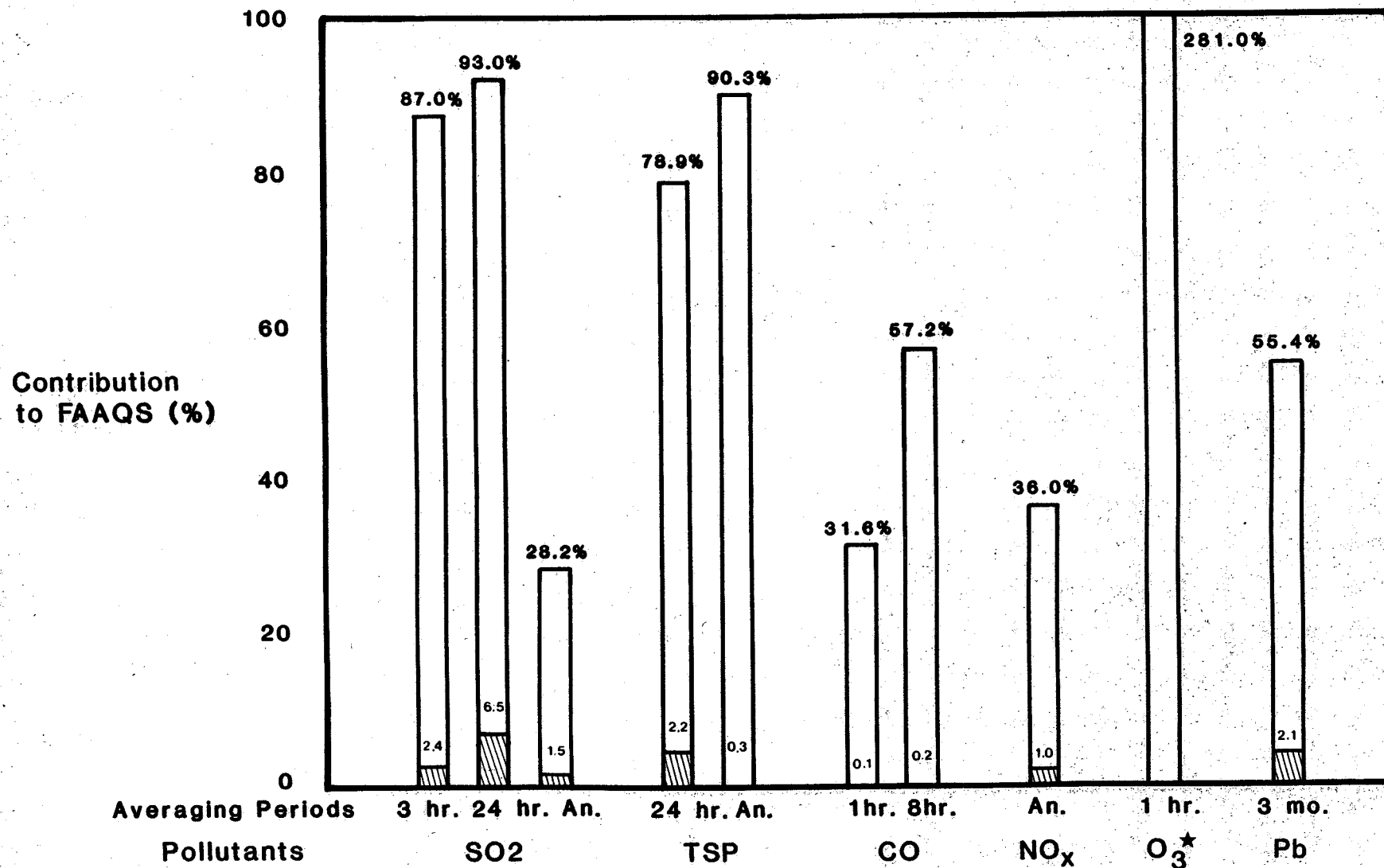
Increment consumed by proposed source
Increment consumed by other PSD sources

A comparison of the proposed impacts to the Florida Ambient Air Quality Standards (FAAQS) is made in Figure 5.2. As with the increment evaluation, 3-hour and 24-hour SO_2 were evaluated along with other major SO_2 sources which included the PSD sources. The HSH concentrations from the additional sources were added to the HSH monitored background concentration. This approach is used to estimate the maximum possible impact. Ozone is not directly emitted from the facility but is formed in the atmosphere as a secondary pollutant. Non-methane hydrocarbons are considered a precursor to ozone formation.

As is shown on Figure 5.2, the impact of the facility is small compared to the existing background concentrations. The 24-hour SO_2 concentration has the greatest impact contributing 6.5 percent of the standard. All other pollutants contribute less than 2.5 percent.

As previously stated, the site is designated non-attainment for particulates, however, Figure 5.2 shows a combined concentration less than the standard. This is due to the need for two years of monitoring without recording any violation of standards before an area can be redesignated as attainment. Also, there are several other monitors in the area at which violations have been recorded. The TSP data from the Orient Road monitor is believed to be representative of the proposed site. The site is also classified as non-attainment for ozone. Figure 5.2 clearly shows excessive background ozone concentrations.

The impact of the facility was also evaluated with regard to visibility, soils, and vegetation. The visibility of the plume was examined with respect to Chassahowitzka National Wilderness Area. Using a worst case screening analysis defined by Latimer, et al, (1980), no degradation in visibility is predicted. The predicted maximum annual concentrations are well below the thresholds injurious to soils and plants. For a detailed analysis of those air quality related issues, see Section 8.0 in the PSD, Appendix 10.1.5 (Volume III-Air Quality).



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-  Contribution from proposed source
-  Contribution from background or other major sources
- ★ Ozone is a secondary pollutant and not directly emitted from the facility

FIGURE 5.2
AIR QUALITY IMPACT
COMPARED TO FAAQS

5.6.2 Monitoring Program

No post-construction ambient monitoring plan is proposed for this facility. The monitoring network operated by the Hillsborough County Environmental Protection Commission is sufficient to monitor ambient air quality levels in the vicinity of the site. However, a continuous in-stack monitoring program will be operated for opacity, and oxygen or carbon dioxide concentrations. The equipment will be installed, calibrated and maintained in accordance with FAC 17-2.710 and 40 CFR 51, Appendix P. Compliance testing will also be conducted for pollutants with emission limiting standards in accordance with FAC 17-2.700 and 40 CFR 60. This testing shall include, but not be limited to, testing for particulate emissions.

5.7 NOISE

Noise baseline conditions are discussed in Section 2.3.8. Monitoring sites are illustrated in Figure 2.28 within that section. Baseline sound levels are shown in Table 2.29 in the same section.

Sound levels expected to be generated by both truck traffic and by the operating facility were superimposed on the existing sound levels actually measured. Construction noise impacts at the facility were also determined.

From the analysis, presented in detail in Appendix 10.12, it can be seen that daytime operations of the proposed facility would not result in any perceived noise impacts at the closest sensitive receptors. Nighttime ambient noise monitoring conducted by Hillsborough County EPC at the closest residence indicate nighttime sound levels of 55 dBA. With the expected facility sound levels at the location of the sensitive receptors to be in the vicinity of 44 to 46 dBA, no significant impact is anticipated.

Efforts will be made during the design phases of this project to include appropriate mitigative measures for reducing expected noise levels. Mitigative measures presently being considered include:

- o locating major noise producing components, such as ID (induced draft) fans on the far side of the structure from sensitive receptors;
- o locating individual components which can be separated from the structure; i.e., condensers at remote locations on the site;
- o use of structural noise screens and, where appropriate, planting of vegetative buffers; and
- o requiring the use of higher performance standards for noise producing equipment.

It should be noted that while an additional effort will be made to minimize noise levels, the expected sound levels at the receiving receptors will be well below Hillsborough County EPC noise criteria. The rules of the Hillsborough County Environmental Protection Commission (Rule 1-10) allow a dBA sound level limit of 55 and 60 for a receiving residential land use category between the nighttime hours of 10:00 PM and 7:00 AM and daytime hours of 7:00 AM to 10:00 PM, respectively. The predicted noise levels of the proposed facility will be well below these limits.

The operation of the proposed facility will increase daytime truck traffic levels along roadways in the vicinity of the site. Truck traffic will be restricted to daytime hours, more specifically, starting at 7:00-8:00 AM to 5:00 PM. As a result of the truck traffic, noise levels can be expected to increase somewhat in the vicinity of the site's access road, Faulkenburg Road, and State Road 60.

The maximum hourly truck volume expected to be added to Faulkenburg Road from the proposed project is 106 vehicle trips. At this volume, the median sound level expected from the trucks along with the current existing trucks traveling along Faulkenburg at 100 feet from the roadway is between 58 to 59 dBA with or without the facility. The closest residence along Faulkenburg Road is about 100 feet from the roadway. Truck traffic could be expected to slightly increase ambient noise levels by 0.5 to 1 dBA during

this maximum truck volume period along Faulkenburg Road south of the site's entrance. In comparison, an increase of 3 dBA is barely perceptible in the natural environment. The Hillsborough County EPC noise criteria allows a sound level limit of 75 dBA at manufacturing or industrial receiving land uses, a level of 65 dBA at commercial or business receiving land uses, and a sound level limit of 60 dBA at residential land uses between the hours of 7:00 AM and 10:00 PM. The peak hourly traffic with the facility traffic is not expected to exceed the County criteria at any of the receptors except at Site 6 (See Figure 1 in Appendix 10.12). Based on the one 24-hour measurement made by HCEPC at this site, the noise criteria are currently being exceeded (see Table 3 in Appendix 10.12).

Monitoring by the County at Site 6, which is at the closest residence along the east side of Faulkenburg Road indicate the existing daytime equivalent noise levels (Leqs) range between 61-64 dBA and nighttime Leqs range from 55-58 dBA. Modeling of the existing traffic levels at all of the monitoring sites predicts an insignificant increase of only 0.5 to 1.0 dBA above existing monitored and modeled data.

5.8 CHANGES IN NON-AQUATIC SPECIES POPULATIONS

5.8.1 Impacts

Long-term impacts to non-aquatic species populations resulting from plant operation 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 significant impacts to non-aquatic species populations are expected. Therefore, long-term monitoring programs are not proposed.

5.9 OTHER PLANT OPERATION EFFECTS

Transportation impacts are the primary environmental effect of the proposed resource recovery not addressed in Sections 5.1 to 5.8.

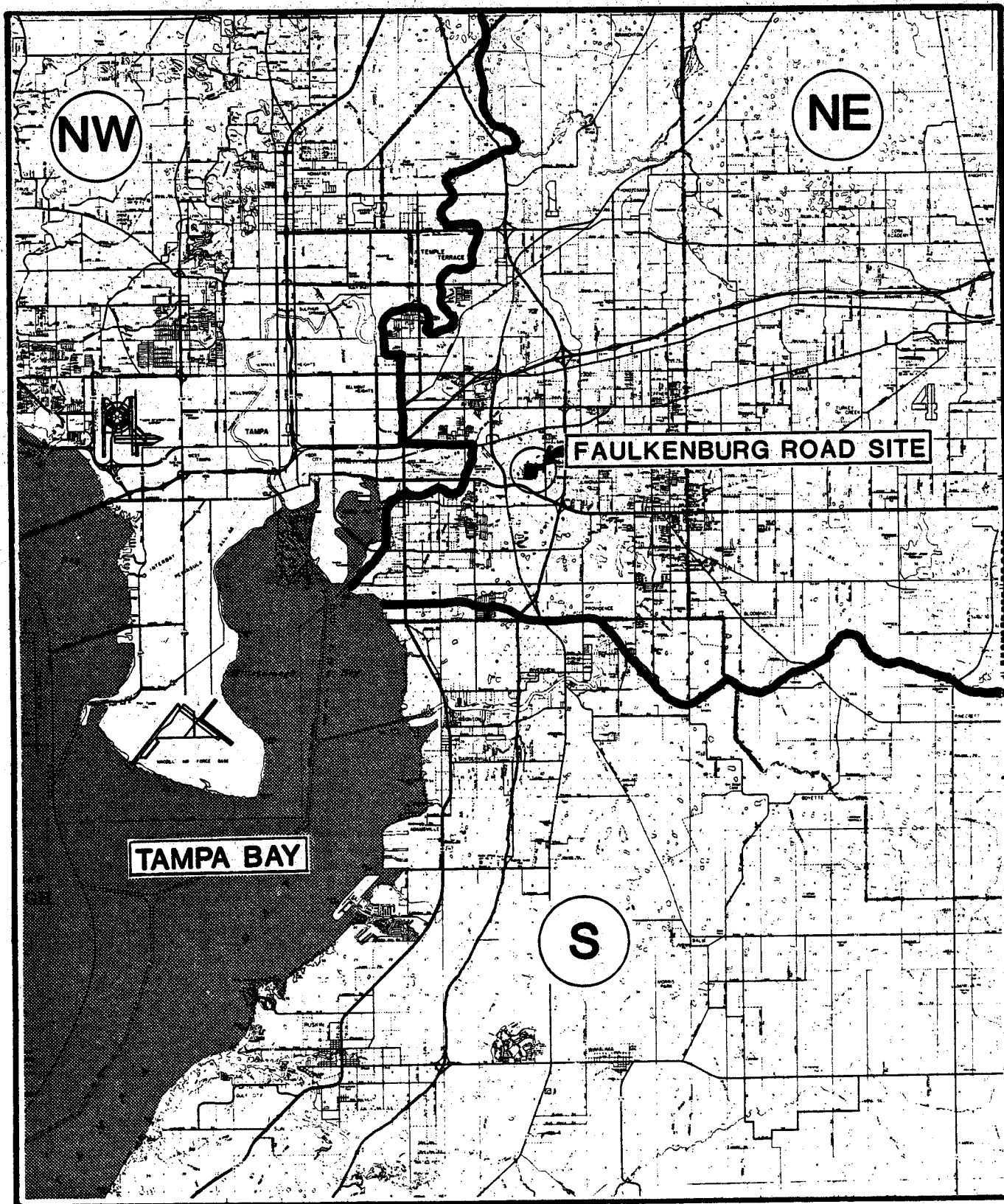
The transportation analysis presented in Appendix 10.13 was prepared by Camp Dresser & McKee with the assistance of traffic consultants, Kimley-Horn and Associates, Inc. A supplemental transportation analysis conducted by Kimley-Horn and Associates responds to specific comments from the Hillsborough County Road Department to the traffic analysis presented in the County's Resource Recovery Facility and Wastewater Treatment Plant Rezoning Application #83-274. That supplemental analysis is incorporated in the following sections and included in its entirety in Exhibit A to Appendix 10.13.

5.9.1 Traffic Generation of Proposed Action

Truck traffic associated with the delivery of refuse to the facility and the removal of ash residue for disposal will be the major contributor of increased vehicle traffic. A much smaller volume will be added as a result of commuting employees and administrative and support functions for both the resource recovery facility and the wastewater treatment plant.

Truck Traffic Generation. Three major solid waste generation planning regions were defined and utilized for this transportation analysis. The three major solid waste generation regions are the Northwest County Transfer Station (NW), the South County Transfer Station (S), and the Northeast County solid waste generation regions (NE). The general limits of these designated wastesheds are shown in Figure 5.3. On a total County basis, the approximate split of waste quantities generated within these regions was 43 percent from the NW, 20 percent from the S and 37 percent from the NE.

The transport of wastes to the site from the NW and S regions will be by transfer trailer (assumed 18-20 tons per trailer capacity). This will account for 44 and 21 transfer trailer truck deliveries per working day,



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FIGURE 5.3
SOLID WASTE GENERATION
PLANNING REGIONS

respectively. Transport from the NE region and local areas will be by packer truck with an assumed 4 to 5 tons capacity. This will account for about 168 packer truck deliveries per day. It should be noted that more modern packer trucks typically have an eight to ten ton capacity. Therefore, this analysis is very conservative since realistically the actual number of packer truck deliveries could be half of that assumed herein. It is planned that the facility will receive refuse six days per week. Residue from the resource recovery site will be hauled by trucks to the Southeast County Landfill. This operation will take place six days per week and would require about 24 truck loads per day.

The estimated total number of trips for trucks only entering and leaving the Faulkenburg Road site is 514 trips (65 transfer trailers + 168 packer trucks + 24 residue trucks x 2). This volume of traffic would occur during each of the typical six work days.

The access to the site is off of Faulkenburg Road. Faulkenburg Road intersects with the State Route 60 about 9000 feet south of the site entrance. North of the site Faulkenburg Road is intersected by County Road 574 (Broadway Avenue) and State Route 574 (Buffalo Avenue).

Other Vehicle Traffic Generation. The principal direct generator of traffic as a result of the proposed site use is refuse delivery and ash residue disposal. However, there will be other traffic associated with the proposed site use that needs to be considered in this transportation analysis. This other traffic includes commuting employees and miscellaneous routine traffic associated with the operation and maintenance of the proposed resource recovery facility and the wastewater treatment plant.

It is expected that there will be a total of 73 full-time employees operating the resource recovery facility and wastewater treatment plant (58 and 15, respectively). These facilities will operate with a three-shift cycle. The day shift will account for approximately 60 percent of the staff while the other two shifts will each require only 20 percent of the work force. Most, if not all, of the employees will probably commute via use of single rider auto. With allowances for routine absenteeism (illness, vacation,

etc.), it is anticipated that commuting employees will generate 130 vehicle trips per day. Over weekend and holiday periods, the volume would be considerably less, probably in the vicinity of 80 vehicle trips per day.

The miscellaneous routine traffic associated with the operation and maintenance of the proposed resource recovery facility and the wastewater treatment plant will probably generate an average of 14 vehicle trips per day. Most of this traffic would be associated with administrative functions, deliveries, and visitor activities.

Total Trip Generation. The site development of a proposed resource recovery facility and the wastewater treatment plant will result in the generation of 658 vehicle trips over the course of a typical 24-hour weekday period. Of this total, 466 trips will be associated with refuse delivery, 48 trips from ash residue removal, 130 trips from commuting employees, and 14 trips from routine support activities.

5.9.2 Transportation Impact Area

Section 2.3.9 presented a discussion of the important roadway segments and intersections near the site. Additional data on existing traffic conditions and descriptions of these roadway segments can be found in Appendix 10.13 "Transportation Analysis."

Future Conditions. The region in the vicinity of the transportation study area is presently experiencing a major growth in commercial and industrial type activities. This development is certain to have an impact on future traffic conditions. Additionally, there will be three interchanges of Interstate 75 (presently under construction) within the relative vicinity of the project area, one planned for the end of the Crosstown Expressway, another with SR 60, and the third with SR 574. The presence of these interchanges will obviously change the present traffic patterns in the area. The details of some of the major changes planned for the area are discussed in the section on future land use (Section 2.2.3).

Portions of SR 60 in the vicinity of the interchange with Interstate 75 will be upgraded with road widening and the addition of turning and yield lanes. Additionally, a traffic signal has recently been installed at the intersection of State Road 60 and Faulkenburg Road. There are also various proposals as part of the Tampa Urban Area Transportation Study (TUATS) to improve the traffic conditions on SR 60 by the year 2000. The adopted plan calls for converting SR 60 in this area to a multiple lane (greater than two lanes in each travel direction) expressway.

Buffalo Avenue (SR 574), located north of the proposed site, is scheduled to be widened to a four-lane, divided roadway from Interstate 4 to CR 579 (east of Interstate 75) in 1986 by the Florida Department of Transportation (FDOT).

5.9.3 Time and Roadway Distribution of Project Traffic

The time distribution of traffic generated by the proposed project was analyzed by a two-step procedure. First, each of the individual categories of traffic was defined and reviewed for its schedule patterns. Then, all of the traffic volume predicted to occur during the same hour periods were added together. This resulted in an hourly distribution of expected traffic volume generated by the proposed project.

The individual categories of traffic generated by the operation of the proposed project and used in this transportation analysis are listed below.

- Solid Waste Transfer Trailers
- Ash Residue Trucks
- Solid Waste Packer Trucks
- Administrative and Support Vehicles
- Commuting Employee Vehicles

The principal hours of facility operation that will be associated with the generation of truck traffic will be between 8:00 AM and 5:00 PM. The facility may be opened at 7:00 AM for receipt of commercial wastes. However, it is expected that this traffic volume would be relatively minor.

The basic assumption for the temporal distribution of the individual categories of traffic to be generated by the proposed project are described in Appendix 10.13.

Once the time distribution of project-related traffic is established, the next step is to review the expected travel patterns of this traffic on local roadways. A general review was presented in an earlier section on the origin and/or destination of the project traffic along with a discussion of the roadways to be utilized. In this section, the project traffic is assigned to specific road segments that have a high probability of being utilized by each of the traffic categories. The five roadway segments previously introduced and described were the focus on this analysis. In projecting the expected truck travel patterns, two scenarios have been developed.

Scenario No. 1. This scenario assumes that the County will direct the specific routes to be utilized by the transfer trailers originating from the County's NW Transfer Station. The County could direct transfer trailer traffic associated with the NW Transfer Station to use U.S. 301 to SR 60 to Faulkenburg Road, thus approaching the proposed site from the south. This would reduce the exposure of residential traffic along Faulkenburg Road north of the proposed site to large transfer trailers.

Similarly, Scenario No. 1 assumes that most packer trucks servicing the NE region would approach the proposed site from the south rather than using SR 574 and approaching from the north. This assumption is based on an initial survey of existing roadway conditions which concluded that packer truck operators could choose to minimize travel on secondary roadways by traveling on I-75 to the SR 60 exit. Also, the County could specify use of I-75, SR 60 and/or other roadways in the franchise agreements with the waste handling companies.

It should be noted that this scenario creates a worst-case traffic situation since a considerable portion of the site's traffic would travel south of the site.

Scenario No. 2. The second scenario assumes that no traffic routing would be specified for County operated transfer trailers or within franchise agreements. Scenario No. 2 assumes greater use of Faulkenburg Road to the north of the proposed site (Segment Four) based on the following considerations:

1. Transfer trailers originating from the County's NW Transfer Station assumed to approach the proposed site from the north via I-4, Buffalo Avenue, and Faulkenburg Road. This traffic assignment considers the following:
 - a. Buffalo Avenue (S.R. 574) is scheduled to be widened to a four-lane, divided roadway from Interstate 4 to County Road 579 (east of Interstate 75) in 1986 by the Florida Department of Transportation (FDOT). Conceptual plans for this improvement include the addition of left-turn auxiliary lanes on all approaches to the Buffalo Avenue/Faulkenburg Road intersection. At this time, FDOT has not made any recommendations concerning the type of control needed at this intersection.
 - b. The Horizon 2000 Plan, Hillsborough County's adopted land use plan, designates the property fronting on Faulkenburg Road between Buffalo Avenue and S.R. 60 for light industrial development.
2. Traffic assignment in the Northeast sector was based on the distribution of population in the Northeast sector. Packer trucks serving this area will make their collection runs and deposit refuse at the Resource Recovery Plant. Thus, the traffic will be most heavily distributed to areas of greater population and development intensity. Population data used was obtained from the 1980 census.

The actual predicted distribution of traffic for each of these scenarios is reviewed in more detailed in Appendix 10.13.

5.9.4 Roadway Capacity Analysis

- o Segments One, Two, and Three - Scenario No. 1 is more conservative for evaluating the potential impacts to SR 60's Level of Service (LOS), especially at its intersection with Faulkenburg Road. Therefore, Scenario No. 1 (presented in Section 2.3.9) has been used for the following Roadway Capacity Analysis for Segments One, Two, and Three.

At a level of service (LOS) C, each of these three segments of SR 60 has a daily capacity of 28,800 vehicles. This is based upon a Florida Department of Transportation capacity estimate of 36,000 vpd for LOS-E and an adjustment factor of 0.8 from the Highway Capacity Manual. Under Scenario No. 1, the proposed project will add approximately 142 vehicle trips to Segment One, 388 vehicle trips to Segment Two, and 172 vehicle trips to Segment Three during weekdays between the hours of 6:00 AM and 5:00 PM. This represents 0.5 percent, 1.3 percent, and 0.6 percent of SR 60 LOS-C daily capacity for Segments One, Two, and Three, respectively.

These roadway segments of SR 60 are presently carrying a daily traffic volume in excess of the LOS-C daily capacity. As a result of existing traffic volumes this roadway is operating at a LOS-F. A summary of the impact the proposed project will have on these segments of SR 60 is presented on Table 5.4. This comparison shows the relative proportion of the traffic generated by the proposed project to existing ADT and that predicted to occur by the year 2000. It is readily apparent that the proposed project will have a negligible effect on existing or the higher predicted ADT.

While this predicted increase is, from a practical perspective, insignificant, SR 60 traffic volumes presently exceed LOS-C capacity levels. Therefore, any increase, however minor, should be reviewed with regard to its potential consequences. As discussed in an earlier section the peaking characteristics of the proposed project's traffic fortunately do not coincide with the peaking patterns of SR 60. As a result, minimal levels of project-related traffic should occur during the periods of maximum traffic volume on SR 60. Additionally, the peak project related traffic volume will occur between SR 60's typical AM and PM peak traffic periods.

The portion of SR 60 expected to experience the greatest volume of project-related traffic on this roadway is also the shortest. This Segment Two which includes that portion of SR 60 between Faulkenburg Road and the planned interchange of I-75. As previously indicated, most of SR 60 is scheduled for major modifications by the year 2000 and Segment Two will be modified by the construction of the interchange with I-75.

With planned roadway modifications, it is expected that traffic conditions on SR 60 will improve. Additionally, regardless of the influence from the traffic of this proposed project, service levels on SR 60 will stay low without future improvements in roadway conditions.

- o Segments Four and Five - The proposed projects daily traffic volume of 658 vpd is the same for both Scenario Nos. 1 and 2. Under Scenario No. 1, the split of the project's daily traffic between segments Four and Five is 10 percent and 90 percent, respectively. Under Scenario No. 2, the split is 60 percent and 40 percent for Segments Four and Five, respectively.

The daily capacity of Faulkenburg Road was estimated by Kimley-Horn and Associates, Inc. in the following manner. The roadway capacity during the PM peak hour was estimated at the three intersections which will limit roadway capacity: Buffalo Avenue, Broadway Avenue, and SR 60. The estimated peak hour capacity was then divided by the percent of daily traffic occurring in that hour to estimate daily capacity. Daily capacities calculated in this manner are an extension of the peak hour operating condition. The estimated daily capacities are 14,000 vpd and 10,950 vpd for Segments Four and Five, respectively.

These roadway segments of Faulkenburg Road are presently carrying a daily traffic volume well below their estimated daily capacities. A summary of the impact the proposed project will have on these segments of Faulkenburg Road is presented on Table 5.4 for both Scenario Nos. 1 and 2. This comparison shows the relative proportion of the traffic generated by the proposed project to both existing ADT and estimated daily capacity.

TABLE 5.4
PREDICTED CHANGES IN ADT VOLUMES ON SR 60

<u>SEGMENT ONE</u>			
	<u>Roadway ADT¹</u>	<u>Proposed Project ADT²</u>	<u>Percent Increase from Project</u>
Present	44,540	142	0.3%
Future	68,100	142	0.2%

<u>SEGMENT TWO</u>			
	<u>Roadway ADT¹</u>	<u>Proposed Project ADT²</u>	<u>Percent Increase from Project</u>
Present	48,900	388	0.8%
Future	58,100	388	0.7%

<u>SEGMENT THREE</u>			
	<u>Roadway ADT³</u>	<u>Proposed Project ADT²</u>	<u>Percent Increase from Project</u>
Present	48,900	172	0.4%
Future	58,100	172	0.3%

SOURCE: 1. Hillsborough County Traffic Count Map, 1982.
2. CDM Estimates.
3. CDM Estimate from Reference 1.

The greatest impact on Segment Four occurs under Scenario No. 2 with the proposed project traffic accounting for 2.6 percent of the roadway capacity and the present ADT plus proposed traffic equaling 44.2 percent of the roadway capacity. The greatest impact on Segment Five occurs under Scenario No. 1 with the proposed project traffic accounting for 5.4 percent of the roadway capacity and the present ADT plus proposed traffic equaling 51.9 percent of the roadway capacity. These predicted increases are insignificant from a practical perspective.

A generalized volume of 11,800 vpd is normally considered the maximum for LOS-C operation of a two-lane arterial such as Faulkenburg Road. The proposed project traffic will not increase existing ADT beyond this LOS-C Capacity. As shown on Table 5.5, the maximum predicted daily traffic volume on Faulkenburg Road, including the proposed project traffic, occurs on Segment Four under Scenario No. 1. The predicted volume of 6,456 vpd represents 55 percent of the roadway's LOS-C capacity.

An analysis of the temporal distribution and potential impacts was also conducted and revealed very insignificant impacts on an hourly basis. The results of this analysis are presented in more detail within Appendix 10.13. The difference between the peaking patterns of existing traffic with that of the proposed project is the principal reason that impacts reviews on a temporal basis rather than an ADT basis are still insignificant. Additionally, along Faulkenburg there are no capacity problems with or without this proposed project.

5.9.5 Relation to Land Use

The land upon which the plant is located has been rezoned from Light Industrial to Hillsborough County's Community Unit zoning classification. Consequently, the determination has been made in the past that light industrial uses are suitable for the site. Kimley-Horn and Associates, Inc. has evaluated the proposed resource recovery facility impacts in terms of what might be expected with some other light industrial development on the site. According to the Institute of Transportation Engineers' Trip Generation report (Third Edition, 1982), this site could be expected to

TABLE 5.5

PREDICTED CHANGES IN ADT VOLUMES
ON FAULKENBURG ROAD

	Scenario No. 1		Scenario No. 2	
	Volume (vpd)	Percent of Capacity	Volume (vpd)	Percent of Capacity
<u>Segment Four</u>				
Capacity: 14,600 vpd ⁽¹⁾				
Average Daily Traffic ⁽²⁾	6,060	41.5%	6,060	41.5%
Proposed Project Traffic ⁽³⁾	64	0.5%	396	2.7%
TOTAL	6,124	42.0%	6,456	44.2%
<u>Segment Five</u>				
Capacity: 10,950 vpd ⁽¹⁾				
Average Daily Traffic ⁽²⁾	5,090	46.5%	5,090	46.5%
Proposed Project Traffic ⁽³⁾	594	5.4%	263	2.4%
TOTAL	5,684	51.9%	5,353	48.9%

(1) Estimated by Kimley-Horn and Associates, Inc.

(2) Hillsborough County Traffic County Map, 1982.

(3) CDM Estimates.

generate 2,650 daily vehicle trip-ends if developed as a light industrial site. Twenty percent of this traffic volume would occur in the PM peak hour -- the time of day when road capacities are most taxed. In contrast, the facility is expected to generate only 576 vehicle trip-ends per day, with virtually no traffic generated during the hours when adjacent streets experience their peak traffic loadings. Consequently, the energy recovery plant development proposal represents a lessening of intensity of land use from a traffic generation perspective.

5.10 ARCHAEOLOGICAL SITES

A report which details an archaeological and historical survey for the proposed site was completed for the Hillsborough County Department of Solid Waste in May 1983. According to this report, the Florida Master Site File listed no historic or prehistoric resources known to be present within the tract boundaries.

Some 34 subsurface test pits were excavated to determine if any sites could be located.

Two chert flakes were covered in a random testing design. More intensive testing near the location of these cultural materials was then undertaken, but no other material was found and no archaeological site is present. An historic assessment indicated that no significant historic sites have existed on the property. Furthermore, no significant historic events have occurred on the property, according to the report.

The historical documents research provided insight into the historic period use of the tract and its immediate environs. The research concluded that the survey tract has no significant historic period or cultural resources: a fact that was confirmed by the field investigations. Only one modern farm-related building is located on the tract and it is not a significant architectural structure. No further historical research was recommended.

The report concluded that the projected use of the property will not impact any historic or prehistoric cultural resources.

The Florida Department of State, Division of Archives, History, and Records Management also concluded that the proposed project is unlikely to affect any significant archaeological or historic resources. The complete archaeological report and correspondence is presented in Appendix 10.8.

5.11 RESOURCES COMMITTED

Numerous natural and human resources would be consumed, converted or made unavailable for future use if the proposed action is implemented.

The resources used in the construction of the plant would be committed to this project. Some building materials would be irretrievably used in construction of the resource recovery facility or irreversibly committed to the plant. Certain lumber products and concrete structures would be committed as well as glass, ceramics, paint, insulation and paving materials. In addition to the materials consumed during construction, the energy and human labor expended could not be retrieved. However, this type of commitment of resources is typical for major capital intensive projects. Financial commitments include dedication of bond issue funds or other sources of construction funds. This results in a lost opportunity for Hillsborough County, since these committed funds would not be available for competing projects. As with the commitment of labor and materials, the financial requirements for a major capital project are very typical.

The combustion process chemically alters many of the compounds within the waste stream. Many of the heat releasing reactions, practically speaking, are irreversible. Therefore, the materials consumed in the combustion process are permanently lost. This, however, is considered a positive "reuse" of a material for the generation of energy which otherwise would have been buried in a landfill. In contrast, the processing 1600 tpd of MSW in a resource recovery facility could result in the conservation of approximately 150,000 tons per year of coal and the potential for the recovery of reusable materials.

5.12 VARIANCES

It is not anticipated that any variances from applicable standards will be sought as part of the site certification proceedings.

Transmission Lines and Other Linear Facilities

CHAPTER 6

TRANSMISSION LINES AND OTHER LINEAR FACILITIES

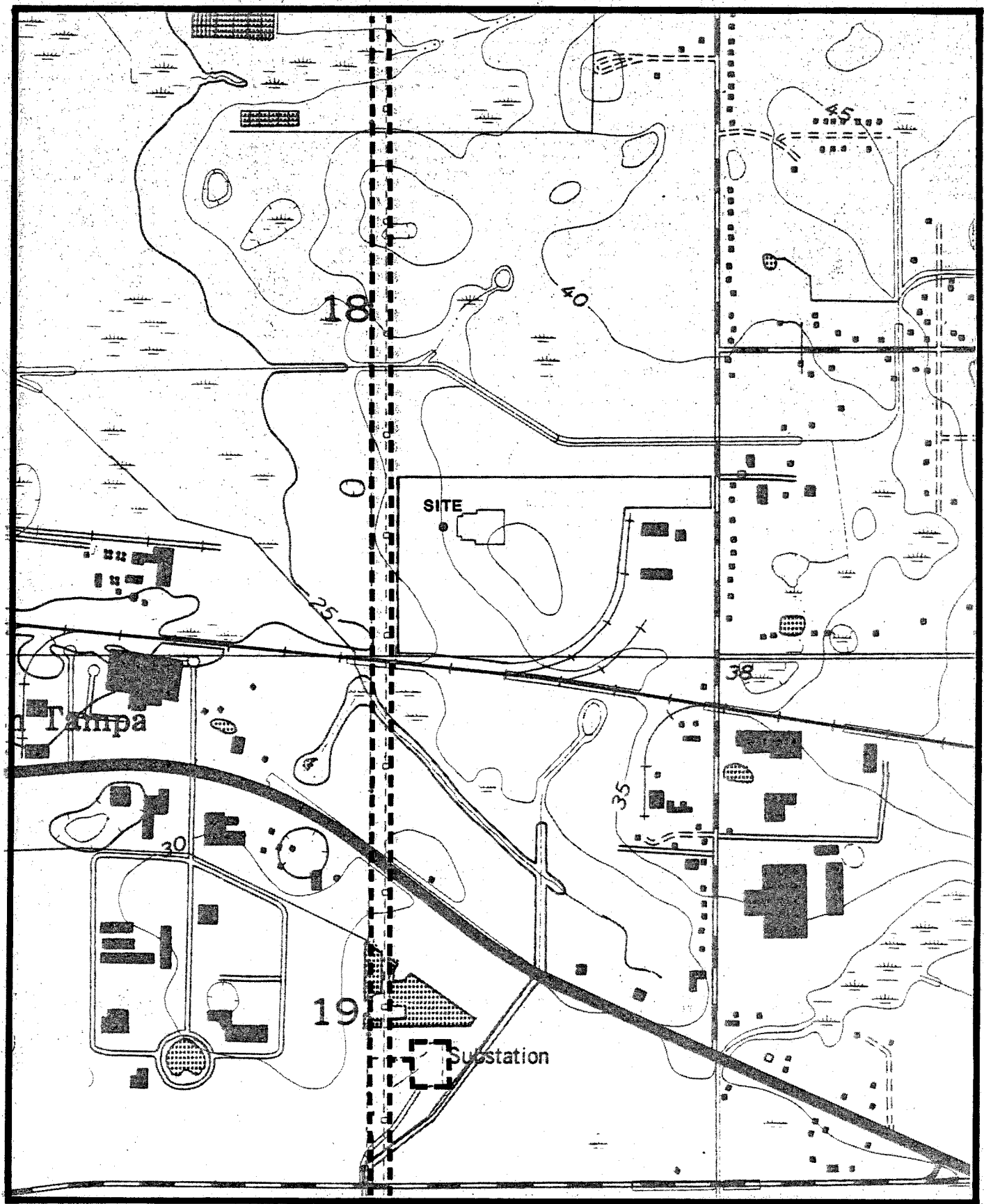
There are no new transmission line corridors or other long narrow siting corridors (e.g., rail lines, influent or effluent pipelines, etc.) which leave the main site area. The site abuts a 200-foot wide easement of the Tampa Electric Company (TECO).

Because the abutting transmission corridor contains existing transmission lines, and because the site of the proposed energy recovery facility abuts this easement corridor, environmental features of the corridor in the vicinity of the site are described in conjunction with the main site area descriptions in Chapter 2. These environmental features include existing land use, future land use, and zoning. If the results of TECO's interconnection study described under Section 6.1 below conclude that an expanded easement or alternative transmission corridor is required, then a permit for the expanded easement or transmission corridor will be obtained by TECO.

This chapter presents a discussion of the TECO interconnection study and evaluates the electromagnetic effects from the proposed energy recovery facility.

6.1 TRANSMISSION LINES

The abutting TECO easement contains three 230 kV transmission lines, as well as a 20-foot easement for the Houston Texas Gas and Oil Corporation. The nearest electric substation is located approximately 3000 feet due south of the site, adjacent to the TECO easement corridor, as shown on Figure 6.1.



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 6.1
TECO EASMENT CORRIDOR
AND SUBSTATION LOCATION

500' 0 500 1000 1500 FEET

Based upon information supplied by the selected full service contractor, the Tampa Electric Company (TECO) will perform an interconnection study. The purpose of the study is twofold:

1. To determine the interconnection system required to serve the proposed facility. The study will be an examination of alternative interconnection arrangements. It will consider the requirements of safe and reliable operation of the interconnected system and make a recommendation to guide in the contract negotiations.
2. To study the ability of the composite area expansion plan to satisfy TECO planning criteria.

The objectives of the study are to:

1. Collect load flow data for the study year and planned future expansion.
2. Assess the steady-state and transient stability performance of the alternative interconnection arrangements for normal and contingency conditions consistent with TECO planning criteria.

Major items will include:

- A. Steady-state voltage regulation and line loading will be evaluated in response to single and some multiple contingencies.
- B. Transient stability analysis will be done on all alternatives interconnecting the proposed facility to the existing system. Twelve, twenty-four, and sixty cycle reclosing times will be modeled.
- C. Detailed evaluation will be done at three different load levels - 100%, 60% and 40% of peak.

The data required by TECO which will be supplied by the full-service contractor are:

1. Proposed system one-line diagram, including impedances.
2. Plant load and generation. Projected duration curves.
3. Generator Ratings (including power factor) and WATT-VAR capability curves for all generators.
4. Proposed relay and protection scheme.
5. Stability data, as follows:
 - a. All D and Q axis impedances and time constants for generator.
 - b. Generator inertia constant.
 - c. Generator saturation curve.
 - d. Excitation system type and constants for stability modeling.
 - e. Steam system and governor type and constants for stability modeling.

The study is estimated by TECO to take about two years to complete. TECO will be responsible for constructing the transmission line from the selected substation to the project boundary (including obtaining any required permits) within their existing right-of-way. If the study concludes that additional right-of-way is necessary, TECO will be responsible for obtaining it.

Electromagnetic Effects

The proposed facility will produce about 39 megawatts as a product of combusting the refuse. This energy-from-waste will be fed into the Tampa Electric Company (TECO) power grid. Currently, 230 kv high voltage transmission lines (HVTL) are located in the TECO easement to the west of the site. In order to tie into the existing grid, additional 69 kv lines will be run from the proposed facility's generator and switchyard to the TECO easement and then within the easement to the substation chosen by TECO from the results of the interconnection study. To define the specific interconnection system required to serve the project, Tampa Electric Company will perform an interconnection study as described above.

The new lines necessitated by the proposed facility will run only through County or TECO property. No residences are located in the vicinity of the new lines and thus the general public will not be exposed to electromagnetic radiation associated with HVTL as a result of the operation of the energy recovery facility. The following discussion presents a brief overview of effects postulated to result from HVTL. It should be noted however, that the proposed facility is only hooking into an existing network rather than creating the need for new HVTL.

With the development of increasingly higher voltage transmission lines -- extra high voltage (EHV) transmission lines (700 kv or higher) and ultra high voltage (UHV) lines (1,100 to 1,500 kv), concerns have been raised as to possible health effects to workers or persons living adjacent to power easements. These concerns can be divided into two major areas: 1) possible effects caused by electric and magnetic fields which exist in the vicinity of the lines; and 2) possible effects caused by electrical discharges from the line. With higher carrying capacity, the electric and magnetic fields in the vicinity of the lines grow stronger. The 230 kv lines found adjacent to the site carry a relatively low voltage and thus can be expected to produce smaller and lower strength fields compared to the higher voltage lines which are often the subject of testing.

The fields that exist near HVTL will cause voltages and currents to be induced in any conducting objects placed in the field. A person or animal touching an object such as an underground metal building or vehicle will have the current flow through them. While any building constructed within the influence of a power line will be adequately grounded, large mobile objects have the greatest potential for inducing sufficient current to cause harm. It is agreed, however, that levels generated are below those which cause anything more than a startle reflex. An exception to this may be in the instance of a person with a pacemaker touching a large insulated vehicle. Sufficient current could be generated to cause a pacemaker reversion. (Frazier, 1979).

A substantial amount of disagreement exists as to possible effects which may be caused by long term exposure to the low frequency electromagnetic radiation generated by HVTL. In addition to effects such as nerve stimulation, other effects which have been reported in the literature include reduced growth rate and changes in blood chemistry in mice, depressed activity in chicks, reduced egg production in hens and the preference of rats to stay on the shielded side of a two compartment shuttle box (Off. Sci Tech Policy, 1978). Soviet literature also reports many biochemical, neuroendocrine central nervous system and behavioral changes. Again, these results are controversial because of questions in testing procedures and data interpretation.

A second area of concern with HVTL is the occurrence of electric discharges along the transmission lines causing the production of corona -- an "avalanche" of ionizations in the air surrounding the line -- which in turn produces ozone, audible noise and radio frequency noise. Generally, transmission lines can be designed to reduce corona effects to a minimum.

As discussed above, the new 69 kv lines from the proposed energy recovery facility are expected to share an existing easement containing existing 230 kv lines. The incremental effect created by the new lines is expected to be of minor significance.

6.2 ASSOCIATED LINEAR FACILITIES

This section is not applicable to the proposed project because there are no associated linear facilities.

Economic and Social Effects of Plant Construction and Operation

CHAPTER 7

ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

The benefits of the County's resource recovery project are: (1) it provides an ecologically sound and economical method to dispose of solid waste, (2) it decreases the potential threat to groundwater and the land area needed for landfilling solid waste, and (3) it recovers energy from combustion of the solid waste which helps defray the cost of disposal.

It is sometimes difficult to quantify the economic and, in particular, the social ramifications of facility construction and operation. The discussion below not only addresses those readily quantifiable cost items and benefit items (such as worker earnings), but also discusses the qualitative costs and benefits of the proposed project.

7.1 SOCIO-ECONOMIC BENEFITS

Land disposal of solid waste is becoming increasingly difficult in Hillsborough County. Permitting of additional landfills has been constrained by a rapid increase in land prices, a decrease in available land, public resistance and regulations. Because of these restrictions on landfilling, County officials are pursuing resource recovery as a more efficient method of solid waste disposal. The following paragraphs describe the benefits associated with a modern resource recovery facility.

The resource recovery system of disposal, although initially more expensive than landfilling, could become less expensive than landfilling if the prices of real estate and energy continue to increase. In addition, resource recovery is an ecologically sound method of waste disposal and the facility will be designed in an aesthetically pleasing manner. Extensive landscaping is planned for the grounds surrounding the facility.

The facility will have a continuous design-rated capacity of 438,000 tons per year, although it will initially receive between 280,000 and 320,000 tons of solid waste per year. Some non-combustible materials will be transported directly to the Southeast County Landfill. However, of the 280,000 - 300,000 tons processed by the facility, under 25 percent (containing less than 0.3 percent putrescible debris) will require landfilling. This significant decrease in waste tonnage corresponds to a 90 percent reduction in waste volume. Consequently, the annual land area requirement for landfilling will be substantially reduced. For example, with the implementation of both the resource recovery facilities serving the County and the City of Tampa, the estimated site life of the Southeast County Landfill can be extended an estimated 16 to 20 years.

Another benefit related to resource recovery is the reduced potential for damage to valuable surface water and groundwater resources. Landfilling of unprocessed garbage may result in water resources contamination by organic materials leaching out of the waste. In contrast, materials processed by resource recovery consist of burned-out matter discharged from the grate and flyash which are relatively inert (i.e., containing less than 0.3 percent putrescible material).

A third benefit related to the resource recovery program is the generation of a minimum of 126 million kilowatt hours of electricity per year (based on a guaranteed tonnage of 280,000 tons/year and 450 KWH/ton net output). This energy production corresponds to a decrease in use of imported crude oil by 280,000 barrels per year (or a minimum of 5.6 million barrels in 20 years). At current oil prices, this decrease in dependence on foreign crude oil translates into a reduction of about \$156 million over 20 years in foreign spending. Because no inflation was figured into this calculation, the \$156 million is a very conservative number.

Benefits to the local economy will result from local hirings for plant operations. A staff of about 58 (including 7 administrative, 41 operations and 10 maintenance positions) will be required for operation of the facility. A direct annual payroll of approximately \$2 million will contribute \$40 million (in present worth dollars) to the local economy over a 20-year period.

There would also be indirect beneficial impacts from the resource recovery operation on industries throughout the regional economy. Examples include increased sales and jobs in industries which supply the facility, and retail establishments which supply goods and services to the workers in the affected businesses.

Benefits will also be derived from facility construction. For the duration of construction, the direct benefits of a \$100 million construction project will be felt in the local economy through provision of local jobs and the purchase of construction materials and services.

Indirect benefits from facility construction include increased sales and jobs in industries which supply the construction firms. These indirect benefits will also occur to retail establishments which sell goods and services to workers employed by construction of the facility.

A social benefit associated with facility development will be derived from the provision of a public education/visitors center at the site. Tours of the facility and information on state-of-the-art resource recovery will be available to all visitors.

7.2 SOCIO-ECONOMIC COSTS

This section is a description of the costs associated with constructing and operating the energy recovery facility in Hillsborough County over a 20-year period.

Constructing the facility will require approximately 36 acres of land of the 50 acre site to be used solely for resource recovery operations. Although the proposed site is presently owned by Hillsborough County, the 36 acres must be counted as a cost of obtaining the facility since this land will be restricted from other uses. The land was purchased at a price of \$30,700/acre, which amounts to \$1.1 million for 36 acres.

Another land-related cost to be considered is the effect of the proposed facility on real estate values of adjacent industrial properties. An

appraisal conducted by Richard Klusza of Wheeler and Klusza, Inc., revealed that there would be no impact to adjacent industrial property values due to the proposed facility.

The costs associated with site preparation, access road and facility construction, utilities extension and all other legal, administrative and financing costs (not including capitalized interest during construction and various reserve accounts) are estimated at about \$100 million. The County will finance these costs through the issuance of revenue bonds. However, since the bonds have not yet been issued, a breakdown of cost plus interest is not currently available. The following figures, although subject to change during final negotiations and bond sales, are the best available approximations of cost breakdown:

	<u>\$ x 1,000</u>
Contractor Cost	100,000
Permits & Fees	2,000
Additional County Costs	<u>9,000</u>
TOTAL CAPITAL COSTS	111,000
TOTAL BOND ISSUE	192,000

The operator of the facility will receive from the County an annual operating and maintenance fee of about \$7 million (based on 280,000 tons/year and 1984 costs). These costs, however, are not fixed; they will be periodically adjusted over the life of the operating agreement in accordance with selected price indices.

An evaluation of costs over a 20-year financing period was conducted in order to quantify the estimated cost/benefit of plant construction and provide a basis for comparison with continued landfilling of solid waste.

Items included in construction and maintenance are tipping or user's fees, bonding costs, energy revenues and general overhead and maintenance.

Landfill costs were also estimated by analyzing current and predicted waste disposal costs and land requirements (and costs) to meet expected demand. All costs under this evaluation were adjusted according to projected trends in inflation over the 20-year period. Through the year 2008, it is estimated that continued landfilling will result in a cost to users of \$170 million, while the total net resource recovery costs to the users (including transportation and process waste landfilling) will be about \$220 million. Therefore, the cost associated with resource recovery over cost of continued landfilling for 20 years is estimated at \$50 million. The initial cost of resource recovery above that of landfilling is estimated to be an increase of only \$3/month/household. However, this situation will change as the cost of landfilling increases over time, while the increasing revenues from the sale of electricity will eventually bring the cost of resource recovery below the cost of landfilling.

It should also be noted that Hillsborough County will have purchased the resource recovery facility at the end of the 20-year financing period. In addition, at the end of 20 years, the 20-year old plant may be worth as much as 50 percent of the new facility, assuming proper maintenance over this period. Assuming this is the case, the present worth of the County-owned plant would decrease the cost by about \$14 million, resulting in a total cost of \$36 million. There are also some unquantifiable economic benefits which may further reduce this cost. For example, the decreased risk of contaminating environmental resources is a real social and environmental benefit which may be translated into economic benefits. Ecological/environmental losses, e.g. displacement of wildlife, habitat disruption and deterioration of aesthetic and scenic values, will be minimal and are therefore not cited as costs of the project.

Traffic volume will increase on Faulkenburg Road once the facility is operational. However, as discussed in Section 5.9.5, the increase in traffic from this project would be less than if the site were developed for a typical light industrial use. During the facility construction phase, there

will also be a traffic increase associated with construction vehicles on Faulkenburg Road. However, construction (and therefore construction-related traffic) will have only a minor effect on the area. Facility development will also result in an additional turning lane in Faulkenburg Road and an 18-foot right-of-way, as required under zoning conditions.

Site and Design Alternatives

CHAPTER 8

SITE AND PLANT DESIGN ALTERNATIVES

There have been many alternatives evaluated for various components of this project. Reports pertaining to site selection, the evaluation of solid waste management alternatives, ownership and financing, and facility size and boiler configuration are among those related to alternatives evaluation.

This chapter will present three of the more directly applicable alternative divisions -- site selection, stack height, and alternative sources of water.

8.1 ALTERNATIVE SITES

On October 27, 1982, the Hillsborough County Board of County Commissioners approved the selection of the Faulkenburg Road site recommended by both the County's consultant engineers, Camp Dresser & McKee and the Resource Recovery Project Oversight Committee. The site embodies a central location; good road access; a compatible land use; and favorable environmental conditions. By selecting a site near the County's waste generation center, transportation times and costs are minimized.

Site selection by Hillsborough County came after many months of detailed study by Camp Dresser & McKee Inc. and County staff. Air, traffic, noise, water, and aesthetic issues were examined in detail. A specific siting methodology was developed to evaluate the suitability of candidate sites for a resource recovery facility. The basic approach used consisted of a progression of data collection and reviews in increasingly greater detail. In the early phase of the study, a total of 35 potential sites were identified representing all areas within Hillsborough County. Following field investigation, this list of potential sites was narrowed to 23 for further screening. These twelve sites were eliminated because their actual field conditions were unsuited for construction of a resource recovery facility.

The remaining 23 candidate sites received a detailed evaluation and rating through the use of a specific siting criteria developed by the consulting engineers. These included engineering, zoning, and environmental considerations. Based on this analysis, four candidate sites were selected for additional evaluation. On September 29, 1982, the Board of County Commissioners instructed Camp Dresser & McKee to perform additional detailed studies on these sites and expressed a preference at that time for a site near Faulkenburg Road and another near the Tampa Electric Company Gannon Station generating plant off Port Sutton Road.

After completing these studies, Camp Dresser & McKee recommended that Hillsborough County select the Faulkenburg Road site for construction of its resource recovery facility. The siting process and recommendation are presented in the Evaluation and Selection of a Resource Recovery Facility Site for Hillsborough County, Final Report, December 1982; prepared for the Hillsborough County Board of County Commissioners by CDM. While each of the four candidate sites could have been developed for the facility, the consultant's studies indicated that the Faulkenburg Road site could be developed with the least relative cost compared to the other three sites and also with the fewest negative impacts.

8.2 PROPOSED SITE DESIGN ALTERNATIVES

The development of the resource recovery facility for Hillsborough County includes the design of a stack for discharging exhaust gases into the atmosphere. A principle feature of stack design is the selection of an acceptable stack height to avoid unacceptable impacts on ambient air quality. As a rule-of-thumb, if the stack height is equal to or greater than 2.5 times the principle onsite structures, aerodynamic downwash effects are not encountered and unacceptable impacts on air quality due to these effects are avoided.

However, the stack height can be less than the rule-of-thumb height if an evaluation shows the lower stack height will avoid unacceptable impacts.

The report presented in Appendix 10.16 summarizes the analyses that have been performed to evaluate the impact of facility emissions on ambient air quality levels for the chosen stack height of 67 meters (220 feet) above grade level (agl). The report contains two methods which have been applied in evaluating impacts, one, the Industrial Source Complex (ISC) computer model, the other, a method developed by Halitsky (1976). This model is regarded as state-of-the-art in estimating ground-level concentrations via Gaussian dispersion assumptions. The advantages and shortcomings, as well as a description of the algorithms used are presented in the report.

The basic conclusions of the stack height analysis are that the proposed stack (220 feet), although less than 2.5 times the height of the principle onsite structure, will not result in downwash problems that have excessive pollutant concentrations.

Based on the analysis presented in Appendix 10.16 (see Volume III-Air Quality), supplemented by the air quality analysis contained in the PSD application (Appendix 10.1.5 in Volume III), it has been determined that a 220 foot stack is feasible for the proposed energy recovery facility. The analysis contained in the stack height analysis and in the PSD application examined the aerodynamic downwash issue and the groundlevel concentrations of pollutants associated with the proposed facility. The analyses show that neither downwash nor pollutant concentrations will be a problem at the facility with a 220 foot stack.

8.3 ALTERNATIVE WATER SOURCE

The County is committed to building the Northwest Brandon Subregional Wastewater Treatment Plant adjacent to the energy recovery facility. However, if for some unlikely reason the wastewater treatment plant is not constructed, the County would construct a pipeline from one of its existing wastewater treatment facilities to the energy recovery facility. This alternative wastewater effluent supply would be used as process water by the energy recovery facility.

Coordination

CHAPTER 9

COORDINATION

Implementation of the energy recovery facility project has required input from numerous federal, state, regional, county and local government agencies. Input has been provided in the form of meetings, phone calls and correspondence between Hillsborough County, Camp Dresser & McKee and contacts at these agencies.

As stipulated in the Instruction Guide for Certification Application, this chapter contains lists of individuals within government agencies who were contacted regarding the proposed energy recovery facility. Two lists are presented here because of the different subject matter and chronology. Table 9.1 contains names of those individuals contacted during the course of the preparation of this application. During that time (1983-1984) the County was involved in the Land Use Plan Amendment and Rezoning. In that the Plan Amendment and Rezoning are important aspects presented in this application, the individuals who were involved in those proceedings are included in the table. The second list, Table 9.2, contains the names of individuals contacted during the site selection activities in 1982.

TABLE 9.1

COORDINATION DURING LAND USE PLAN AMENDMENT,
REZONING AND PREPARATION OF POWER PLANT
SITE CERTIFICATION APPLICATION

FEDERAL

<u>Agency</u>	<u>Contact</u>	<u>Date</u>	<u>Subject</u>
DEPARTMENT OF COMMERCE			
National Oceanic and Atmospheric Administration, National Marine Fisheries Service (Southeast Region)	Andreas Mager, Jr. Fishery Biologist Protected Species Management Branch	4/13/84	Letter re: NMFS properties or juris- dictions
		4/10/84	Phone call re: endangered species
	Richard J. Hoogland, Chief, Environmental Assessment Branch	4/17/84	Letter re: NMFS jurisdiction
DEPARTMENT OF INTERIOR			
Fish & Wildlife Service	Dave Smith (Region II)	9/21/83	Data request
		4/25/84	Phone call re: critical wildlife habitats within 5 miles of site
		John Hefner Regional Wetland Coordinator (Region IV)	7/6/83
U.S. Geological Survey	Craig Hutchinson	11/2/83	Surface & ground water data
		11/3/83	Meeting re: water resources data
	Joe Stewart	11/3/83	Meeting re: water resources data
	E. Johnson	10/31/83	Phone call re: water resources data

<u>Agency</u>	<u>Contact</u>	<u>Date</u>	<u>Subject</u>
	Steve Hendersen	8/23/83	STORET/NAWDEX
		10/31/83	Phone call re: water resources data
FEDERAL ENERGY REGULATORY COMMISSION	Kenneth F. Plumb	8/25/83	Matters related to Qualifying Small Power Production Facility
ENVIRONMENTAL PROTECTION AGENCY			NPDES

STATE

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Bureau of Air Quality Management	Larry George	11/4/83	Letter from Pompelia, CDM, re: air quality modeling methodology
	Bill Thomas	7/12/83	Project meeting
	Clair Fancy	8/12/83	Project meeting
Division of Environmental Planning	Dan Williams	4/10/83	Phone call re: agency jurisdictions
Office of Coastal Management	Richard Tucker	4/12/84	Letter re: governmental designated lands
Power Plant Siting Section	Karen Anthony	8/12/82	Project meeting
Solid Waste	Ray Moreau	7/12/83	Project meeting
		8/12/83	Project meeting
Groundwater	Alan G. Anwarter	7/12/83	Project meeting
NPDES Permitting	Kenneth Klos	7/12/83	Project meeting
Other	Victoria Tschinkel	7/15/83	Letter to Dr. M.J. Rogoff re: approval of modifications of Resource Recovery Program Plan

<u>Agency</u>	<u>Contact</u>	<u>Date</u>	<u>Subject</u>
FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS	Hamilton J. Oven Jr., Administrator	8/12/82	Project meeting
		10/14/83	Letter from CDM re: water quality and sediment sampling program
		10/14/83	Letter from Dr. M.J. Rogoff re: noise and traffic monitoring
		10/25/83	Phone call re: water quality and sediment sampling program
		11/10/83	Letter from CDM re: response to comments of the Bureau of Air Quality Management on Plan of Study
	Stephen Boyes Hydrogeologist	11/21/83	Letter from CDM re: air quality modeling methodology and analysis
		2/23/84	Phone call re: geotechnical field testing
		11/8/83	Letter to Pompelia (CDM) re: meteorolo- gical data
	E. Snipes	8/2/83	Phone call re: Tampa Bypass Canal
	Jan Rae Clark	7/12/83	Project meeting
	Doug MacLaughlin	7/12/83	Project meeting
	Bill Brett	7/12/83	Project meeting
	Eric Shaw	12/8/83	Phone call re: agency jurisdictions
		8/26/83	Site visit

<u>Agency</u>	<u>Contact</u>	<u>Date</u>	<u>Subject</u>
FLORIDA DEPARTMENT OF NATURAL RESOURCES	Paul Darst	7/12/83	Project meeting
	Diana Sawaya-Crane DRI Section Administrator	8/10/83	Matters related to DRI
Division of Recreation and Parks	Jim Stevenson	7/25/84	Phone call re: monuments, memorials within 5 miles of site
FLORIDA DEPARTMENT OF STATE			
Division of Archives, History, and Records Management	George W. Percy Chief, Bureau of Historic Preserva- tion	6/21/83	Letter re: History, archaeology
	Frederick P. Gaske Historic Preserva- Compliance Section	5/11/83	Letter re: cultural resources assessment
Historic Tampa/ Hillsborough County Preservation Board	W. Carl Shiver Historic Preservationist	4/16/83	Letter re: properties listed on National Register of Historic Places
		4/25/84	Phone call
	Lois Miller	4/10/84	Phone call re: National Register Properties
FLORIDA GAME & FRESHWATER FISH COMMISSION	Gregory L. Holder	8/12/83	Endangered species
	Regional Wildlife Biologist	4/16/84	Letter re: game mgmt areas within 5 mile radius of site
		4/11/84	Phone call re: endangered species
	D. Wood	8/13/83	Phone call re: endangered species
	Randy Kautz	7/12/83	Project meeting

<u>Agency</u>	<u>Contact</u>	<u>Date</u>	<u>Subject</u>
FLORIDA DEPARTMENT OF TRANSPORTATION	W. Kuyper	11/3/83	FLUCCS land use Remote Sensing
	Pete Myers	1983	General information and coordination
FLORIDA PUBLIC SERVICE COMMISSION	Robert Trapp	7/12/83	Project meeting
	Stan Hovstik	9/1/83	General correspondence
<u>REGIONAL</u>			
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT	Sandy Semegen Permits Coordinator Well Construction Permitting and Enforcement	9/6/83	Letter re: well completion reports
	William D. Courser	10/22/82	Letter to Dr. Marc J. Rogoff re: comments on CDM siting report
	Ken Weber	9/1/83	Permits meeting
	Oliver DeWitt	8/24/83	Phone call re: surface water permits
		9/1/83	Permits meeting
	Bruce Wirth	8/24/83	Phone call re: groundwater monitoring program
		9/1/83	Permits meeting
	David Slonena Permitting (Groundwater)	11/18/83	Phone call re: PPSA requirements
		9/1/83	Meeting re: project ground water/ surface water permit requirements
		8/4/83	Phone call re: 5-3-1 Rule enforcement
		8/11/83	Phone call re: 5-3-1 Rule

<u>Agency</u>	<u>Contact</u>	<u>Date</u>	<u>Subject</u>
	Lynn Miller Engineering Supervisor (Resource Management)	9/1/83	Permits
	Vincent Attardi Environmental Group	9/1/83	Permits meeting
	T. Doms	8/25/83	Phone call re: water quality
	Bill Sietman Field Operations Director Tampa Bypass Canal (TBC)	9/1/83	Permits meeting
	Jimmy Brooks Structure Operations Supervisor (TBC)	9/1/83	Permits meeting
	S. Ames	8/25/83	Letter re: CUPS printout
		8/24/83	Data Request
	V. Attardi	8/25/83	Letter re: water quality
	J. Semegen	8/9/83	Letter re: well completion reports
TAMPA BAY REGIONAL PLANNING COUNCIL	Mike McKinley	4/11/84	Government agency jurisdictions
WEST COAST REGIONAL WATER SUPPLY AUTHORITY	Loretta Holtkamp	8/24/83	Phone call re: Tampa Bypass Canal

COUNTY

HILLSBOROUGH COUNTY DEPARTMENT OF PARKS AND RECREATION	Phillip Evans Supt. of Parks	Undated	Memorandum and map re: parks and recreation areas of Hillsborough County
	L.G. Burnett	4/26/84	CDM letter request for jurisdiction information
		4/25/84	Phone call

<u>Agency</u>	<u>Contact</u>	<u>Date</u>	<u>Subject</u>
HILLSBOROUGH COUNTY CITY-COUNTY PLANNING COMMISSION	Bill Sparrowhawk Community Planner	4/10/84	Phone call re: agency jurisdictions
	Ronald M. Short Executive Director		Letter re: Resource Recovery Land Use Plan Amendment
	Dale Laughner Senior Planner		
	Joe Bell Principal Planner		
	Jim Stutzman Senior Planner		
HILLSBOROUGH COUNTY ENVIRONMENTAL PROTECTION COMMISSION	Nancy Woodard Environmental Scientist	8/23/83	Phone call re: water quality
		8/31/83	Meeting and site visit
		12/9/83	Phone call re: EPC rules
		9/1/83	Letter re: publications and wetland indicator species list
	Bob Jones	11/7/83	Noise correspondence
		11/2/83	Noise monitoring
	Richard G. Wilkens Environmental Assessment Manager		General correspondence
HILLSBOROUGH COUNTY DEPARTMENT OF SOLID WASTE	Jerry Campbell		General correspondence
	Warren N. Smith Director		Contacted through- out project
	Marc J. Rogoff		
	Patricia Berry		

<u>Agency</u>	<u>Contact</u>	<u>Date</u>	<u>Subject</u>
HILLSBOROUGH COUNTY DEPARTMENT OF DEVELOPMENT COORDINATION	Jeff Miller Director		
	Gary Englehardt Zoning Administrator		Rezoning
	Ethel Hammer		Rezoning
	Laura Belflower		
HILLSBOROUGH COUNTY DEPARTMENT OF WATER AND WASTEWATER UTILITIES	Bruce Kennedy Director		
HILLSBOROUGH COUNTY DIVISION OF PUBLIC WORKS	C. Edwin Copeland Assistant Co. Administrator		
HILLSBOROUGH COUNTY	John A. Crislip Zoning Hearing Master	4/30/84	Recommendations re: rezoning to the Hillsborough County Commissioner
HILLSBOROUGH COUNTY DEPARTMENT OF HEALTH	W. Cameron	11/3/83	Public well chemical area
	J. Rosen	11/3/83	Public well chemical area (phone call and meeting)
	N. Vik	11/3/83	Public well chemical area (meeting)
HILLSBOROUGH COUNTY OFFICE OF THE COUNTY ATTORNEY	Richard E. Davis Asst. County Atty	6/13/84	Transmittal to P. Kennedy, CDM of hearing materials
HILLSBOROUGH COUNTY AVIATION AUTHORITY	Glen Durst	5/13/83	Siting
		5/18/83	Permit requirements

LOCAL

CITY OF PLANT CITY	Nettie Draughon City Manager	Intergovernmental coordination
	Bud Nabong City Administrator	Intergovernmental coordination
CITY OF TEMPLE TERRACE	Picot Floyd City Manager	Intergovernmental coordination

<u>Agency</u>	<u>Contact</u>	<u>Date</u>	<u>Subject</u>
CITY OF TAMPA	Rick Garrity Urban Environmental Coordinator (Now DER District Manager Tampa Officer)		Intergovernmental coordination
	Nancy McKann McKay Bay Refuse-to- Energy Project		Intergovernmental coordination
	Joseph Murdock Management Analyst McKay Bay Refuse-to- Energy Project		Intergovernmental coordination

TABLE 9.2

COORDINATION DURING SITE SELECTION ACTIVITIES (1982)

<u>FEDERAL</u>		
<u>Agency</u>	<u>Contact</u>	<u>Agency Has Authority Regarding</u>
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT JACKSONVILLE	Bob Cruz	Noise impacts
DEPARTMENT OF COMMERCE		
National Oceanic and Atmospheric Administration, National Marine Fisheries Service		Impacts to fisheries resources
DEPARTMENT OF INTERIOR		
Fish & Wildlife Service Vero Beach	Dave Smith	Endangered species
DEPARTMENT OF LABOR		
Occupational Safety and Health Administration Tampa	William Demery	Employee exposure to unsafe working conditions
DEPARTMENT OF THE ARMY		
Corps of Engineers Jacksonville	Joe Bachelor	Dredge and fill, wetlands
ENVIRONMENTAL PROTECTION AGENCY		
Solid Waste Branch, Atlanta	Heather Ford	Solid Waste
Wastewater Branch, Atlanta	John Marler	NPDES permits

<u>Agency</u>	<u>Contact</u>	<u>Agency Has Authority Regarding</u>
	<u>STATE</u>	
FLORIDA STATE DEPARTMENT OF LABOR AND INDUSTRIAL SAFETY COMMISSION	Mr. Schmidt District Supervisor	Safe working conditions
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION		
Office of Coastal Management	David Worley	Development in coastal zone
Division of Environmental Planning, Tallahassee	Jerry Craft Administrator of Standard Permits	Permit review process
Division of Environmental Planning, Tampa	Dan Williams/ Bill Hennesey	Permit review process
Division of Solid Waste, Tallahassee	John Reese	Solid waste facility
Division of Solid Waste, Tampa	Pat Lewis	Permit review facilities
Office of General Counsel	Doug McLaughlin	Legal matters
Industrial Wastewater Section	Pedro Hernandez	Industrial wastewater
Solid and Hazardous Waste Section, Tallahassee	Raoul Clark	Solid and hazardous waste
Air Quality Section, Tallahassee	Clair Fancy	Air permitting
Dredge and Fill Section, Tampa	Rosanne Clementi	Dredge and fill permits
FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS	Diana Sayawa-Crane	DRI determination
FLORIDA DEPARTMENT OF STATE		
Division of Archives, History and Records Management	Fred Gaske	Historic, cultural and archaeological resources
Historic Tampa/Hillsborough County Preservation Board	Lois Miller	Historic buildings

<u>Agency</u>	<u>Contact</u>	<u>Agency Has Authority Regarding</u>
FLORIDA DEPARTMENT OF NATURAL RESOURCES		
Tallahassee	Don Keirn	Coastal setbacks
Tampa	Ken Haddad	Coastal setbacks
GOVERNOR'S OFFICE OF PLANNING AND BUDGETING, TALLAHASSEE	Ronald Fahs	A-95 review
FLORIDA DEPARTMENT OF GAME AND FRESHWATER FISH	Greg Holder	Endangered and threatened plants and animals
<u>REGIONAL</u>		
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, BROOKSVILLE	William D. Courser, Director of Resource Regulation	
	Ken Webber	Ground and surface water withdrawals
TAMPA BAY REGIONAL PLANNING COUNCIL	Mike McKinley, Director of Planning	Regional planning
<u>COUNTY</u>		
HILLSBOROUGH COUNTY AVIATION AUTHORITY	Glen Durst	Aviation safety
HILLSBOROUGH COUNTY CITY-COUNTY PLANNING COMMISSION	Joe Bell Principal Planner	Horizon 2000 Land Use Plan
	Warren Weathers Chairman	
HILLSBOROUGH COUNTY DEPARTMENT OF DEVELOPMENT COORDINATION	Ethel Hammer Section Chief	Zoning changes, development approvals
	Gary Engelhardt, Zoning Administration	
	Laura Belflower	

<u>Agency</u>	<u>Contact</u>	<u>Agency Has Authority Regarding</u>
HILLSBOROUGH COUNTY ENVIRONMENTAL PROTECTION COMMISSION	Roger Stewart Executive Director	DER permit review
	Charner Benz	
HILLSBOROUGH COUNTY PUBLIC SCHOOLS	Raymond O. Shelton, Sup't of Schools	Public education facilities
	<u>LOCAL</u>	
TAMPA PORT AUTHORITY	Carl Giovenco	Port Activities

References

References

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Appendices

CHAPTER 10

APPENDICES

The appendices to this application are included in Volume II. Air quality related appendices - Appendix 10.1.5 Prevention of Significant Deterioration and Appendix 10.16 Stack Height Analysis and Recommendations, are included in Volume III.

Hillsborough County,
Florida

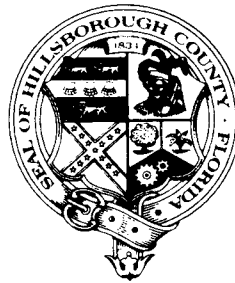
**Solid Waste Energy Recovery Facility —
Application for Power Plant Site Certification**

**Volume II —
Appendices**

Hillsborough County, Florida

**Solid Waste Energy Recovery Facility —
Application for
Power Plant Site Certification
Volume II — Appendices**

Submitted By
The Hillsborough County
Board of County Commissioners



Rodney Colson, Chairman
Matt Jetton, Vice Chairman
E. L. Bing
John Paulk
Jan K. Platt

Norman W. Hickey,
County Administrator

August, 1984

Prepared by
Camp Dresser & McKee Inc.

Hillsborough County, Florida

Solid Waste Energy Recovery Facility — Application for Power Plant Site Certification Volume II — Appendices

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Hillsborough County, Florida
Solid Waste Energy Recovery Facility
Application for Power Plant
Site Certification

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APPENDIX 10.1
FEDERAL PERMIT APPLICATIONS OR APPROVALS

APPENDIX 10.1.1

316 DEMONSTRATIONS

Demonstrations pursuant to Section 316(a) and (b) of the Clean Water Act are not applicable to this project.

APPENDIX 10.1.2

NPDES APPLICATION/PERMIT

COUNTY OF HILLSBOROUGH
PO. BOX 1110 TAMPA, FLORIDA 33601

NORMAN W. HICKEY, COUNTY ADMINISTRATOR

881-2156

July 13, 1984

Mr. Fritz Wagener
U.S. Environmental Protection Agency
EPA Region IV
Water Management Division
345 Courtland Street
Atlanta, GA 30365

Dear Mr. Wagener:

Pursuant to the Clean Water Act, Hillsborough County is hereby submitting EPA Short Form C, 7550-8 under the National Pollutant Discharge Elimination System (NPDES) for the construction and operation of a solid waste energy recovery facility. The proposed facility will ultimately combust 1,600 tons per day (tpd) of municipal solid waste from the unincorporated areas of Hillsborough County and generate approximately 39 megawatts of electricity.

During operation of the facility, all sanitary and process wastewater will be discharged to the Northwest Brandon Subregional Wastewater Treatment Plant to be constructed on adjacent property. The only discharge to surface waters (other than uncontaminated stormwater during peak storm events) will occur during construction dewatering. This will involve discharge to an existing unnamed drainage ditch adjacent to the facility site during the refuse bunker construction phase, a period not to exceed six months.

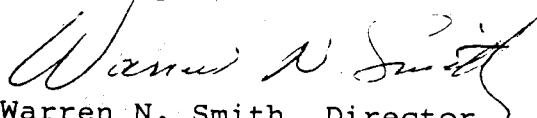
Mr. Fritz Wagener
Page Two
7/13/84

As required by your office, Hillsborough County is submitting the attached EPA applications for the proposed Solid Waste Energy Recovery Facility.

In accordance with the requirements of the Federal Consistency Evaluation Procedures (15 CFR 930.50), these permit applications are accompanied by an "NPDES Florida Coastal Zone Management Certification". As specified in 15 CFR 930.58, ten (10) copies of EPA Short Form C, 7550-8 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, DER.

If, after reviewing these applications you have further questions or require additional materials, please feel free to contact this office at (813) 272-6674.

Sincerely,



Warren N. Smith, Director
Department of Solid Waste

WNS/pd
Attachment

cc: Richard Tucker, DER
Coastal Zone Management Program
Elmer Cleveland, EPA
Richard Smith, DER Federal Consistency Coordinator

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
APPLICATION FOR PERMIT TO DISCHARGE - SHORT FORM C

OPERATION OF HILLSBOROUGH CO. ENERGY RECOVERY FACILITY

To be filed only by persons engaged in manufacturing and mining

FOR
AGENCY
USE

APPLICATION NUMBER									
DATE RECEIVED									
YEAR			MO.			DAY			

Do not attempt to complete this form before reading accompanying instructions
Please print or type

1. Name, address, location, and telephone number of facility producing discharge

A. Name Hillsborough County Solid Waste Energy Recovery Facility
B. Mailing address Hillsborough County/Dept. of Solid Waste
1. Street address P.O. Box 1110
2. City Tampa 3. State Florida
4. County Hillsborough 5. ZIP 33601
C. Location:
1. Street Faulkenburg Road
2. City _____ 3. County Hillsborough
4. State Florida
D. Telephone No. 813 272-6674
Area Code

2. SIC

--	--	--

(Leave blank)

3. Number of employees 58 approx.

If all your waste is discharged into a publicly owned waste treatment facility and to the best of your knowledge you are not required to obtain a discharge permit, proceed to item 4. Otherwise proceed directly to item 5.

4. If you meet the condition stated above, check here ☒ and supply the information asked for below. After completing these items, please complete the date, title, and signature blocks below and return this form to the proper reviewing office without completing the remainder of the form.

A. Name of organization responsible for receiving waste Hillsborough County Dept. of Water and Wastewater Utilities
B. Facility receiving waste:

1. Name Northwest Brandon Subregional Wastewater Treatment Plant
2. Street address (mailing address) P.O. Box 1110 (co-located
3. City Tampa 4. County Hillsborough with facility
5. State Florida 6. ZIP 33601

5. ☐ Principal product, ☐ raw material (Check one) _____

6. Principal process _____

7. Maximum amount of principal product produced or raw material consumed per (Check one)

Basis	Amount							
	1-99 (1)	100-199 (2)	200-499 (3)	500-999 (4)	1000-4999 (5)	5000-9999 (6)	10,000-49,999 (7)	50,000 or more (8)
A. Day								
B. Month								
C. Year								

8. Maximum amount of principal product produced or raw material consumed, reported in item 7, above, is measured in (Check one):

A. ☐ pounds B. ☐ tons C. ☐ barrels D. ☐ bushels E. ☐ square feet
F. ☐ gallons G. ☐ pieces or units H. ☐ other, specify _____

9. (a) Check here if discharge occurs all year ☐ , or

(b) Check the month(s) discharge occurs:

1. ☐ January 2. ☐ February 3. ☐ March 4. ☐ April 5. ☐ May 6. ☐ June
7. ☐ July 8. ☐ August 9. ☐ September 10. ☐ October 11. ☐ November 12. ☐ December

(c) Check how many days per week: 1. ☐ 1 2. ☐ 2-3 3. ☐ 4-5 4. ☐ 6-7

10. Types of waste water discharged to surface waters only (check as applicable)

Discharge per operating day	Flow, gallons per operating day					Volume treated before discharging (percent)				
	0.1-999 (1)	1000-4999 (2)	5000-9999 (3)	10,000-49,999 (4)	50,000- or more (5)	None (6)	0.1-29.9 (7)	30-64.9 (8)	65-94.9 (9)	95-100 (10)
A. Sanitary, daily average										
B. Cooling water, etc. daily average										
C. Process water, daily average										
D. Maximum per operating day for total discharge (all types)										

11. If any of the three types of waste identified in item 10, either treated or untreated, are discharged to places other than surface waters, check below as applicable.

Waste water is discharged to:	Average flow, gallons per operating day				
	0.1-999 (1)	1000-4999 (2)	5000-9999 (3)	10,000-49,999 (4)	50,000 or more (5)
A. Municipal sewer system					
B. Underground well					
C. Septic tank					
D. Evaporation lagoon or pond					
E. Other, specify _____					

12. Number of separate discharge points: A. ☐ 1 B. ☐ 2-3 C. ☐ 4-5 D. ☐ 6 or more

13. Name of receiving water or waters _____

14. Does your discharge contain or is it possible for your discharge to contain one or more of the following substances added as a result of your operations, activities, or processes: ammonia, cyanide, aluminum, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual). A. ☐ yes B. ☐ no

I certify that I am familiar with the information contained in the application and that to the best of my knowledge and belief such information is true, complete, and accurate.

Warren N. Smith
Printed Name of Person Signing

7-12-84
Date Application Signed

Director, Hillsborough County
Department of Solid Waste

Title
Signature of Applicant

18 U.S.C. Section 1001 provides that:

Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious, or fraudulent statements or representations; or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than 5 years, or both.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
APPLICATION FOR PERMIT TO DISCHARGE - SHORT FORM C

CONSTRUCTION OF HILLSBOROUGH CO. ENERGY
RECOVERY FACILITY
To be filed only by persons engaged in manufacturing and mining

FOR
AGENCY
USE

APPLICATION NUMBER									
DATE RECEIVED									
YEAR			MO.			DAY			

Do not attempt to complete this form before reading accompanying instructions

Please print or type

1. Name, address, location, and telephone number of facility producing discharge

A. Name Hillsborough County Solid Waste Energy Recovery Facility

B. Mailing address Hillsborough County

1. Street address Dept. of Solid Waste, P.O. Box 1110

2. City Tampa 3. State Florida

4. County Hillsborough 5. ZIP 33601

C. Location:

1. Street Faulkenburg Road

2. City _____ 3. County Hillsborough

4. State Florida

D. Telephone No. 813 272-6674

Area
Code

2. SIC

--	--	--	--

(Leave blank)

3. Number of employees 58 approx.

If all your waste is discharged into a publicly owned waste treatment facility and to the best of your knowledge you are not required to obtain a discharge permit, proceed to item 4. Otherwise proceed directly to item 5.

4. If you meet the condition stated above, check here ☐ and supply the information asked for below. After completing these items, please complete the date, title, and signature blocks below and return this form to the proper reviewing office without completing the remainder of the form.

A. Name of organization responsible for receiving waste _____

B. Facility receiving waste:

1. Name _____

2. Street address _____

3. City _____ 4. County _____

5. State _____ 6. ZIP _____

5. ☐ Principal product, ☐ raw material (Check one) See Attachment A

6. Principal process See Attachment A

7. Maximum amount of principal product produced or raw material consumed per (Check one) See Attachment A

Basis	Amount							
	1-99	100-199	200-499	500-999	1000-4999	5000-9999	10,000-49,999	50,000 or more
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Day								
B. Month								
C. Year								

8. Maximum amount of principal product produced or raw material consumed, reported in item 7, above, is measured in (Check one):

A. ☐ pounds B. ☐ tons C. ☐ barrels D. ☐ bushels E. ☐ square feet
F. ☐ gallons G. ☐ pieces or units H. ☐ other, specify N/A

9. (a) Check here if discharge occurs all year ☐ , or

(b) Check the month(s) discharge occurs: Dewatering not to exceed six months

1. ☐ January 2. ☐ February 3. ☐ March 4. ☐ April 5. ☐ May 6. ☐ June

7. ☐ July 8. ☐ August 9. ☐ September 10. ☐ October 11. ☐ November 12. ☐ December

(c) Check how many days per week: 1. ☐ 1 2. ☐ 2-3 3. ☐ 4-5 4. ☐ 6-7

10. Types of waste water discharged to surface waters only (check as applicable)

Discharge per operating day	Flow, gallons per operating day					Volume treated before discharging (percent)				
	0.1-999	1000-4999	5000-9999	10,000-49,999	50,000- or more	None	0.1-29.9	30-64.9	65-94.9	95-100
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A. Sanitary, daily average										
B. Cooling water, etc. daily average										
C. Process water, daily average										
D. Maximum per operating day for total discharge (all types)	See Attachment for Groundwater Quantities									

11. If any of the three types of waste identified in item 10, either treated or untreated, are discharged to places other than surface waters, check below as applicable.

Waste water is discharged to:	Average flow, gallons per operating day				
	0.1-999	1000-4999	5000-9999	10,000-49,999	50,000 or more
	(1)	(2)	(3)	(4)	(5)
A. Municipal sewer system					
B. Underground well					
C. Septic tank					
D. Evaporation lagoon or pond					
E. Other, specify <u>Detention Basin</u>				35,000	

12. Number of separate discharge points: A. ☒ 1 B. ☐ 2-3 C. ☐ 4-5 D. ☐ 6 or more

13. Name of receiving water or waters unnamed existing drainage ditch

14. Does your discharge contain or is it possible for your discharge to contain one or more of the following substances added as a result of your operations, activities, or processes: ammonia, cyanide, aluminum, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual). A. ☐ yes B. ☒ no

I certify that I am familiar with the information contained in the application and that to the best of my knowledge and belief such information is true, complete, and accurate.

Warren N. Smith
Printed Name of Person Signing
7-12-84
Date Application Signed

Director, Hillsborough County
Dept. of Solid Waste
Title Warren N. Smith
Signature of Applicant

18 U.S.C. Section 1001 provides that:
Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and wilfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious, or fraudulent statements or representations; or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than 5 years, or both.

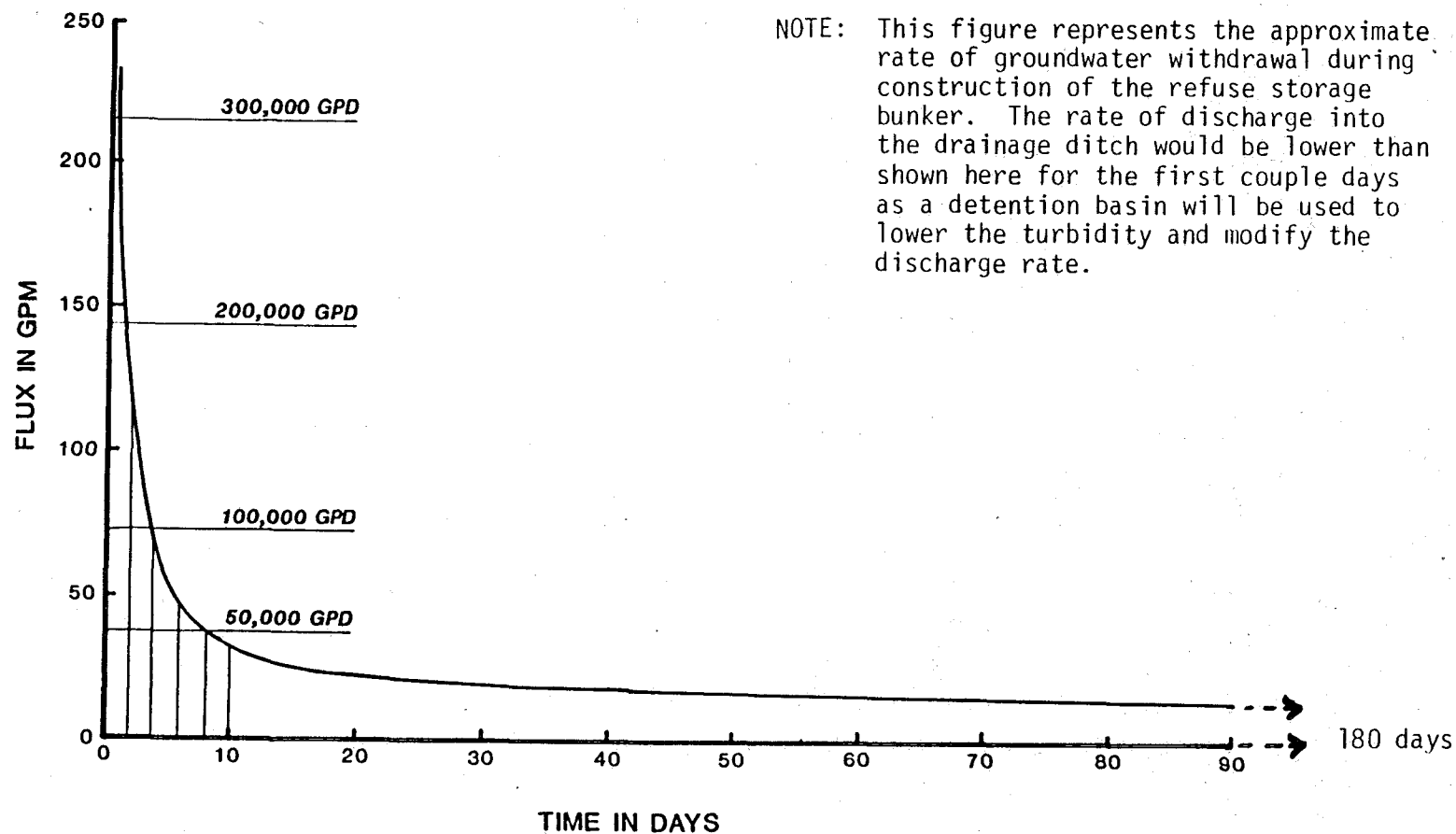
ATTACHMENT A

During operation of the Energy Recovery Facility, all sanitary and process wastewater will be discharged to the co-located Northwest Brandon Subregional Wastewater Treatment Plant. The only discharge to surface waters (other than uncontaminated stormwater during peak storm events) would occur during construction dewatering. As recommended by Fritz Wagener, Water Management Division of EPA Region IV, the following project description has been provided to supplement the information provided on Short Form C in order to address the dewatering issue.

The proposed facility will ultimately combust 1600 tons per day (tpd) of municipal solid waste from the unincorporated sections of Hillsborough County and harness the energy produced in the process to generate electricity (39 megawatts). During construction, site dewatering will involve discharge to an existing unnamed drainage ditch adjacent to the facility site. Water will be pumped to a detention basin in order to lower turbidity before discharge to the stream. This dewatering process will last only through the refuse bunker construction phase, a period not to exceed six months. The average amount of discharge over this six-month period is about 32,000 gpd. The water withdrawal rate is depicted in Figure 1.

Hillsborough County is currently preparing an Application for Power Plant Site Certification to be reviewed by the Florida Department of Environmental Regulation. A construction dewatering analysis and a hydrologic analysis for stormwater basis design have been conducted and are included as appendices to the Application for Power Plant Site Certification.

Attachment B provides the Coastal Zone Management Certification required in the Federal Coastal Management Program.



NOTE: Assumes 2.5in/mo recharge

HILLSBOROUGH COUNTY SOLID WASTE
ENERGY RECOVERY FACILITY

Hillsborough County
Department of Solid Waste

FIGURE 1.
WATER WITHDRAWAL RATE
(WET CONDITIONS)

ATTACHMENT B

NPDES

FLORIDA COASTAL ZONE MANAGEMENT CERTIFICATION

COASTAL ZONE MANAGEMENT CERTIFICATION

According to Florida Coastal Management Program (FCMP) Federal Consistency Evaluation Procedures (15 CFR of 30.50), all federal permits for which there are no analogous state permits require certification of compliance with the FCMP.

One federal permit applicable to the proposed project for which no analogous state permits exist is the USEPA NPDES permit (SS.402 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 attached certification package includes:

- o a written and pictorial description of the project;
- o an assessment of the probable project impacts with respect to relevant FCMP statutes;
- o certification that the project complies with the FCMP and will be conducted in a manner consistent with that program.

As specified in 15 CFR 930.58, the certification package and permit application must be sent to the appropriate federal agency (USEPA) and 10 copies must be submitted to the Federal Consistency Coordinator of the Florida State Planning and Development Clearinghouse, DER.

DER evaluation commences upon receipt of the consistency certification and application(s). The State's consistency response will be made to the applicant "at the earliest practicable time". If there is no state objection within six months following commencement of evaluation, the applicant may presume consistency (15 CFR 930.63).

If the state agrees with the applicant's consistency certification, the federal agency may grant the permit to the applicant. If the state objects to the certification, objections must describe how the proposed project is inconsistent and alternative measures (if any) which would allow the project to be conducted in a manner consistent with the CMP (15 CFR 930.64).

DESCRIPTION OF THE PROJECT

Background Information

Hillsborough County is currently seeking proposals from qualified firms and organizations for the design, construction, startup, acceptance testing, operation and maintenance of a solid waste resource recovery and electrical generating facility to serve the unincorporated areas of the County. The Board of County Commissioners has officially stated that the County will own the project. The contractor will provide a full-service arrangement, including design, construction, acceptance testing, and 20 years of continuous operation, for a "mass-burn" type resource recovery facility with a continuous design rated capacity of 1,200 tons per day using three combustion/steam generation units each with a continuous design rated capacity of 400 tons per day. Additionally, the layout of the project will be such as to allow the addition of a fourth combustion/steam generation unit. Initial projection construction shall include a tipping area and refuse storage pit sized to handle 1,600 tons per day (continuous design rated capacity) and the stack shall have four (4) flues. The project will have one steam turbine-generator which shall generate electricity to be delivered for sale to Tampa Electric Company (TECO). Power lines from the project's electrical switchyard will connect TECO's powerline right-of-way which abuts the western boundary of the project site. Revenues from energy sales will be shared by the County and Contractor over the life of the operating contract.

The project will be located on a site (Faulkenburg Road Site) that has been selected by the County. The County has purchased the property from Seaboard System Railroad. At public hearings, after hearing presentations from both the County staff and the public, the Board of County Commissioners approved an amendment to the Land Use Plan Element of the Horizon 2000 Plan which designated the site as the location of Public/Semi-Public facilities and changed the site zoning from Restricted Industry District to Community Unit District.

Process Description

Since the proposed facility will utilize mass-burn technology, there will be no preprocessing of wastes at the facility prior to combustion (except for some limited size reduction of oversized items). A schematic diagram of a typical resource recovery facility is presented in Figure 1. MSW will be truck-delivered to the facility and ash residue removed by the same mode of transport. MSW would be dumped into the refuse bunker directly from packer trucks inside the building. All waste will be stored inside the building, so no waste will be visible from the outside.

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 attracted to the electrically charged collecting plates. The dust is then removed mechanically from these plates. The efficiency of the ESPs would be established during the federal and state (such as PSD/NSR) air quality

permit process. The flue gases will be drawn through the ESPs by an induced draft fan which would be located between the stack and the ESPs.

A wastewater treatment plant is also planned at the site and is at the preliminary design phase. Treatment process trains are currently being developed. The wastewater treatment plant will treat wastewater that the County currently pays the City of Tampa to treat. The subregional facility is also expected to treat flows from several industrial concerns, including the proposed resource recovery facility. This plant will help to alleviate the area's effluent disposal problems and, at the same time, supply all of the cooling water needs (approximately 800,000 gallons per day maximum) of the proposed resource recovery facility. The proposed facility will be capable of providing an effluent treated to high levels to meet the mandated requirements of the Florida Department of Environmental Regulation (FDER).

Project Certification

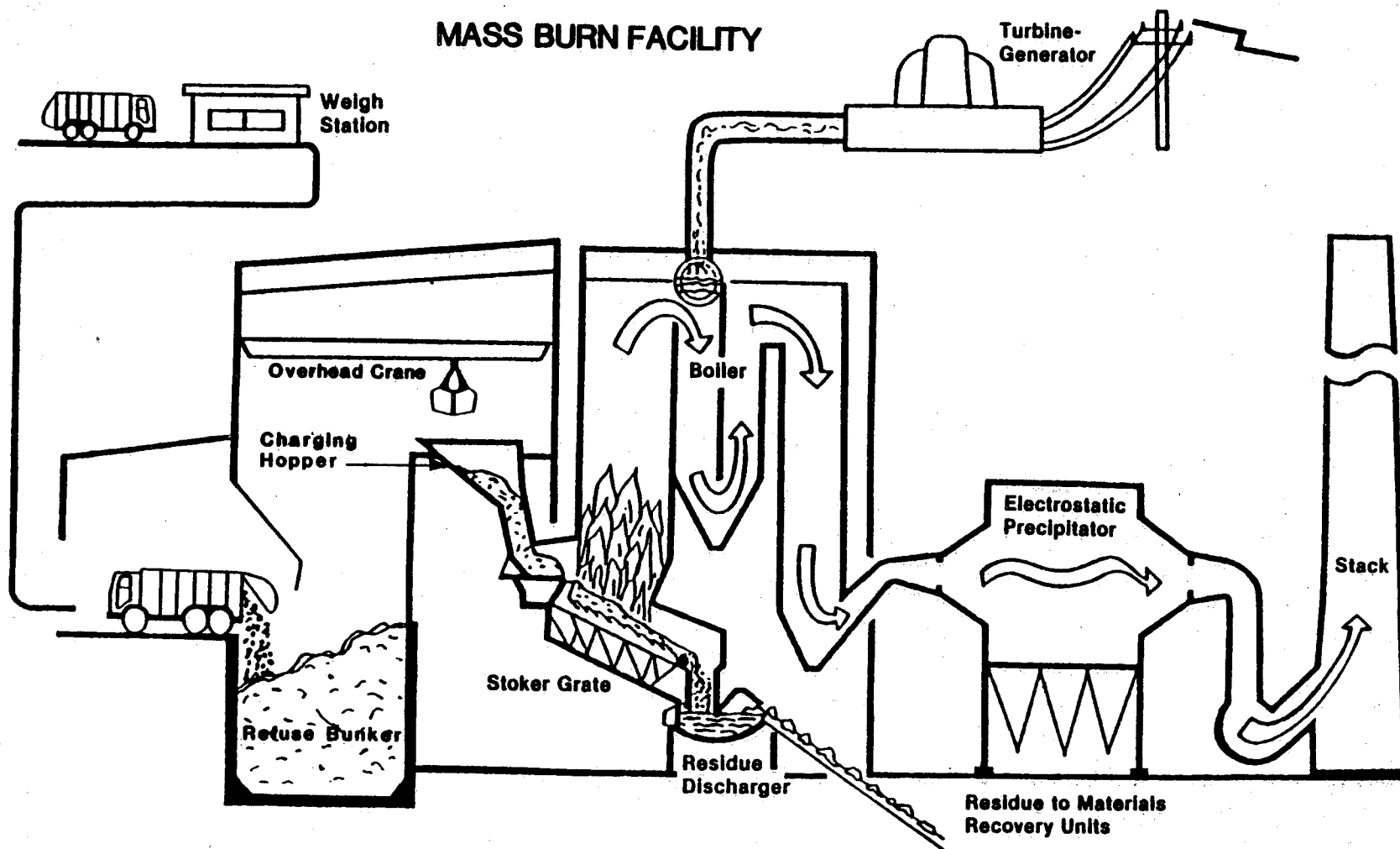
Florida has adopted legislation, the Florida Electrical Power Plant Siting Act (Florida Statutes, Chapters 403.501 - 403.517), as amended, through Chapter 17-17 of the Florida Administrative Code (FAC) "to provide efficient, centralized review of the needs for increased electrical power generation and the effects of generator-related activities on human health and the environment and ecology of the lands and waters within the state." The Florida Department of Environmental Regulation (FDER) implements this Act.

This Act provides for a certification process which is a "one stop" centralized permitting procedure. Under the Act, the County may elect to obtain each required permit separately, or to file an application for certification which would expedite the review and coordinate the permit application process.

The County is pursuing Site Certification under the Florida Electrical Power Plant Siting Act. The County has submitted a "Plan of Study for Completion of the Application for Certification of Proposed Electrical Power Generating Plant Site" and will file the "Application for Certification" in July 1984.

Once the site is certified by the state, no other state permits will be required for the project. Although the rated continuous design capacity of the project will be 1,200 tons per day (generating about 29 megawatts), site certification is being sought for an ultimate continuous design rated capacity of 1,600 tons per day (generating about 39 megawatts) since it is anticipated that the County may expand the project in the future.

MASS BURN FACILITY



**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 1
SCHEMATIC OF TYPICAL
RESOURCE RECOVERY FACILITY**

ASSESSMENT OF PROBABLE PROJECT IMPACTS

As stipulated under 15 CFR 930.58, an assessment of the probable project effects on the coastal zone was conducted in relation to the relevant statutes comprising the Florida Coastal Management Program (FCMP).

The most applicable statute is Chapter 403 (Environmental Control) Part I (Pollution Control), Part II (Electrical Power Plant Siting) and Part IV (Resource Recovery and Management). The air and water pollution concerns under Part I of Chapter 403 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 regulations governing New Source Review for Nonattainment Areas (NSRNA).

A subregional wastewater treatment plant will treat process water from the facility. Effluent quality will be responsive to needs for cooling water at the facility and to meet FDER requirements for land application (disposal) by spray irrigation.

Chapter 267 (Archives, History and Records Management) of the FCMP statutes is also relevant to the proposed project. The Division of Archives, History and Records Management (DAHRM) has reviewed the project tract for archaeological and historical sites and concluded that no significant cultural resources would be affected by the proposed project.

Chapter 373 (Water Resources) also applies to the proposed resource recovery project. The Southwest Florida Water Management District is to 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.

A Power Plant Siting Act (PPSA) application is being filed with FDER. 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 CERTIFICATION

The proposed activity complies with Florida's Coastal Management Program and will be conducted in a manner consistent with that program.


Warren N. Smith, Director
Hillsborough County
Department of Solid Waste

APPENDIX 10.1.3

HAZARDOUS WASTE DISPOSAL APPLICATIONS/PERMITS

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 energy recovery facility.

APPENDIX 10.1.4

SECTION 10 or 404 APPLICATIONS/PERMITS

No permits pursuant to Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act are applicable to this project.

APPENDIX 10.1.5
PSD APPLICATIONS/PERMITS

The Prevention of Significant Deterioration (PSD) permit application pursuant to the Clean Air Act is included in "Volume III - Air Quality" of this Application for Power Plant Site Certification.

APPENDIX 10.1.6
COASTAL ZONE MANAGEMENT CERTIFICATIONS

APPENDIX 10.1.6

COASTAL ZONE MANAGEMENT CERTIFICATIONS

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.

The only federal permits applicable to the proposed project for which no analogous state permits exist are the U.S. Department of Transportation Federal Aviation Administration (FAA) stack height permit (SS.14 CFR 77) and the USEPA NPDES permit (SS.402 Clean Water Act) for construction dewatering. In accordance with the requirements of the Federal Consistency Evaluation Procedures, these permit applications must be accompanied by a consistency certification. The certification package includes:

- o a written and pictorial description of the project;
- o a signed (by the applicant) statement of the proposed project's consistency with the FCMP; and
- o an assessment of the probable project impacts with respect to relevant FCMP statutes.

As specified in 15 CFR 930.58, the certification package and permit application must be sent to the appropriate federal agencies (FAA and USEPA) and 10 copies must be submitted to the Federal Consistency Coordinator of the Florida State Planning and Development Clearinghouse, DER. Copies of the permit application(s) and certification(s) are included in this appendix.

DER evaluation commences upon receipt of the consistency certification and application(s). The state's consistency response will be made to the applicant "at the earliest practicable time." If there is no state objection within six months following commencement of evaluation, the applicant may presume consistency (15 CFR 930.63).

If the state agrees with the applicant's consistency certification, the federal agency may grant the permit to the applicant. If the state objects to the certification, objections must describe how the proposed project is inconsistent and alternative measures (if any) which would allow the project to be conducted in a manner consistent with the CMP (15 CFR 930.64).

APPLICATION PACKAGE

SUBMITTED TO FEDERAL AVIATION ADMINISTRATION
ON JULY 13, 1984
(NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION)

COUNTY OF HILLSBOROUGH

PO. BOX 1110 TAMPA, FLORIDA 33601



NORMAN W. HICKEY, COUNTY ADMINISTRATOR

July 13, 1984

Chief of Air Traffic Division
Federal Aviation Administration
ASO-Southern Region
3400 Norman Berry Drive
P.O. Box 20636
Atlanta, GA 30320
Attn: ASO-530

Gentlemen:

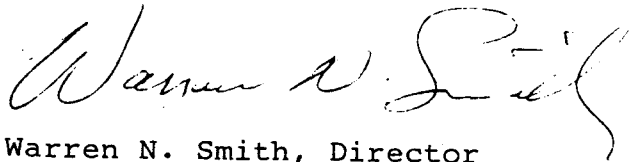
Pursuant to Federal Aviation Regulations, Part 77.13, Subchapter B, Hillsborough County is hereby notifying the Federal Aviation Administration of the proposed construction of a solid waste resource recovery facility to serve the unincorporated areas of the County. Attached please find one executed set (four copies) of FAA Form 7460-1, "Notice of Proposed Construction or Alteration". Under separate cover, we have sent copies of this form to the local aviation agency, the Hillsborough County Aviation Authority.

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 Permit" has no analogous State of Florida permit. Therefore, in accordance with the requirements of the Federal Consistency Evaluation Procedures, this permit application is accompanied by an "FAA Florida Coastal Zone Management Certification". As specified in 15 CFR 930.58, ten (10) copies of FAA Form 7460-1 and the "FAA Florida Coastal Zone Management Certification" have been sent under separate cover to the Federal Consistency Coordinator of the Florida State Planning and Development Clearinghouse, DER.

Chief of Air Traffic Division
Page Two
7/13/84

We trust that the accompanying information on FAA Form 7460-1 will meet the notification requirements of stack construction under the Federal Aviation Regulations. Please contact this office at (813) 272-6674 if you have additional questions.

Sincerely,

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

Warren N. Smith, Director
Department of Solid Waste

WNS/pd
Attachment

cc: Glen Durst, Hillsborough County
Aviation Authority
Richard Smith, DER Federal Consistency Coordinator

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

NATURE OF STRUCTURE

A. TYPE

☒ NEW CONSTRUCTION
☐ ALTERATION

B. CLASS

☒ PERMANENT
☐ TEMPORARY

C. PROJECTED LENGTH OF TIME TO COMPLETE

Months Stack 7
Facility 26

2. NAME AND ADDRESS OF INDIVIDUAL, COMPANY, CORPORATION, ETC. PROPOSING THE CONSTRUCTION OR ALTERATION (Number, Street, City, State and Zip Code)

TO Hillsborough County
Department of Solid Waste
925 E. Twiggs St., P.O. Box 1110
Tampa, Florida 33601
Attn: Warren N. Smith
Director, Dept. of Solid Waste

3. COMPLETE DESCRIPTION OF STRUCTURE (Include effective radiated power of proposed or modified AM, FM or TV station and assigned frequency, size and configuration of power transmission line in vicinity of FAA facilities as appropriate)

The resource recovery facility will consist of four 400 ton per day combustion units and appropriate control devices. This would be housed in one building complex with a 220 foot stack for air quality purposes.

4. LOCATION OF STRUCTURE

A. COORDINATES (To nearest second)

LATITUDE LONGITUDE
27° 57' 16" 82° 20' 30"

B. NEAREST CITY OR TOWN, AND STATE

Tampa, Florida - City Hall

(1) DISTANCE FROM 4B

6.75

MILES

(2) DIRECTION FROM 4B

East Northeast

C. NAME OF NEAREST AIRPORT, HELIPORT, OR SEAPLANE BASE

Peter O. Knight

(1) DISTANCE FROM NEAREST POINT OF NEAREST RUNWAY

37,000 ft.

(2) DIRECTION FROM AIRPORT

ENE

D. DESCRIPTION OF LOCATION OF SITE WITH RESPECT TO HIGHWAYS, STREETS, AIRPORTS, PROMINENT TERRAIN FEATURES, EXISTING STRUCTURES, ETC. (Attach a highway, street, or any other appropriate map or scaled drawing 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.)

The purposed site location is bounded by Faulkenburg Road to the east, Seaboard System Railroad to the south, Tampa Electric Company Transmission line to the west and improved pastureland to the north. The site is located approximately 3,000 ft. north of State Road 60.

5. HEIGHT AND ELEVATION (Complete A, B and C to the nearest foot)

A. ELEVATION OF SITE ABOVE MEAN SEA LEVEL

35

B. HEIGHT OF STRUCTURE INCLUDING APPURTENANCES AND LIGHTING (if any) ABOVE GROUND, OR WATER IF SO SITUATED

220

C. OVERALL HEIGHT ABOVE MEAN SEA LEVEL (A + B)

255

6. WORK SCHEDULE DATES

A. BEGINNING June
(facility) 1985

B. END

August 1987

7. OBSTRUCTION MARKED AND/OR LIGHTED IN ACCORDANCE WITH CURRENT FAA ADVISORY CIRCULAR 70/7460-1, OBSTRUCTION MARKING AND LIGHTING

A. MARKED

B. AVIATION RED OBSTRUCTION LIGHTS

C. HIGH INTENSITY WHITE OBSTRUCTION LIGHTS

D. DUAL LIGHTING SYSTEM

YES NO

I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge.

DATE

7/13/84

TEL. NO. (Give area code)

(813) 272-6674

TYPED NAME/TITLE OF PERSON FILING NOTICE

Warren N. Smith, Director
Department of Solid Waste

SIGNATURE

Warren N. Smith

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 willfully 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)).

FOR FAA USE ONLY

AERONAUTICAL STUDY NO.

FAA will either return this form or issue a separate acknowledgement.

A. The proposed structure:

- ☐ Does not require a notice to FAA.
☐ Would not exceed any obstruction standard of Part 77 and would not be a hazard to air navigation.
☐ Should be obstruction ☐ marked
☐ lighted per FAA Advisory Circular 70/7460-1, Chapter(s)
☐ Obstruction marking and lighting are not necessary.
☐ Requires supplemental notice. Use FAA form enclosed.

B. FCC ☐ was ☐ was not advised.

REMARKS:

ISSUING OFFICE:

REVIEWING OFFICER

DATE

FAA

FLORIDA COASTAL ZONE MANAGEMENT CERTIFICATION

COUNTY OF HILLSBOROUGH

P.O. BOX 1110 TAMPA, FLORIDA 33601



NORMAN W. HICKEY, COUNTY ADMINISTRATOR

July 13, 1984

State Planning & Development Clearinghouse
Office of Planning and Budgeting
Executive Office of the Governor
The Capital
Tallahassee, Florida 32301
Attn: Richard Smith, DER Federal Consistency Coordinator

Re: Hillsborough County Solid Waste Energy
Recovery Facility: FAA-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. Department of Transportation Federal Aviation Administration (FAA) stack height permit (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 a signed statement (by the applicant) of the proposed project's consistency with the FCMP; and
- o an assessment of the probable project impacts with respect to relevant FCMP statutes.

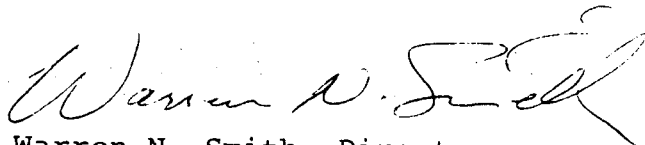
Mr. Smith
Page Two
7/13/84

As specified in 15 CFR 930.58, the certification package and permit application (FAA Form 7460.1) must be sent to the appropriate federal agency (FAA) and ten (10) copies must be submitted to the Federal Consistency Coordinator of the Florida State Planning and Development Clearinghouse, DER. Copies of the permit application and certification are enclosed. Under separate cover, the certification package and permit application has been sent to the FAA Regional Office in Atlanta for their review.

As required by your office, Hillsborough County is submitting the enclosed FAA permit application and the consistency certification package for the County's Solid Waste Energy Recovery Facility.

If, after reviewing these materials, you have questions or require additional information, please contact this office at (813) 272-6674.

Sincerely,

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

Warren N. Smith, Director
Department of Solid Waste

WNS/pd
Enclosure

cc: Richard Tucker, DER
Office of Coastal Zone Management

DESCRIPTION OF THE PROJECT

Background Information

Hillsborough County is currently seeking proposals from qualified firms and organizations for the design, construction, startup, acceptance testing, operation and maintenance of a solid waste resource recovery and electrical generating facility to serve the unincorporated areas of the County. The Board of County Commissioners has officially stated that the County will own the project. The contractor will provide a full-service arrangement, including design, construction, acceptance testing, and 20 years of continuous operation, for a "mass-burn" type resource recovery facility with a continuous design rated capacity of 1,200 tons per day using three combustion/steam generation units each with a continuous design rated capacity of 400 tons per day. Additionally, the layout of the project will be such as to allow the addition of a fourth combustion/steam generation unit. Initial projection construction shall include a tipping area and refuse storage pit sized to handle 1,600 tons per day (continuous design rated capacity) and the stack shall have four (4) flues. The project will have one steam turbine-generator which shall generate electricity to be delivered for sale to Tampa Electric Company (TECO). Power lines from the project's electrical switchyard will connect TECO's powerline right-of-way which abuts the western boundary of the project site. Revenues from energy sales will be shared by the County and Contractor over the life of the operating contract.

The project will be located on a site (Faulkenburg Road Site) that has been selected by the County. The County has purchased the property from Seaboard System Railroad. At public hearings, after hearing presentations from both the County staff and the public, the Board of County Commissioners approved an amendment to the Land Use Plan Element of the Horizon 2000 Plan which designated the site as the location of Public/Semi-Public facilities and designated the zoning site from Restricted Industry District to Community Unit District.

Process Description

Since the proposed facility will utilize mass-burn technology, there will be no preprocessing of wastes at the facility prior to combustion (except for some limited size reduction of oversized items). A schematic diagram of a typical resource recovery facility is presented in Figure 1. MSW will be truck-delivered to the facility and ash residue removed by the same mode of transport. MSW would be dumped into the refuse bunker directly from packer trucks inside the building. All waste will be stored inside the building, so no waste will be visible from the outside.

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 attracted to the electrically charged collecting plates. The dust is then removed mechanically from these plates. The efficiency of the ESPs would be established during the federal and state (such as PSD/NSR) air quality

permit process. The flue gases will be drawn through the ESPs by an induced draft fan which would be located between the stack and the ESPs.

A wastewater treatment plant is also planned at the site and is at the preliminary design phase. Treatment process trains are currently being developed. The wastewater treatment plant will treat wastewater that the County currently pays the City of Tampa to treat. The subregional facility is also expected to treat flows from several industrial concerns, including the proposed resource recovery facility. This plant will help to alleviate the area's effluent disposal problems and, at the same time, supply all of the cooling water needs (approximately 800,000 gallons per day maximum) of the proposed resource recovery facility. The proposed facility will be capable of providing an effluent treated to high levels to meet the mandated requirements of the Florida Department of Environmental Regulation (FDER).

Project Certification

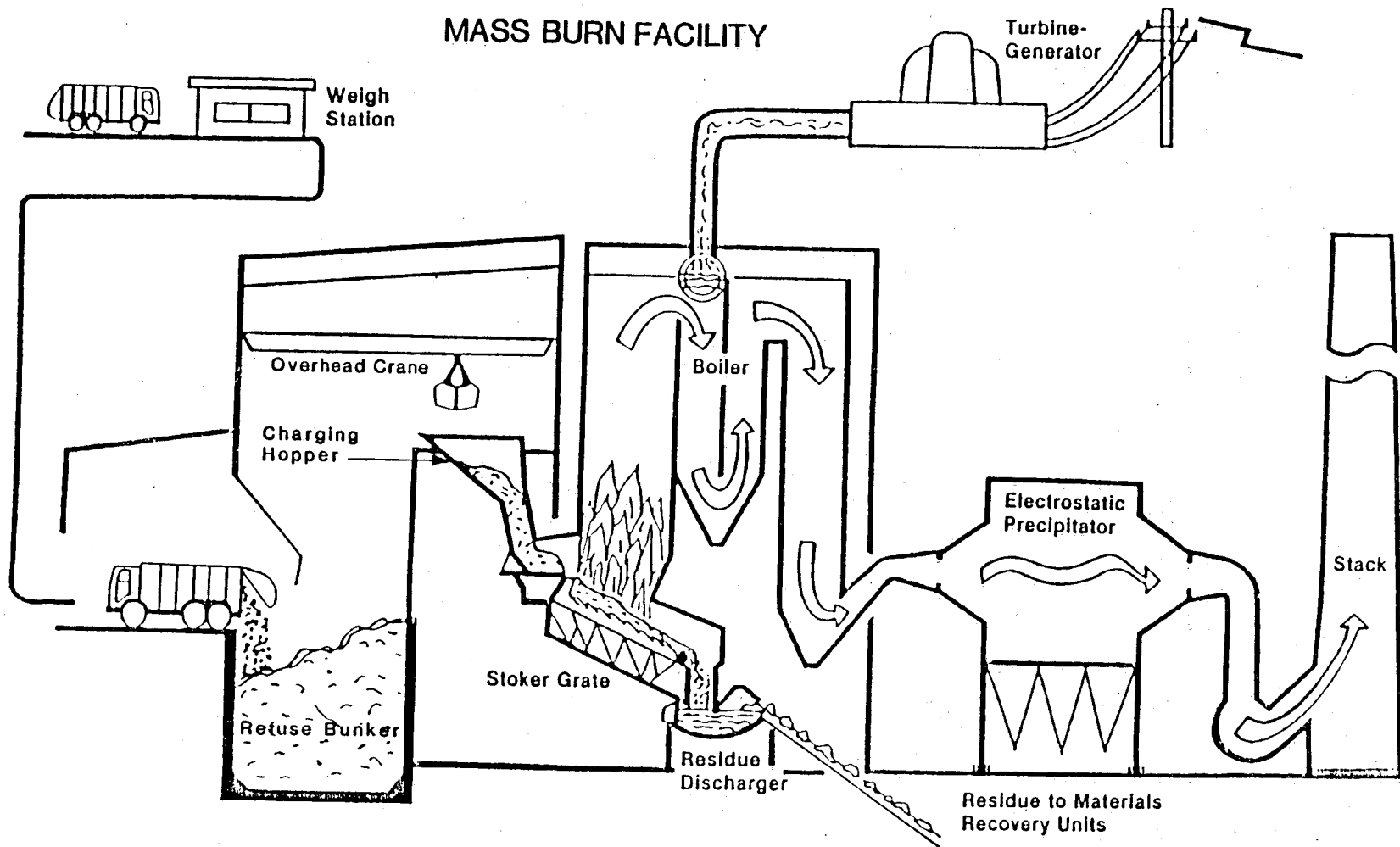
Florida has adopted legislation, the Florida Electrical Power Plant Siting Act (Florida Statutes, Chapters 403.501 - 403.517), as amended, through Chapter 17-17 of the Florida Administrative Code (FAC) "to provide efficient, centralized review of the needs for increased electrical power generation and the effects of generator-related activities on human health and the environment and ecology of the lands and waters within the state." The Florida Department of Environmental Regulation (FDER) implements this Act.

This Act provides for a certification process which is a "one stop" centralized permitting procedure. Under the Act, the County may elect to obtain each required permit separately, or to file an application for certification which would expedite the review and coordinate the permit application process.

The County is pursuing Site Certification under the Florida Electrical Power Plant Siting Act. The County has submitted a "Plan of Study for Completion of the Application for Certification of Proposed Electrical Power Generating Plant Site" and will file the "Application for Certification" in July 1984.

Once the site is certified by the state, no other state permits will be required for the project. Although the rated continuous design capacity of the project will be 1,200 tons per day (generating about 29 megawatts), site certification is being sought for an ultimate continuous design rated capacity of 1,600 tons per day (generating about 39 megawatts) since it is anticipated that the County may expand the project in the future.

MASS BURN FACILITY



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 1
SCHEMATIC OF TYPICAL
RESOURCE RECOVERY FACILITY

ASSESSMENT OF PROBABLE PROJECT IMPACTS

As stipulated under 15 CFR 930.58, an assessment of the probable project effects on the coastal zone was conducted in relation to the relevant statutes comprising the Florida Coastal Management Program (FCMP).

The most applicable statute is Chapter 403 (Environmental Control) Part I (Pollution Control), Part II (Electrical Power Plant Siting) and Part IV (Resource Recovery and Management). The air and water pollution concerns under Part I of Chapter 403 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 regulations governing New Source Review for Nonattainment Areas (NSRRA).

A subregional wastewater treatment plant will treat process water from the facility. Effluent quality will be responsive to needs for cooling water at the facility and to meet FDER requirements for land application (disposal) by spray irrigation.

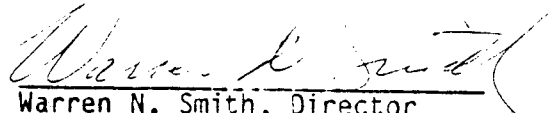
Chapter 267 (Archives, History and Records Management) of the FCMP statutes is also relevant to the proposed project. The Division of Archives, History and Records Management (DAHRM) has reviewed the project tract for archaeological and historical sites and concluded that no significant cultural resources would be affected by the proposed project.

Chapter 373 (Water Resources) also applies to the proposed resource recovery project. The Southwest Florida Water Management District is to 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.

A Power Plant Siting Act (PPSA) application is being filed with FDER. 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 CERTIFICATION

The proposed activity complies with Florida's Coastal Management Program and will be conducted in a manner consistent with that program.


Warren N. Smith, Director
Hillsborough County
Department of Solid Waste

APPLICATION PACKAGE
SUBMITTED TO EPA REGION IV
ON JULY 13, 1984

(NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM APPLICATION FOR PERMIT TO DISCHARGE)

COUNTY



OF HILLSBOROUGH

P.O. BOX 1110 TAMPA, FLORIDA 33601

NORMAN W. HICKEY, COUNTY ADMINISTRATOR

July 13, 1984

Mr. Fritz Wagener
U.S. Environmental Protection Agency
EPA Region IV
Water Management Division
345 Courtland Street
Atlanta, GA 30365

Dear Mr. Wagener:

Pursuant to the Clean Water Act, Hillsborough County is hereby submitting EPA Short Form C, 7550-8 under the National Pollutant Discharge Elimination System (NPDES) for the construction and operation of a solid waste energy recovery facility. The proposed facility will ultimately combust 1,600 tons per day (tpd) of municipal solid waste from the unincorporated areas of Hillsborough County and generate approximately 39 megawatts of electricity.

During operation of the facility, all sanitary and process wastewater will be discharged to the Northwest Brandon Subregional Wastewater Treatment Plant to be constructed on adjacent property. The only discharge to surface waters (other than uncontaminated stormwater during peak storm events) will occur during construction dewatering. This will involve discharge to an existing unnamed drainage ditch adjacent to the facility site during the refuse bunker construction phase, a period not to exceed six months.

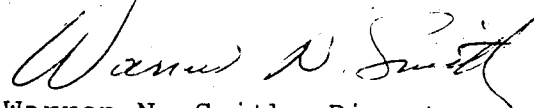
Mr. Fritz Wagener
Page Two
7/13/84

As required by your office, Hillsborough County is submitting the attached EPA applications for the proposed Solid Waste Energy Recovery Facility.

In accordance with the requirements of the Federal Consistency Evaluation Procedures (15 CFR 930.50), these permit applications are accompanied by an "NPDES Florida Coastal Zone Management Certification". As specified in 15 CFR 930.58, ten (10) copies of EPA Short Form C, 7550-8 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, DER.

If, after reviewing these applications you have further questions or require additional materials, please feel free to contact this office at (813) 272-6674.

Sincerely,



Warren N. Smith, Director
Department of Solid Waste

WNS/pd

Attachment

cc: Richard Tucker, DER
Coastal Zone Management Program
Elmer Cleveland, EPA
Richard Smith, DER Federal Consistency Coordinator

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
APPLICATION FOR PERMIT TO DISCHARGE - SHORT FORM C

CONSTRUCTION OF HILLSBOROUGH CO. ENERGY
RECOVERY FACILITY
To be filed only by persons engaged in manufacturing and mining

FOR
AGENCY
USE

APPLICATION NUMBER									
DATE RECEIVED									
YEAR			MO.				DAY		

Do not attempt to complete this form before reading accompanying instructions

Please print or type

1. Name, address, location, and telephone number of facility producing discharge

A. Name Hillsborough County Solid Waste Energy Recovery Facility

B. Mailing address Hillsborough County

1. Street address Dept. of Solid Waste, P.O. Box 1110

2. City Tampa

3. State Florida

4. County Hillsborough

5. ZIP 33601

C. Location:

1. Street Faulkenburg Road

2. City _____

3. County Hillsborough

4. State Florida

D. Telephone No. 813 272-6674

Area
Code

2. SIC

--	--	--	--

(Leave blank)

3. Number of employees 58 approx.

If all your waste is discharged into a publicly owned waste treatment facility and to the best of your knowledge you are not required to obtain a discharge permit, proceed to item 4. Otherwise proceed directly to item 5.

4. If you meet the condition stated above, check here ☐ and supply the information asked for below. After completing these items, please complete the date, title, and signature blocks below and return this form to the proper reviewing office without completing the remainder of the form.

A. Name of organization responsible for receiving waste _____

B. Facility receiving waste:

1. Name _____

2. Street address _____

3. City _____

4. County _____

5. State _____

6. ZIP _____

5. ☐ Principal product, ☐ raw material (Check one) See Attachment A

6. Principal process See Attachment A

7. Maximum amount of principal product produced or raw material consumed per (Check one) See Attachment A

Basis	Amount							
	1-99	100-199	200-499	500-999	1000-4999	5000-9999	10,000-49,999	50,000 or more
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Day								
B. Month								
C. Year								

8. Maximum amount of principal product produced or raw material consumed, reported in item 7, above, is measured in (Check one):

A. ☐ pounds B. ☐ tons C. ☐ barrels D. ☐ bushels E. ☐ square feet
F. ☐ gallons G. ☐ pieces or units H. ☐ other, specify N/A

9. (a) Check here if discharge occurs all year ☐, or

(b) Check the month(s) discharge occurs: Dewatering not to exceed six months

1. ☐ January 2. ☐ February 3. ☐ March 4. ☐ April 5. ☐ May 6. ☐ June

7. ☐ July 8. ☐ August 9. ☐ September 10. ☐ October 11. ☐ November 12. ☐ December

(c) Check how many days per week: 1. ☐ 1 2. ☐ 2-3 3. ☐ 4-5 4. ☐ 6-7

10. Types of waste water discharged to surface waters only (check as applicable)

Discharge per operating day	Flow, gallons per operating day					Volume treated before discharging (percent)				
	0.1-999	1000-4999	5000-9999	10,000-49,999	50,000 or more	None	0.1-29.9	30-64.9	65-94.9	95-100
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A. Sanitary, daily average										
B. Cooling water, etc. daily average										
C. Process water, daily average										
D. Maximum per operating day for total discharge (all types)	See Attachment for Groundwater Quantities									

11. If any of the three types of waste identified in item 10, either treated or untreated, are discharged to places other than surface waters, check below as applicable.

Waste water is discharged to:	Average flow, gallons per operating day				
	0.1-999	1000-4999	5000-9999	10,000-49,999	50,000 or more
	(1)	(2)	(3)	(4)	(5)
A. Municipal sewer system					
B. Underground well					
C. Septic tank					
D. Evaporation lagoon or pond					
E. Other, specify <u>Detention Basin</u>				35,000	

12. Number of separate discharge points: A. ☒ 1 B. ☐ 2-3 C. ☐ 4-5 D. ☐ 6 or more

13. Name of receiving water or waters unnamed existing drainage ditch

14. Does your discharge contain or is it possible for your discharge to contain one or more of the following substances added as a result of your operations, activities, or processes: ammonia, cyanide, aluminum, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual). A. ☐ yes B. ☒ no

I certify that I am familiar with the information contained in the application and that to the best of my knowledge and belief such information is true, complete, and accurate.

Warren N. Smith

Printed Name of Person Signing

Date Application Signed 7-12-84

Director, Hillsborough County
Dept. of Solid Waste

Warren N. Smith
Signature of Applicant

18 U.S.C. Section 1001 provides that:

Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious, or fraudulent statements or representations; or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than 5 years, or both.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
APPLICATION FOR PERMIT TO DISCHARGE - SHORT FORM C

OPERATION OF HILLSBOROUGH CO. ENERGY RECOVERY FACILITY

To be filed only by persons engaged in manufacturing and mining

FOR
AGENCY
USE

APPLICATION NUMBER									
DATE RECEIVED									
YEAR			MO.			DAY			

Do not attempt to complete this form before reading accompanying instructions

Please print or type

1. Name, address, location, and telephone number of facility producing discharge

A. Name Hillsborough County Solid Waste Energy Recovery Facility
 B. Mailing address Hillsborough County/Dept. of Solid Waste
 1. Street address P.O. Box 1110
 2. City Tampa 3. State Florida
 4. County Hillsborough 5. ZIP 33601
 C. Location:
 1. Street Faulkenburg Road
 2. City _____ 3. County Hillsborough
 4. State Florida
 D. Telephone No. 813 272-6674
 Area
 Code

2. SIC

--	--	--	--

(Leave blank)

3. Number of employees 58 approx.

If all your waste is discharged into a publicly owned waste treatment facility and to the best of your knowledge you are not required to obtain a discharge permit, proceed to item 4. Otherwise proceed directly to item 5.

4. If you meet the condition stated above, check here ☒ and supply the information asked for below. After completing these items, please complete the date, title, and signature blocks below and return this form to the proper reviewing office without completing the remainder of the form.

A. Name of organization responsible for receiving waste Hillsborough County Dept. of Water and Wastewater Utilities

B. Facility receiving waste:

1. Name Northwest Brandon Subregional Wastewater Treatment Plant
 2. Street address (mailing address) P.O. Box 1110 (co-located
 3. City Tampa 4. County Hillsborough with facility
 5. State Florida 6. ZIP 33601

5. ☐ Principal product, ☐ raw material (Check one) _____

6. Principal process _____

7. Maximum amount of principal product produced or raw material consumed per (Check one)

Basis	Amount							
	1-99 (1)	100-199 (2)	200-499 (3)	500-999 (4)	1000-4999 (5)	5000-9999 (6)	10,000-49,999 (7)	50,000 or more (8)
A. Day								
B. Month								
C. Year								

8. Maximum amount of principal product produced or raw material consumed, reported in item 7, above, is measured in (Check one):

A. ☐ pounds B. ☐ tons C. ☐ barrels D. ☐ bushels E. ☐ square feet
F. ☐ gallons G. ☐ pieces or units H. ☐ other, specify _____

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Discharge per operating day	Flow, gallons per operating day					Volume treated before discharging (percent)				
	0.1-999 (1)	1000-4999 (2)	5000-9999 (3)	10,000-49,999 (4)	50,000- or more (5)	None (6)	0.1-29.9 (7)	30-64.9 (8)	65-94.9 (9)	95-100 (10)
A. Sanitary, daily average										
B. Cooling water, etc. daily average										
C. Process water, daily average										
D. Maximum per operating day for total discharge (all types)										

11. If any of the three types of waste identified in item 10, either treated or untreated, are discharged to places other than surface waters, check below as applicable.

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	0.1-999 (1)	1000-4999 (2)	5000-9999 (3)	10,000-49,999 (4)	50,000 or more (5)
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E. Other, specify					

12. Number of separate discharge points: A. ☐ 1 B. ☐ 2-3 C. ☐ 4-5 D. ☐ 6 or more

13. Name of receiving water or waters _____

14. Does your discharge contain or is it possible for your discharge to contain one or more of the following substances added as a result of your operations, activities, or processes: ammonia, cyanide, aluminum, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual). A. ☐ yes B. ☐ no

I certify that I am familiar with the information contained in the application and that to the best of my knowledge and belief such information is true, complete, and accurate.

Warren N. Smith
Printed Name of Person Signing

7-12-84
Date Application Signed

Director, Hillsborough County
Department of Solid Waste

Title
Signature of Applicant

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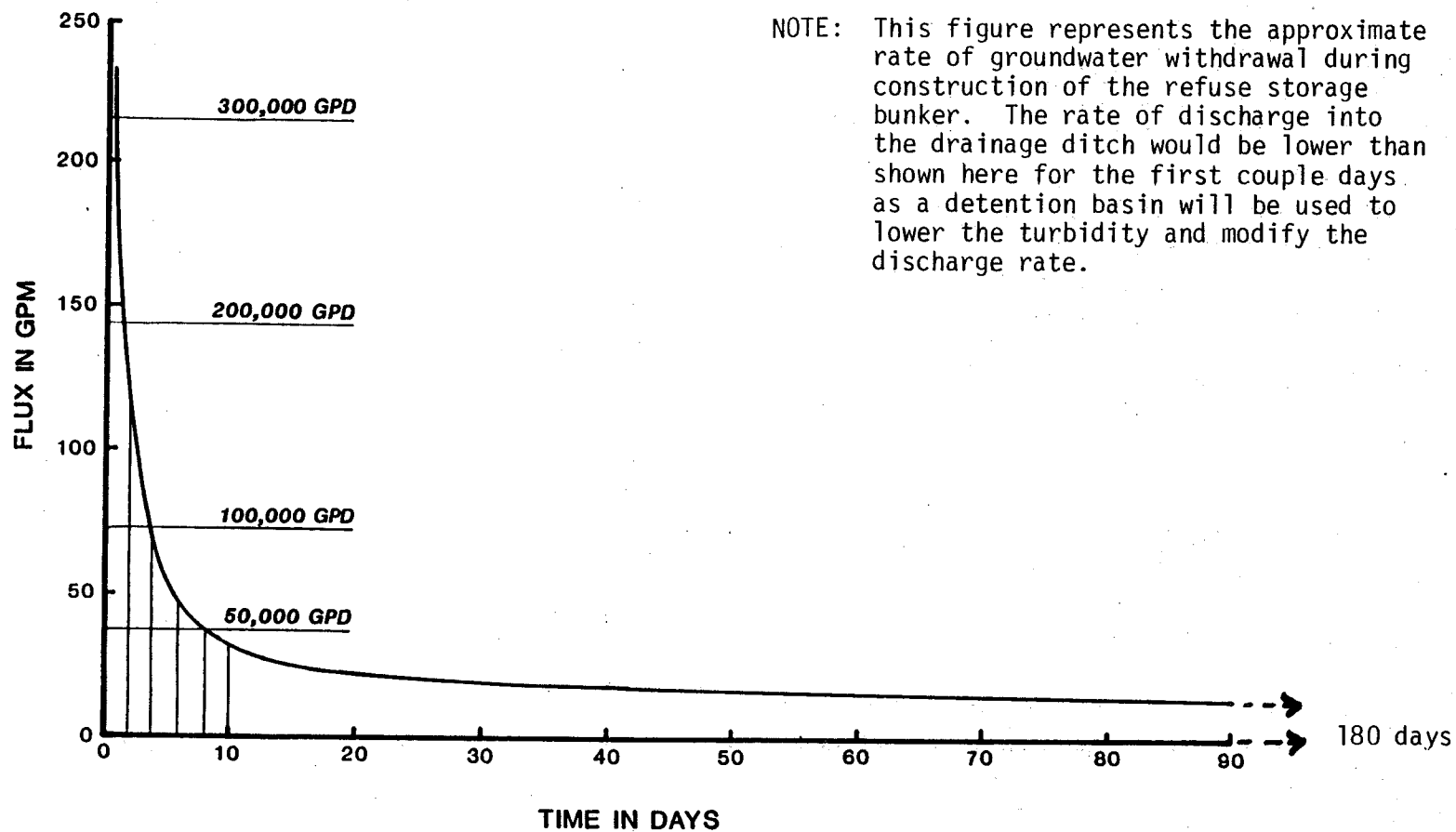
ATTACHMENT A

During operation of the Energy Recovery Facility, all sanitary and process wastewater will be discharged to the co-located Northwest Brandon Subregional Wastewater Treatment Plant. The only discharge to surface waters (other than uncontaminated stormwater during peak storm events) would occur during construction dewatering. As recommended by Fritz Wagener, Water Management Division of EPA Region IV, the following project description has been provided to supplement the information provided on Short Form C in order to address the dewatering issue.

The proposed facility will ultimately combust 1600 tons per day (tpd) of municipal solid waste from the unincorporated sections of Hillsborough County and harness the energy produced in the process to generate electricity (39 megawatts). During construction, site dewatering will involve discharge to an existing unnamed drainage ditch adjacent to the facility site. Water will be pumped to a detention basin in order to lower turbidity before discharge to the stream. This dewatering process will last only through the refuse bunker construction phase, a period not to exceed six months. The average amount of discharge over this six-month period is about 32,000 gpd. The water withdrawal rate is depicted in Figure 1.

Hillsborough County is currently preparing an Application for Power Plant Site Certification to be reviewed by the Florida Department of Environmental Regulation. A construction dewatering analysis and a hydrologic analysis for stormwater basis design have been conducted and are included as appendices to the Application for Power Plant Site Certification.

Attachment B provides the Coastal Zone Management Certification required in the Federal Coastal Management Program.



NOTE: Assumes 2.5in/mo recharge

HILLSBOROUGH COUNTY SOLID WASTE
ENERGY RECOVERY FACILITY

Hillsborough County
Department of Solid Waste

FIGURE 1.
WATER WITHDRAWAL RATE
(WET CONDITIONS)

NPDES

FLORIDA COASTAL ZONE MANAGEMENT CERTIFICATION

COUNTY OF HILLSBOROUGH

P.O. BOX 1110 TAMPA, FLORIDA 33601

NORMAN W. HICKEY, COUNTY ADMINISTRATOR

July 13, 1984

State Planning & Development Clearinghouse
Office of Planning and Budgets
Executive Office of the Governor
The Capital
Tallahassee, Florida 32301
Attn: Richard Smith, DER Federal Consistency Coordinator

Re: Hillsborough County Solid Waste Energy
Recovery Facility: 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. 402 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 a signed statement (by the applicant) of the proposed project's consistency with the FCMP; and
- o an assessment of the probable project impacts with respect to relevant FCMP statutes.

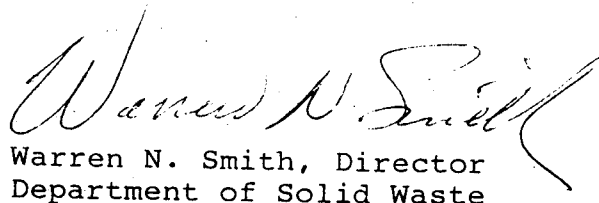
Mr. Smith
Page Two
7/13/84

As specified in 15 CFR 930.58, the certification package and permit application (EPA Form 7550-8) 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, DER. Copies of the permit application and certification are included here. Under separate cover, the certification package and permit application has been sent to the EPA Regional Office in Atlanta for their review.

As required by your office, Hillsborough County is submitting the attached NPDES applications for construction and operation of the Solid Waste Energy Recovery Facility and the consistency certification package.

If, after reviewing these materials, you have questions or require additional information, please contact this office at (813) 272-6674.

Sincerely,



Warren N. Smith, Director
Department of Solid Waste

WNS/pd
Attachment

cc: Richard Tucker, DER
Office of Coastal Zone Management

DESCRIPTION OF THE PROJECT

Background Information

Hillsborough County is currently seeking proposals from qualified firms and organizations for the design, construction, startup, acceptance testing, operation and maintenance of a solid waste resource recovery and electrical generating facility to serve the unincorporated areas of the County. The Board of County Commissioners has officially stated that the County will own the project. The contractor will provide a full-service arrangement, including design, construction, acceptance testing, and 20 years of continuous operation, for a "mass-burn" type resource recovery facility with a continuous design rated capacity of 1,200 tons per day using three combustion/steam generation units each with a continuous design rated capacity of 400 tons per day. Additionally, the layout of the project will be such as to allow the addition of a fourth combustion/steam generation unit. Initial projection construction shall include a tipping area and refuse storage pit sized to handle 1,600 tons per day (continuous design rated capacity) and the stack shall have four (4) flues. The project will have one steam turbine-generator which shall generate electricity to be delivered for sale to Tampa Electric Company (TECO). Power lines from the project's electrical switchyard will connect TECO's powerline right-of-way which abuts the western boundary of the project site. Revenues from energy sales will be shared by the County and Contractor over the life of the operating contract.

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permit process. The flue gases will be drawn through the ESPs by an induced draft fan which would be located between the stack and the ESPs.

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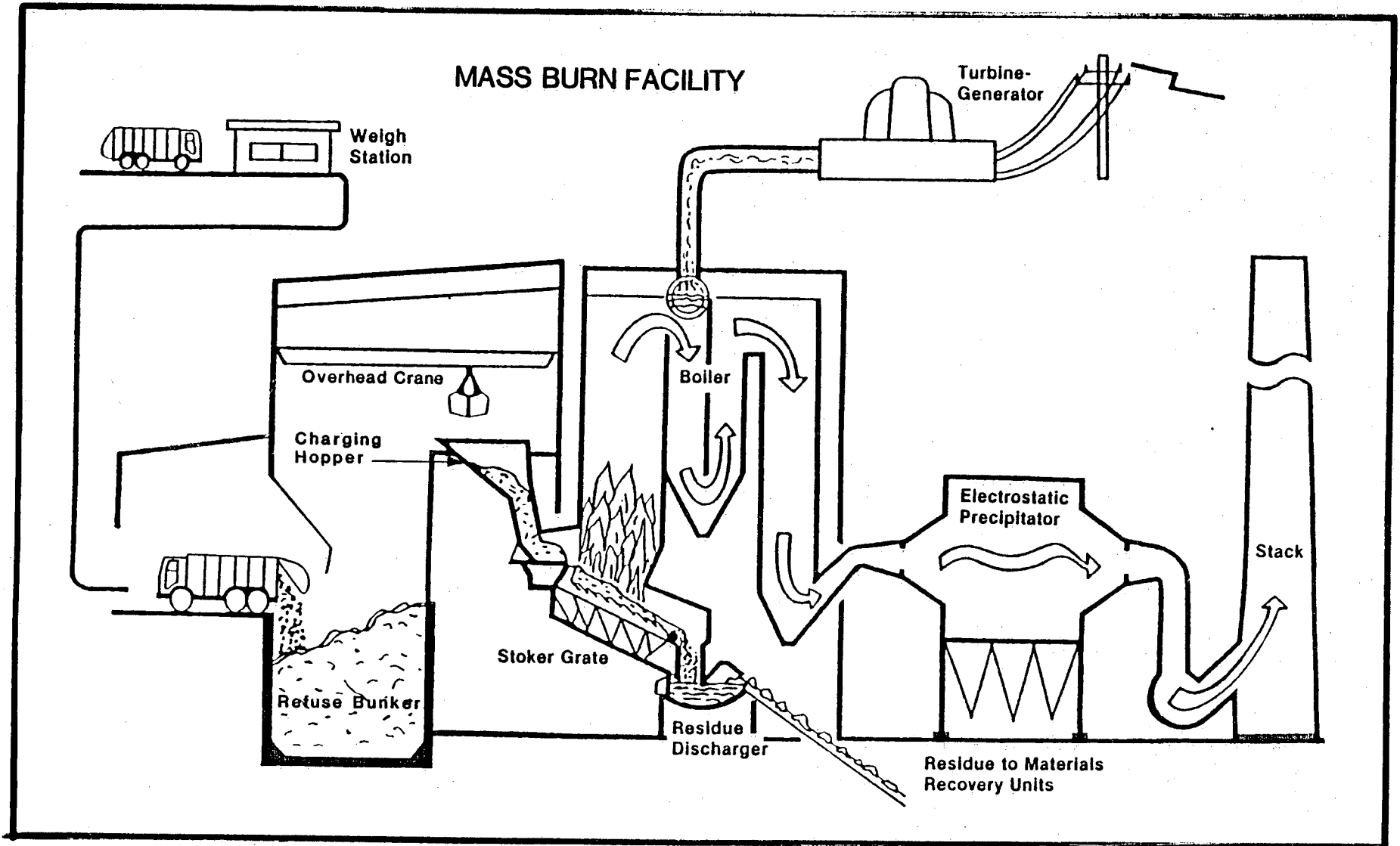
Project Certification

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This Act provides for a certification process which is a "one stop" centralized permitting procedure. Under the Act, the County may elect to obtain each required permit separately, or to file an application for certification which would expedite the review and coordinate the permit application process.

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Once the site is certified by the state, no other state permits will be required for the project. Although the rated continuous design capacity of the project will be 1,200 tons per day (generating about 29 megawatts), site certification is being sought for an ultimate continuous design rated capacity of 1,600 tons per day (generating about 39 megawatts) since it is anticipated that the County may expand the project in the future.



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 1
SCHEMATIC OF TYPICAL
RESOURCE RECOVERY FACILITY

ASSESSMENT OF PROBABLE PROJECT IMPACTS

As stipulated under 15 CFR 930.58, an assessment of the probable project effects on the coastal zone was conducted in relation to the relevant statutes comprising the Florida Coastal Management Program (FCMP).

The most applicable statute is Chapter 403 (Environmental Control) Part I (Pollution Control), Part II (Electrical Power Plant Siting) and Part IV (Resource Recovery and Management). The air and water pollution concerns under Part I of Chapter 403 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 regulations governing New Source Review for Nonattainment Areas (NSRNA).

A subregional wastewater treatment plant will treat process water from the facility. Effluent quality will be responsive to needs for cooling water at the facility and to meet FDER requirements for land application (disposal) by spray irrigation.

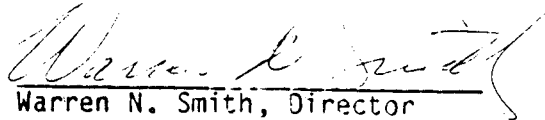
Chapter 267 (Archives, History and Records Management) of the FCMP statutes is also relevant to the proposed project. The Division of Archives, History and Records Management (DAH RM) has reviewed the project tract for archaeological and historical sites and concluded that no significant cultural resources would be affected by the proposed project.

Chapter 373 (Water Resources) also applies to the proposed resource recovery project. The Southwest Florida Water Management District is to 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.

A Power Plant Siting Act (PPSA) application is being filed with FDER. 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 CERTIFICATION

The proposed activity complies with Florida's Coastal Management Program and will be conducted in a manner consistent with that program.



Warren N. Smith, Director
Hillsborough County
Department of Solid Waste

APPENDIX 10.1.7

FEDERAL ENERGY REGULATORY COMMISSION
ORDER GRANTING APPLICATION FOR CERTIFICATION
AS A QUALIFYING SMALL POWER PRODUCTION FACILITY

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Hillsborough County, Florida)
-- Department of Solid Waste)

Small Power Production and)
Cogeneration Facilities)
-- Qualifying Status)

Docket No. QF83-405-000

ORDER GRANTING APPLICATION FOR CERTIFICATION
AS A QUALIFYING SMALL POWER PRODUCTION FACILITY

(Issued November 16, 1983)

On August 29, 1983, Hillsborough County, Florida, Department of Solid Waste, (Applicant) of Tampa, Florida, filed an application with the Federal Energy Regulatory Commission (Commission) for certification of a facility as a qualifying small power production facility pursuant to § 292.207 of the Commission's regulations. 1/ Notice of the application was published in the Federal Register on September 20, 1983. 2/ No protests or petitions to intervene have been filed.

The small power production facility will be located in Hillsborough County, Florida. The primary energy source will be biomass in the form of municipal solid waste. The electric power production capacity of the facility will be approximately 39 megawatts. 3/ The Applicant does not own any other

1/ Section 292.207 (b)(5) of the Commission's regulations requires the Commission to issue an order granting or denying an application for qualifying status, tolling the time for issuance of an order, or setting the matter for hearing within 90 days of the filing of the application. Section 375.308(pp) of the Commission's regulations delegates to the Director, Office of Electric Power Regulation (OEPR), the authority to take appropriate action on uncontested applications for qualifying status. 18 C.F.R. § 375.308(pp) (1982).

2/ 48 Fed. Reg. 42860 (1983).

3/ Pursuant to section 292.601(b) of the Commission's regulations, a biomass-fueled small power production facility with an electric power production capacity greater than 30 megawatts is excluded from exemption from the Federal Power Act.

DC-A-25

- 2 -

Docket No. QF83-405-000

small power production facility located within one mile of the facility. The facility thus satisfies the criteria established under § 292.204 of the Commission's regulations.

No electric utility, electric utility holding company, or any combination thereof has any ownership interest in the facility. The facility thus satisfies the criteria set forth in § 292.206 of the Commission's regulations.

It is found that:

The small power production facility, as described in the application submitted by Hillsborough County, Florida, Department of Solid Waste, meets the requirements established in § 292.203(a) of the Commission's regulations regarding qualification as a small power production facility.

It is ordered:

The application for certification of qualifying status filed on August 29, 1983, by Hillsborough County, Florida, Department of Solid Waste pursuant to § 292.207 of the Commission's regulations and section 3(17)(C) of the Federal Power Act, as amended by section 201 of the Public Utility Regulatory Policies Act of 1978, is hereby granted provided that the facility operates in the manner described in the application. 4/

Lawrence R. Anderson
Director, Office of Electric
Power Regulation

4/ Certification as a qualifying facility serves only to establish eligibility for benefits provided by the Public Utility Regulatory Policies Act of 1978, as implemented by the Commission's regulations, 18 CFR Part 292. It does not relieve a facility of any other requirements of local, State or Federal law, including those regarding siting, construction, operation, licensing and pollution abatement. Certification does not establish any property rights, resolve competing claims for a site, or authorize construction.

Appendix 10.2

APPENDIX 10.2

ZONING DESCRIPTIONS

APPENDIX 10.2

ZONING DESCRIPTIONS

Pursuant to Florida Administrative Code Chapter 17-17.21., Hillsborough County is submitting to DER, unattached to this application, three copies of a compilation of information specifying the procedures taken to accomplish compliance of the site, including associated facilities, with existing land use plans and zoning ordinance. The compilation, titled the "Compliance Document" includes copies of all applicable portions of ordinances, regulations, or land use plans involved.

The material presented in this appendix is specifically referenced in Chapter 2.2.2 of the Application for Power Plant Site Certification (Volume 1).

APPENDIX 10.2.1

APRIL 5, 1984 HILLSBOROUGH COUNTY DEPARTMENT
OF DEVELOPMENT COORDINATION PLANNING
REPORT AND RECOMMENDATION TO
REZONING PETITION #83-274

HEARING DATE: April 13, 1984
PETITION NUMBER: 83-274
PRESENTED BY: Ethel Hammer
PREPARATION DATE: April 5, 1984

(THIS PETITION WAS CONTINUED FROM THE SEPTEMBER 22, 1983 BOARD OF COUNTY COMMISSIONERS LAND USE HEARING; THE OCTOBER 6, 1983 BOARD OF COUNTY COMMISSIONERS LAND USE HEARING; THE DECEMBER 5, 1983 BOARD OF COUNTY COMMISSIONERS LAND USE HEARING; THE FEBRUARY 2, 1984 ZONING HEARING MASTER HEARING; THE MARCH 8, 1984 ZONING HEARING MASTER HEARING; AND THE MARCH 23, 1984 ZONING HEARING MASTER HEARING.)

I. Planning Report

- A. This parcel lies within the Public/Semi-Public area of the adopted Amended Horizon 2000 Land Use Plan.
- B. The following agencies have no adverse comments:
1. Department of Fire Control and Emergency Operations
 2. Department of Parks and Recreation
 3. School Board
 4. Sheriff's Office
- C. These agencies have the following comments:
1. Department of Water and Wastewater Utilities - Public water (a 12-inch main located on the west side of Faulkenburg Road) from the City of Tampa exists approximately 30 feet from the site. Public sewer (sewer line - force main in Faulkenburg Road) exists approximately 50 feet from the site. Any extension of water and/or sewer lines would be done at the expense of the developer.
 2. Department of Engineering -
 - a. HUD Flood Insurance Rate Map C indicates that this property is in zone C (area of minimal flooding). Zoning Application 83-274 based on the Location Map (i.e., hearing agenda item 83-274b) and not the legal site is located in flood Zone C only according to Flood Map 380C. All impervious area requires retention. There must be compliance with Federal Emergency Management Agency requirements. The area drains to an existing canal which discharges into Six-Mile Creek.
 - b. Traffic Operations Services Section - Traffic Operations Services Section has reviewed the revised transportation analysis prepared by Kimley-Horn and Associates, Incorporated, for the subject project. Traffic Operations Services Section agrees with the assumptions, methodology, and conclusions presented therein. It appears that existing and proposed improvements (by the State of Florida Department of Transportation) scheduled in the near future will accommodate projected traffic from the facility. It is recommended that a 150-foot long left-turn storage lane be constructed on Faulkenburg Road for northbound vehicles turning left into the facility. The cost of the left-turn lane and any right-of-way needed should be borne by the petitioner. Faulkenburg Road, functionally classified by the Department of Engineering as a major collector road, requires an additional 17 feet of right-of-way on the west side. This will provide part of the 94 feet of total right-of-way needed ultimately to accommodate a symmetrical four-lane divided urban section.

HEARING DATE: April 13, 1984
PETITION NUMBER: 83-274
PRESENTED BY: Ethel Hammer
PREPARATION DATE: April 5, 1984

(THIS PETITION WAS CONTINUED FROM THE SEPTEMBER 22, 1983 BOARD OF COUNTY COMMISSIONERS LAND USE HEARING; THE OCTOBER 6, 1983 BOARD OF COUNTY COMMISSIONERS LAND USE HEARING; THE DECEMBER 5, 1983 BOARD OF COUNTY COMMISSIONERS LAND USE HEARING; THE FEBRUARY 2, 1984 ZONING HEARING MASTER HEARING; THE MARCH 8, 1984 ZONING HEARING MASTER HEARING; AND THE MARCH 23, 1984 ZONING HEARING MASTER HEARING.)

3. Environmental Protection Commission - The proposed site contains no wetland areas. The proposed facilities will require State of Florida Department of Environmental Regulation construction and operation permits which will be reviewed by the Environmental Protection Commission staff to insure that air pollution and water pollution standards are met. Drainage plans and calculations must be submitted to the Environmental Protection Commission for review. If discharge is into State of Florida waters, it is the responsibility of the developer to notify the State of Florida Department of Environmental Regulation of the intent to construct a stormwater discharge facility.
4. Health Department - The Health Department recommends consideration of the following aspects relating to ground water protection and water supply.
 - a. The existing three-inch water well and any other water wells on the site should be abandoned and permanently plugged in accordance with Southwest Florida Water Management District requirements.
 - b. Consideration should be given to any possible impact of the proposed retention basins and other on-site facilities on any off-site water supply wells which may be located on adjacent property.

The Health Department assumes that the domestic water supply needs for the facilities would be obtained from the City of Tampa water system. The on-site water system must comply with the requirements of Chapter 17-22 of the Florida Administrative Code. There should be connection to the City of Tampa water supply.

II. Recommendation

- A. Approval with Conditions - Staff recommends approval of this request with the conditions listed below. Approval is based on the revised General Site Plan received March 13, 1984.
 1. The developer shall construct, prior to the issuance of Certificates of Occupancy, a 150-foot long left-turn storage lane on Faulkenburg Road for northbound vehicles turning left into the facility. The cost of the left-turn lane and any right-of-way needed shall be paid by the petitioner/developer.
 2. The developer shall dedicate to the County, upon request of the County, an additional seventeen feet of right-of-way on the west side of Faulkenburg Road, thereby providing part of the 94 feet of total right-of-way needed ultimately to accommodate a symmetrical four-lane divided urban section.
 3. All structures shall be limited to the maximum heights shown on the General Site Plan (received March 13, 1984) as measured from existing grade, except for the effluent storage reservoirs which may be a maximum of 60 feet in height and the resource recovery buildings which shall be a maximum of 160 feet above existing grade. All structures shown as "1 story" shall be a maximum 15 feet in height. All structures shown as "2 stories" shall be a maximum 30 feet in height.

HEARING DATE: April 13, 1984
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4. All setbacks shown on the General Site Plan (received March 13, 1984) shall be considered minimums.
5. The developer shall undertake the following mitigative measures to control soil erosion and air pollutants during construction activities:
 - a. designate haul routes on site to channel main traffic over a path which can be stabilized;
 - b. undertake chemical stabilization over heavily travelled primary haul route sections;
 - c. undertake mid-weekly cleaning of dirt during construction off Faulkenburg Road adjacent to the site or as required by grading permit;
 - d. wherever possible, use selective clearing to allow natural seeding to stabilize the disturbed soil and berms to minimize wind erosion;
 - e. water all dirt roads as necessary;
 - f. develop asphalt roads as soon as practical;
 - g. stage clearing of land within the development to reduce land opened and exposed to windy conditions; and
 - h. undertake mulching, landscaping, and sodding as soon as possible after final grading is completed.
6. All structures in the project shall utilize public water services. No use of on-site wells for potable water shall be permitted.
7. The use of the site shall be limited to the uses shown on the General Site Plan (received March 13, 1984).
8. No sludge or chemicals shall be stored outside an enclosed structure. All refuse transfer and storage shall be inside an enclosed structure.
9. All off-site noise levels created by this project shall not exceed the standards as defined below.
 - a. Measured at any residentially zoned property line within one-fourth mile of the project:

between 7:00 A.M. and 10:00 P.M. - 60 dBA and

between 10:00 P.M. and 7:00 A.M. - 55 dBA.
 - b. Measured at any commercially or industrially zoned property line within one-fourth mile of the project - 75 dBA.
10. All emissions from the project shall meet all applicable Federal, State, and local emission standards.

HEARING DATE: April 13, 1984
PETITION NUMBER: 83-274
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11. The site shall be buffered by a berm-and-planting combination around the perimeter of the site with the exception of along the western boundary of the Electric Switchyard. The western boundary of the Electric Switchyard shall be buffered by hedge fence, or wall. The remaining area shall include buffering consisting of trees, such as silk oaks and live oaks on 25-foot centers, and/or trees, such as long-leaf pines or slash pines on 10-foot centers. All trees shall be a minimum of 3-inch caliper at the time of planting. The areas under and between the trees shall contain plantings or plantings-and-fence combinations of a size and type that will provide buffering a minimum of six feet in height (measured from the finished grade) and 75 percent opaque. No portion of the fence shall be more than six feet in height as measured from the finished grade. All berms shall be between 10 to 25 feet in height. The Resource Recovery buildings shall be screened by plantings, such as crepe myrtle; southern wax myrtle; weeping elm; viburnum; or evergreens, which shall be a minimum of four feet tall at the time of planting.
12. The developer shall provide, upon request of the County, sidewalks external to the project in the right-of-way area of the major roadway bordering the project (i.e., Faulkenburg Road). The exact location of said sidewalk shall be determined by the County Department of Development Coordination prior to Detailed Site Plan approval.

Notes:

1. Drainage plans and calculations shall be submitted to the County Environmental Protection Commission for review.
2. If discharge is into State of Florida waters, it is the responsibility of the developer to notify the State of Florida Department of Environmental Regulation of the intent to construct a storm-water discharge facility.
3. All impervious area shall require retention.
4. The developer shall comply with Federal Emergency Management Agency requirements.

APPENDIX 10.2.2

APRIL 30, 1984 RECOMMENDATION
OF ZONING HEARING MASTER
CONCERNING REZONING PETITION #83-274

Hillsborough County, Florida

Recommendation of Zoning Hearing Master

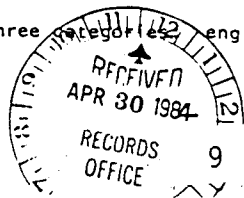
Petition File Number: 83-274
Petitioner: Hillsborough County Division of
Public Works
Petition Request: M-1A to C-U
Date of Public Hearing: April 13, 1984

Findings of Fact and Summary of Evidence Presented

The subject property constitutes a 50.431-acre tract of land located on the west side of Faulkenberg Road, approximately three-quarters of a mile north of State Road 60. It has 225 feet of frontage on Faulkenberg Road which extends in depth 680 feet to the main body of the tract. The subject property is adjoined on the north by pasture land, on the east by a single-family house and a pipe company, on the south by the Seaboard Coastline Railroad and on the west by a TECO transmission line easement. Development patterns in the general area are predominately industrial. The subject property is surrounded by a pattern of M-1A zoning except for a small A-AR district located across Faulkenberg Road to the east. Zoning patterns in the general area are predominately industrial.

The petitioner proposes to rezone the subject property from M-1A to C-U in order to construct a multiple-purpose public use development consisting of a mass-burn resource recovery plant, a subregional wastewater treatment plant, and an electric power co-generating facility. The three activities will be interrelated in the following manner. The wastewater treatment plant will supply cooling water for the resource recovery plant. The resource recovery plant will dispose of treated effluent from the sewage treatment plant through evaporation. The resource recovery plant will also supply steam to power the electric power turbo-generator. The electric power generator will supply electric power to the wastewater treatment plant and the resource recovery plant. Excess electric power will be sold and transmitted to the Tampa Electric Company. These interrelationships will result in economics beneficial to the customers of the County Departments of Solid Waste and Water and Wastewater Utilities and of the Tampa Electric Company.

The petitioner's representative stated that the subject property was selected as the most suitable site for the proposed development because, of thirty-five potential sites studied, it best met the site selection criteria. These criteria were of three categories: engineering, institutional, and environmental.



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APR 30 1984

They were developed in consultation with various state and local agencies and in recognition of the goals and policies of the Horizon 2000 Land Use Element. They reflected both requirements of the proposed development itself and its impact upon the surrounding area.

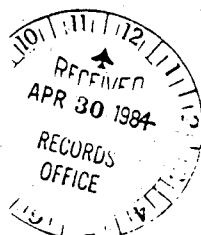
The Department of Development Coordination recommends approval with conditions. The Planning Commission staff has no objections.

One person representing the Southeast Hillsborough Civic Association testified in favor of the petition, citing the need for a centrally-located resource recovery facility which will reduce the cost of hauling solid waste to the landfill in the southeast part of the county and reduce the heavy truck traffic upon the inadequate two lane roads in that area.

The Greater Brandon Citizens Alliance, represented by its attorney and several of its officers, spoke in opposition to the petition. The president of the Brandon Chamber of Commerce read a letter in opposition. A representative of the owner of an adjoining industrial property also spoke in opposition.

Statements in opposition to the petition are summarized as follows:

1. The subject site is too small to adequately buffer the project from surrounding properties.
2. The height and bulk of the resource recovery plant and the height of the stack are not in keeping with low-profile existing developments in the industrial area and would be visible from residential areas to the east.
3. The burning of solid waste, especially plastics and metals, will produce air pollution which will be hazardous to people in the surrounding area.
4. The resource recovery plant is not permitted in the M-1A zoning district because it is, in fact, an incinerator which requires M-1 zoning. Section 4, page 15 of the Zoning Regulations prohibits wastewater treatment plants in industrial districts. The height of the building and stack will exceed the maximum height permitted by the M-1A district. For these reasons, the proposed development is not in keeping with the surrounding M-1A zoning district.
5. As a heavy industrial use, the proposed resource recovery plant is not in keeping with the developing light industrial and commercial land-use patterns in the area, and it would tend to attract other heavy industrial uses to the area.
6. As a heavy industrial use, the proposed resource recovery plant would be in violation of the Horizon 2000 Plan Land Use Element which has designated the subject area "light industrial".
7. Traffic generated by the proposed development would consist of slow-moving heavy trucks, which would worsen problems already existing in the area due to overloaded facilities. Railroad crossings exist on Faulkenberg Road north and south of the subject property.



8. The resource recovery plant in Dade County, built in 1982, is under citation and in court because of air pollution.

Rebuttal by the petitioner's representatives included the following:

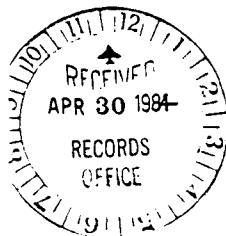
1. All Federal Environment Protection Agencies and State Department of Environmental Regulation standards for control of air pollutions emissions will be met.
2. Traffic generated by the proposed facilities will be about one-half of that generated by a typical M-1A use and virtually no traffic will be generated during peak morning and evening hours.
3. A survey of other resource recovery facilities indicated that surrounding properties were not adversely affected, and no trend to heavier uses was evident.
4. The resource recovery plant in Miami, which is under citation, utilizes a different technology from the proposed Hillsborough plant. All plants in the United States which use technology similar to the Hillsborough plant are experiencing no air pollution problems.

Conclusions and Recommendation

1. The subject site is sufficient in size for its intended use, with ample setbacks and provisions for screening with berms and landscaping.
2. The subject site is uniquely well-located for its intended multiple-use development. The resource recovery plant will be near the center of the solid waste shed of the County. It has excellent accessibility to the major thoroughfare system, being near a major interchange of the Interstate Highway system and not far from the eastern terminus of the Cross Town Expressway. The subregional wastewater treatment plant will be well-located to serve the Brandon community and the industrial area in which the subject property is situated. The electric power generator will be adjacent to the Tampa Electric transmission line easement.
3. The proposed development of the subject site is compatible with surrounding development patterns which are predominately industrial. Its external effects, on which compatibility should be judged, are considered to be no more severe than those of existing industries in the area.
4. The proposed rezoning is consistent with the general M-1A zoning pattern which surrounds the site. It is not considered that it will create any more offensive noise, vibration, dust heat, smoke, odor, glare or other objectional influences than the minimum amount normally resulting from other uses listed in the M-1A district and, therefore, is not considered to be an M-1 use.

The proposed resource recovery plant is not considered to be an incinerator which requires M-1 zoning because it does not, by virtue of its unique design, produce the objectionable external effects normally associated with an incinerator.

The wastewater treatment plant is a permitted use in the C-3 district under the heading "public works and utilities"; uses permitted in the C-3 district are also permitted in the M-1A district.



While electric power generating plants are not listed specifically in the Zoning Regulations, they might be considered as "public works and utilities" listed in the C-3 district. It is probable that a typical power plant which stores and consumes vast amounts of fossil fuels would be classified as an M-1 use. A co-generation power plant which utilizes heat or steam from its companion plant should logically be included in the same district which permits the companion plant, in this case the M-1A district.

The only standard of the M-1A district with which the resource recovery plant does not appear to comply is height. However, radio and television towers are permitted in M-1A district and it is likely that they exceed 100 feet in height. The C-U district states that height and other standards shall be reasonable. A fair test of reasonableness would be based on the size of the site and whether the height of the structure would deprive adjoining property owners of light and air. Because of the large size of the subject site and adjoining sites, it is not considered that the proposed height of structures would be unreasonable. The topography, the raised interstate highway, and existing vegetation reduce the likelihood that the plant will be visible to residential neighborhoods to the east, although the stack probably will be visible.

5. The proposed rezoning is consistent with the Horizon 2000 Plan. The subject property is designated Major Public Facility/Semi-Public on the Land Use Plan. Section 3.2.8.1. of the Land Use Element states that this land use category will be used "to show those major government-owned facilities, and other public uses, existing or proposed". The proposed development is also found to be consistent with all other elements of the Horizon 2000 Plan.

In view of the above findings and conclusions, it is recommended that the proposed rezoning of the subject property from M-1A to C-U be GRANTED, subject to the following conditions:

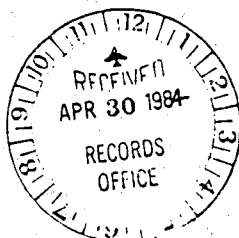
1. No sludge from the wastewater treatment plant will be incinerated in the resource recovery plant.
2. The resource recovery plant shall be completely enclosed and shall be of a color which blends well with its natural background. The stack shall be of a color which blends with the sky (unless prohibited by aircraft operational safety requirements).
3. All conditions recommended by the staff of the Department of Development Coordination shall be complied with.

Respectfully Submitted:

John A. Crislip
John A. Crislip
Zoning Hearing Master

April 30, 1984
Date

JAC/dvn



APPENDIX 10.2.3

MAY 29, 1984 BOARD OF COUNTY COMMISSIONERS
RESOLUTION #R84-0097 APPROVING
REZONING PETITION #83-274

COUNTY



OF HILLSBOROUGH

MEMORANDUM

Date June 11, 1984

To Warren Smith, Director, Solid Waste Department

Edna L. Fitzpatrick, Manager, BOCC Records Department

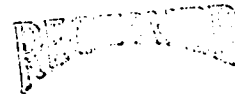
Subject: Resolution - Rezoning Application #83-274 - Resource Recovery

Rezoning Application - H. C. Document No. R84-0097

Attached please find an executed copy of the subject resolution, which was approved by the Board of County Commissioners on May 29, 1984, H. C. Document No. R84-0097. We are providing this copy for your files.

ELF/ej
Attachment

cc: Board Files
Foster Aldridge, Deputy Director, Accounting
Rick Davis, Assistant County Attorney
J. Ed Smith, Chief Deputy Clerk



JUN 12 1984

DEPARTMENT OF SOLID WASTE

RESOLUTION # R84-0097

REZONING APPLICATION # 83-274

WHEREAS the Division of Public Works/Hillsborough County submitted a rezoning application requesting a change from the existing zoning classification to the C-U Community Unit zoning classification for the parcel of land described in said application; and,

WHEREAS, the Zoning Hearing Master on April 13, 1984 held a duly noticed public hearing on said rezoning application for C-U (Community Unit) zoning and heard and considered testimony and documents received thereon; and,

WHEREAS, the Zoning Hearing Master of Hillsborough County filed with the Board of County Commissioners a recommendation of approval of said rezoning application; and,

WHEREAS, said recommendation of approval contained findings of fact and conclusions of law relating to consistency with the Comprehensive Plan and compatibility with adjoining land uses and zoning classifications, a copy of which recommendation is attached hereto as Exhibit A and incorporated herein by reference; and,

WHEREAS, the public notice requirements contained in the Land Use Regulations of Hillsborough County have been satisfied; and,

WHEREAS, the Board of County Commissioners of Hillsborough County has received and considered the report and recommendation of the Hillsborough County Administration; and,

WHEREAS, the Board of County Commissioners has received and considered the report and recommendation of the Zoning Hearing Master; and,

WHEREAS, the Board of County Commissioners has on May 29, 1984 held a duly noticed public hearing on the application for C-U (Community Unit) zoning and has heard and considered the evidence received thereon.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF HILLSBOROUGH COUNTY, FLORIDA:

I. FINDINGS

A. The land under consideration is designated Public/Semi-Public on the land use map adopted as part of the Horizon 2000 Plan. (The designation of the subject property was accomplished through the passage of Hillsborough County Ordinance 84-5, a copy of which is attached hereto as Composite Exhibit C and incorporated herein by reference).

B. The Florida Legislature has, through the passage of Chapter 403.701 et seq. (Florida Resource Recovery Management Act) and Chapter 83-415, Laws of Florida (1983) (Hillsborough County Solid Waste Disposal and Resource Recovery Act of 1983) recognized the societal and environmental importance in proceeding with the development of resource recovery systems.

C. The Florida Legislature has concluded, pursuant to the terms of Chapter 83-415, Laws of Florida (1983), that the County will be performing essential governmental functions and fulfilling uniform State policy by providing for the construction of resource recovery facilities.

D. The public has been extensively involved in the review process relating to the proposed location of the resource recovery facility and has had an opportunity to present testimony and other evidence relating to the issue of compatibility.

E. The proposed resource recovery plant represents state of the art technology.

F. Continued reliance by the County upon the utilization of landfills as a singular means of solid waste disposal is both inefficient and inappropriate.

G. Hillsborough County is an area experiencing growth both presently and projected into the future. It is essential that an alternative to reliance upon landfills be developed so that the solid waste demands of future growth can be accommodated.

H. The utilization of resource recovery facilities represents the application of modern technology to the basic government service of solid waste disposal. It presents a clean and efficient mechanism for the disposal of solid waste. As a by-product of that disposal process, electricity is produced thus conserving other non-renewable resources such as coal and oil.

I. The wastewater treatment facility proposed to be located on the same site as the resource recovery plant will provide a benefit to the adjacent areas including but not limited to the Brandon area. Industrial uses will have an opportunity to draw upon treated wastewater for industrial purposes and the presence of the plant will provide much needed wastewater treatment for the expansion of residential uses in the Brandon area. Also, the wastewater treatment facility will provide a source of cooling water for the resource recovery plant.

J. Based upon the evidence presented, it is apparent that the proposed use will not have an adverse external impact upon the existing land uses in the area. The proposed uses will not adversely impact the kinds of industrial uses that are projected to be located within the area, pursuant to both the Light Industrial land use designation upon the land use plan map and the existing zoning classification of M-1A located on adjoining properties. The proposed uses do not exhibit those kinds of external impacts that have been traditionally associated with heavy industrial uses.

K. Based upon the evidence presented, it is apparent that the proposed uses will not adversely impact the property values of industrial lands located in the area.

II. CONCLUSIONS

A. The Board of County Commissioners having reviewed the application, report and recommendation of the Zoning Hearing Master, and the report and recommendation of the Hillsborough County Administration, and having considered the testimony and other evidence presented during the public hearing hereby concludes:

- (1) that the proposed facilities are compatible with the existing zoning classifications in the area of the subject property; and,
- (2) that the proposed facilities are compatible with existing land uses in the area; and,
- (3) that the proposed facilities are compatible with the development patterns projected for the area pursuant to the Light Industrial land use designation.

B. The proposed uses described in rezoning application 83-274 are appropriate for consideration within the context of the C-U (Community Unit) zoning regulation as described in the Zoning Regulations of Hillsborough County.

C. The Board of County Commissioners of Hillsborough County is authorized and empowered to consider the application for the C-U (Community Unit) zoning.

D. Based upon the proposed location of the project, the evidence submitted relating to the nature and impacts of the project and the site plan and conditions made a part of this review, the Board of County Commissioners concludes that the proposed project is completely compatible with adjacent land uses and zoning classifications, within the contemplation of the C-U zoning regulation.

E. Based upon the proposed location of the project, the evidence submitted relating to the nature and impacts of the project and the site plan and conditions made a part of the C-U (Community Unit) zoning review, the Board of County Commissioners concludes that the proposed project satisfies the compatibility test contained within the Amended Land Use Element and is in compliance with the Goals, Policies, and Objectives contained in said Element and the C-U Zoning Regulations of Hillsborough County.

F. The Board of County Commissioners having considered the report and recommendation of the Hillsborough County Administration, the report and recommendation of the Zoning Hearing Master and the evidence and other testimony presented during the public hearing hereby concludes that the rezoning

of the subject property would be consistent with the Goals, Policies and Objectives contained in the Comprehensive Land Use Plan, including the Amended Land Use Element, enacted by the Board of County Commissioners of Hillsborough County pursuant to the authority contained in Chapter 75-390, Laws of Florida (1975), as amended.

G. The Board of County Commissioners hereby concludes that the construction of both the resource recovery facility and the wastewater treatment plant further proper governmental purposes.

H. The Board of County Commissioners hereby concludes that the approval of the proposed rezoning bears a necessary and substantial relationship to the public health, safety and welfare.

III. ACTION ON REZONING APPLICATION 83-274

The Board of County Commissioners hereby approves Rezoning Application 83-274. The approval of this application is subject to the conditions described in Exhibit B, a copy of which exhibit is attached hereto and incorporated herein by reference, as said conditions may have been supplemented and/or amended by the Board of County Commissioners at the public hearing. Also incorporated into and made a part of this approval is the C-U General Site Plan, attached hereto as Exhibit D.

IV. SEVERABILITY

If any provision of this Resolution or the C-U General Site Plan incorporated herein or the application thereof to any person or circumstance is held invalid, the invalidity shall not affect other provisions or applications of this Resolution or the C-U General Site Plan incorporated herein which can be given effect without the invalid provision or application, and to this end the described provisions are declared severable.

V. EFFECTIVE DATE

This Resolution shall take effect upon passage by the Board of County Commissioners.

STATE OF FLORIDA)
)
COUNTY OF HILLSBOROUGH)

I, JAMES F. TAYLOR, JR., Clerk of the Circuit Court and Ex Officio Clerk to the Board of County Commissioners of Hillsborough County, Florida, do hereby certify that the above and foregoing is a true and correct copy of the resolution adopted by the Board of County Commissioners of Hillsborough County, Florida, at its regular meeting of May 29, 1984 as the same appears of record in Minute Book 97 of the Public Records of Hillsborough County, Florida.

WITNESS my hand and official seal this 11th day of June, 1984.

JAMES F. TAYLOR, JR., CLERK

APPROVED BY COUNTY ATTORNEY

BY [Signature]
Approved As To Form And
Legal Sufficiency.

By: Edna R. Intaglietta
Deputy Clerk

Please note, the Exhibits referenced in Resolution #R84-0097 are found in the following documents:

Exhibit A - contained in Appendix 10.2.2
of this report.

Exhibit B - contained in Appendix 10.2.4
of this report

Exhibit C - contained in Appendix 10.3.5
of this report

Exhibit D - contained in Section 2.1.2
of Volume I
Application for Power Plant Site
Certification.

APPENDIX 10.2.4

CONDITIONS OF APPROVAL
ON PETITION #83-274

COUNTY



OF HILLSBOROUGH

P.O. BOX 1110 TAMPA, FLORIDA 33601

NORMAN W. HICKEY, COUNTY ADMINISTRATOR

June 5, 1984

Hillsborough County Board of County Commissioners
Division of Public Works
P.O. Box 1110
Tampa, FL 33601

RE: #83-274

Dear Ladies and Gentlemen:

At the regularly scheduled public meeting on May 29, 1984 the Board of County Commissioners voted to grant your request for rezoning of the tract of land described in your application to C-U with the attached conditions.

Please keep this letter for your records.

If we may be of service to you at a future date, please feel free to contact this office at 272-5710.

Sincerely yours,

DEPARTMENT OF DEVELOPMENT COORDINATION

Gary Engerhardt
Gary Engerhardt
Zoning Administrator

An Affirmative Action - Equal Opportunity Employer

CONDITIONS OF APPROVAL ON PETITION 83-274

1. The developer shall construct, prior to the issuance of Certificates of Occupancy, a 150-foot long left-turn storage lane on Faulkenburg Road for northbound vehicles turning left into the facility. The cost of the left-turn lane and any right-of-way needed shall be paid by the petitioner/developer.
2. The developer shall dedicate to the County, upon request of the County, an additional seventeen feet of right-of-way on the west side of Faulkenburg Road, thereby providing part of the 94 feet of total right-of-way needed ultimately to accommodate a symmetrical four-lane divided urban section.
3. All structures shall be limited to the maximum heights shown on the General Site Plan (received March 13, 1984) as measured from existing grade, except for the effluent storage reservoirs which may be a maximum of 60 feet in height and the resource recovery buildings which shall be a maximum of 160 feet above existing grade. All structures shown as "1 story" shall be a maximum 15 feet in height. All structures shown as "2 stories" shall be a maximum 30 feet in height.
4. All setbacks shown on the General Site Plan (received March 13, 1984) shall be considered minimums.
5. The developer shall undertake the following mitigative measures to control soil erosion and air pollutants during construction activities:
 - a. designate haul routes on site to channel main traffic over a path which can be stabilized;
 - b. undertake chemical stabilization over heavily travelled primary haul route sections;
 - c. undertake mid-weekly cleaning of dirt during construction off Faulkenburg Road adjacent to the site or as required by grading permit;
 - d. wherever possible, use selective clearing to allow natural seeding to stabilize the disturbed soil and berms to minimize wind erosion;
 - e. water all dirt roads as necessary;
 - f. develop asphalt roads as soon as practical;
 - g. stage clearing of land within the development to reduce land opened and exposed to windy conditions; and
 - h. undertake mulching, landscaping, and sodding as soon as possible after final grading is completed.
6. All structures in the project shall utilize public water services. No use of on-site wells for potable water shall be permitted.
7. The use of the site shall be limited to the uses shown on the General Site Plan (received March 13, 1984).
8. No sludge or chemicals shall be stored outside an enclosed structure. All refuse transfer and storage shall be inside an enclosed structure.
9. All off-site noise levels created by this project shall not exceed the standards as defined below.
 - a. Measured at any residentially zoned property line within one-fourth mile of the project:

between 7:00 A.M. and 10:00 P.M. - 60 dBA and

between 10:00 P.M. and 7:00 A.M. - 55 dBA.
 - b. Measured at any commercially or industrially zoned property line within one-fourth mile of the project - 75 dBA.
10. All emissions from the project shall meet all applicable Federal, State, and local emission standards.

CONDITIONS OF APPROVAL ON PETITION 83-274 (CONTINUED)

11. The site shall be buffered by a berm-and-planting combination around the perimeter of the site with the exception of along the western boundary of the Electric Switchyard. The western boundary of the Electric Switchyard shall be buffered by hedge fence, or wall. The remaining area shall include buffering consisting of trees, such as silk oaks and live oaks on 25-foot centers, and/or trees, such as long-leaf pines or slash pines on 10-foot centers. All trees shall be a minimum of 3-inch caliper at the time of planting. The areas under and between the trees shall contain plantings or plantings-and-fence combinations of a size and type that will provide buffering a minimum of six feet in height (measured from the finished grade) and 75 percent opaque. No portion of the fence shall be more than six feet in height as measured from the finished grade. All berms shall be between 10 to 25 feet in height. The Resource Recovery buildings shall be screened by plantings, such as crepe myrtle; southern wax myrtle; weeping elm; viburnum; or evergreens, which shall be a minimum of four feet tall at the time of planting.
12. The developer shall provide, upon request of the County, sidewalks external to the project in the right-of-way area of the major roadway bordering the project (i.e., Faulkenburg Road). The exact location of said sidewalk shall be determined by the County Department of Development Coordination prior to Detailed Site Plan approval.
13. No sludge from the wastewater treatment plant will be incinerated in the resource recovery plant.
14. The resource recovery plant shall be completely enclosed and shall be of a color which blends well with its natural background. (The stack shall be of a color which blends with the sky (unless prohibited by aircraft operational safety requirements).

Appendix 10.3

APPENDIX 10.3
LAND USE PLAN DESCRIPTIONS

APPENDIX 10.3
LAND USE PLAN DESCRIPTIONS

Pursuant to Florida Administrative Code Chapter 17-17.21, Hillsborough County is submitting to DER, unattached to this application, three copies of a compilation of information specifying the procedures taken to accomplish compliance of the site, including associated facilities, with existing land use plans and zoning ordinance. The compilation, titled the "Compliance Document" includes copies of all applicable portions of ordinances, regulations or land use plans involved.

The material presented in this appendix is specifically referenced in Chapter 2.2.2 of the Application for Power Plant Site Certification (Volume 1).

APPENDIX 10.3.1

JUNE 17, 1983 RECOMMENDATION OF HCCCPC STAFF

TO HCCCPC CONCERNING PLAN

AMENDMENT #83-09

MEMORANDUM

TO: Hillsborough County City-County Planning Commission
FROM: Hillsborough County City-County Planning Commission STAFF
DATE: June 17, 1983
SUBJECT: Plan Amendment 83-09, Hillsborough County Solid Waste Dept.

Site Location: The proposed amendment involves an approximately 50 acre parcel off Faulkenburg Road, northwest of the first railroad crossing north of S.R. 60 in the Brandon Planning Area (see map).

Request: Light Industrial (LI) to Major Public/Semi-Public (P)

Planning Analysis:

- | | <u>Yes</u> | <u>No</u> |
|--|-------------------------------------|--------------------------|
| 1. Is consistent with all portions of the <u>Horizon 2000 Plan</u> . | ☒ | ☐ |
| 2. Is compatible with existing land uses in area. | ☒ | ☐ |
| 3. Is compatible with existing zoning pattern. | ☒ | ☐ |
| 4. Is accessible to existing or planned central water and sewer system. | ☒ | ☐ |
| 5. Is accessible to existing or planned transportation network capable of accommodating proposed land use. | ☒ | ☐ |
| 6. Is consistent with policies regarding environmentally sensitive areas. | ☒ | ☐ |
| 7. Is consistent with future development pattern proposed for the area in adopted land use plan. | ☒ | ☐ |
| 8. Is consistent with sound planning principles and standards and adopted plan policies. | ☒ | ☐ |

Conclusion:

- ☒ Planning Commission STAFF DOES NOT object to the proposed plan amendment.
- ☐ Planning Commission STAFF DOES object to the proposed plan amendment.

Comments:

Plan Amendment 83-09

Petitioner: Hillsborough County Solid Waste Department

Location: Hillsborough County/Brandon Planning Area

Description of the Proposed Amendment

This request for an amendment to the Horizon 2000 Land Use Element involves an approximately 50 acre parcel northwest of the first railroad crossing on Faulkenburg Road north of State Road 60. The site has a 225 foot frontage on Faulkenburg Road. The current land use designation is Light Industrial (LI). The petitioner requests a change from Light Industrial (LI) to Public/Semi-Public (P). The Plan change is requested to accommodate a CU rezoning for the development of a Resource Recovery Facility and Wastewater Treatment Plant.

Study Area

The Planning Commission did not consider studying a larger area since the requested land use category is a site-specific category. Lands surrounding the site will remain in private ownership and thus are not contemplated for public/semi-public use.

Land Use Designation

The site is situated in an extensive Light Industrial (LI) area. The Light Industrial (LI) area extends north to Buffalo Avenue, south to the apex of the proposed I-75 extension and U.S. 301, east to the proposed I-75 extension and west to the Tampa By-Pass Canal and beyond the Crosstown Expressway. These manmade barriers separate the Light Industrial area from the surrounding Low Density Residential (LDR) and Low Medium Density Residential (LMDR) land uses. Other potentially more intensive adjoining land use categories across and along the I-75 corridor include Research/Corporate Park (RCP), Community Commercial (CC), Regional Commercial (RC),

and Medium Density Residential (MDR). These categories are found near the I-75 connector ramps with Buffalo Avenue, State Road 60, the Crosstown Expressway and U.S. 301.

Zoning and Existing Land Use

Most of the area with the Light Industrial (LI) land use designation has M-1A zoning which allows light industrial uses and excludes residential development. However, the area north of S.R. 60 shows extensive M-1 as well as some R-1 and R-1MH zoning. M-1 zoning allows heavy industrial uses and R-1 and R-1MH allow residential usage. These zoning categories are no longer in conformance with the Light Industrial (LI) plan designation as adopted in October 1982. Some scattered residences exist across from the proposed plan amendment site between Faulkenburg Road and the proposed I-75 extension. The sites immediately to the east of the subject parcel have heavy industrial zoning. The subject site is behind L.B. Foster Pipe Company off Faulkenburg Road. The railroad tracks set the site apart from Belcher Oil Company lubricants and fuel supply to the south. Chloride Automotive Industries (battery manufacturing) is located southeast of the site, across Faulkenburg Road. The subject site is currently undeveloped. Land Use directly north of the site is vacant agricultural land and pasture land. Immediately to the west of the site is an undeveloped wooded area and Tampa Electric Company easement. Kaiser Agricultural Chemical lies west of the wooded area, just north of the railroad tracks.

Transportation

The proposed amendment is consistent with the existing road network and improvements planned under the TUATS 2000 Plan. Faulkenburg Road currently operates at Level of Service C. The proposed use of the site will contribute about 510 daily truck trips (hauling refuse and ash). Commuting employees and routine

support activities will account for an additional 145 daily trips. The volume of trips is substantially lower over the weekend and during holiday periods.

The railroad crossing is one of the most heavily used by the Seaboard Coast Line and its temporary closing may cause interruptions in the daily traffic flow. Truck traffic may be more intensive during certain peak periods but usually does not coincide with rush hour. The additional traffic volume on Faulkenburg will not have a negative effect on its current Level of Service designation.

Community Facilities

The proposed amendment is consistent with community facilities in the area. The site has access to water and sewage facilities. The closest fire station is located at the intersection of the proposed Faulkenburg extension and Palm River Road. The Emergency Medical Service units operate from Brandon Community Hospital on Oakfield Drive.

Conformance with Adopted Plan Policies and Recommendation

Policy 3.2.8.1 of the amended Land Use Element of the Horizon 2000 Plan states under "Purpose": To show those major government-owned facilities, and other public uses, existing or proposed. The County is negotiating purchase from Seaboard Coast Lines for the express intent of siting and operating a resource recovery facility and sewage treatment plant. Therefore, the proposed designation is in conformance with policies of the Comprehensive Plan. The Planning Commission recommends that the requested plan amendment be granted since it conforms to the policies of the Land Use Element and is consistent with development in the area.

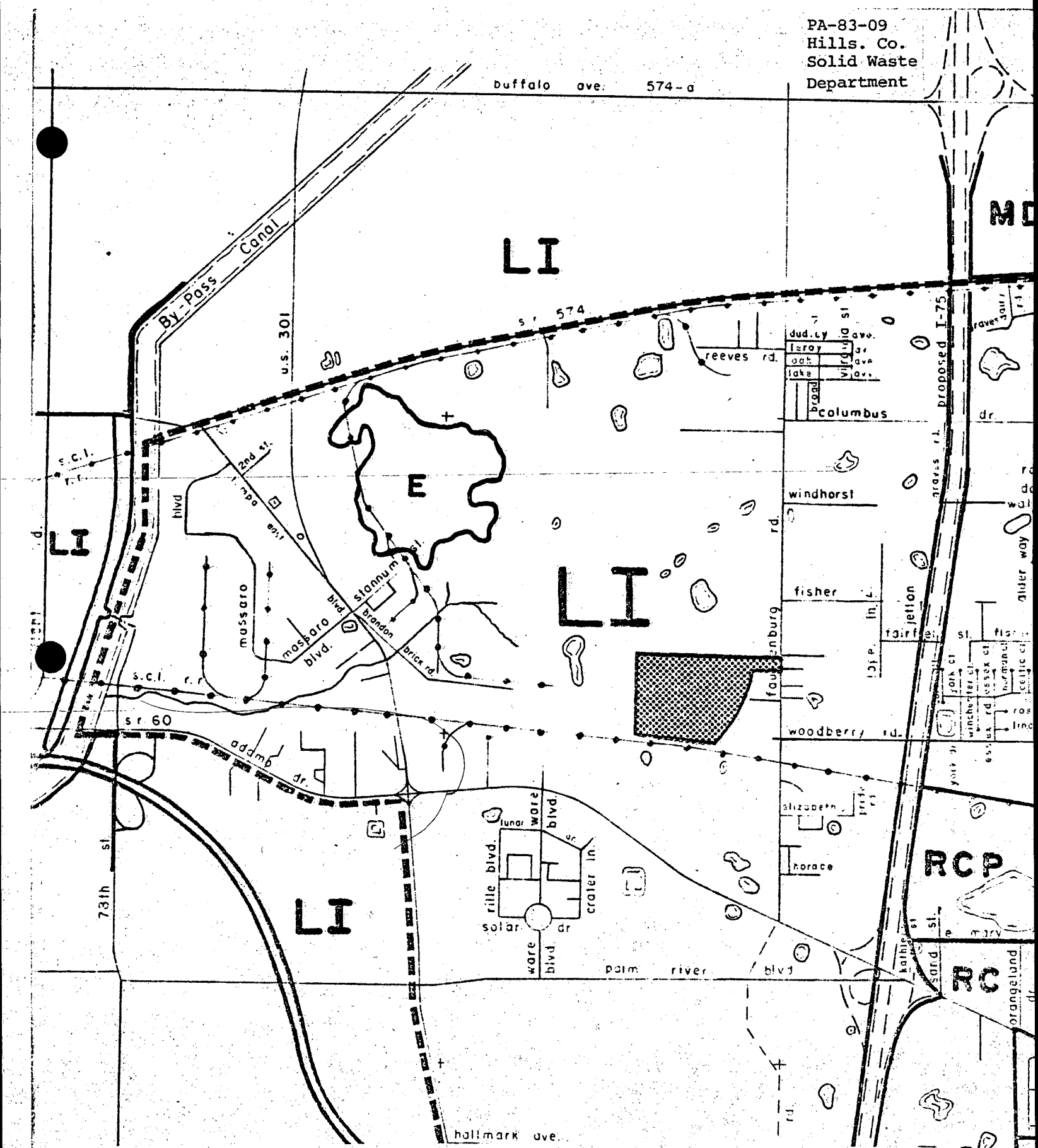
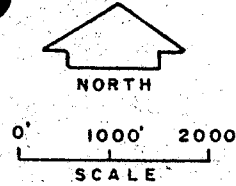
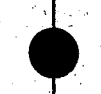


FIG. 1



- | | | |
|--------------------------------------|-----------------------------|----------------|
| Ag = Agricultural (0.2*) | CC = Community Commercial | * = DU/GA or |
| RR = Rural Residential (1*) | LI = Light Industrial | Dwelling Units |
| SR = Suburban Residential (2*) | HI = Heavy Industrial | Gross Acre |
| LDR = Low Density Residential (6*) | R = Recreation / Open Space | Amendment Area |
| LMDR = Low-Medium Density Res. (12*) | P = Public / Semi-Public | |
| MDR = Medium Density Res. (20*) | E = Envir. Sensitive | |

VI 17



0' 1000' 2000'

SCALE

 = AMENDMENT AREA

EXISTING ZONING MA

APPENDIX 10.3.2

JUNE 27, 1983 HCCCPC RESOLUTION ADOPTING
THE RECOMMENDATION FOR
THE LAND USE PLAN AMENDMENT

WESTERN UNION BLDG.
P.O. BOX 1110
TAMPA, FL 33601
TEL. (813) 272-5940

HCCPC

HILLSBOROUGH COUNTY CITY-COUNTY PLANNING COMMISSION

RONALD N. SHORT
EXECUTIVE DIRECTOR

WARREN J. WEATHERS
CHAIRMAN

J. L. MICHAL
VICE CHAIRMAN

DR. CHARLES F. "Chip" HINTON
MEMBER AT LARGE

DR. GORDON BRUNHILD
JOE CHILLURA, JR.
RANDOLPH GONZALEZ
JACK RODRIGUEZ
GARY SCARBORO
IRENE SILVER
WILBERT WILLIAMS

July 6, 1983

Warren N. Smith, Director
Department of Solid Waste
Hillsborough County
P. O. Box 1110
Tampa, Florida 33601

Dear Mr. Smith:

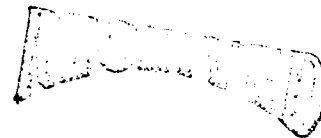
Enclosed please find the resolution concerning your request for a plan amendment which was adopted by the Planning Commission at its June 27, 1983 meeting. The Board of County Commissioners has tentatively agreed to take up your request at its August 23, 1983 meeting. This office will notify you of any possible rescheduling on additional meetings required.

Sincerely,

Robert E. Lewinski
Robert E. Lewinski
Community Planner II

REL:sm

Enclosure



JUL 7 1983

DEPARTMENT OF SOLID WASTE

6		HILLSBOROUGH COUNTY CITY-COUNTY PLANNING COMMISSION		HCCPC File No	
Zoning Subdivision Amendment to Zoning Ordinance X Other <u>Plan Amendment</u>		MEETING DATE <u>June 27, 1983</u>		Agency File No PA-83-09 RL sm G	
Members		Aye	Nay	Absent	
Dr. Brunhild	x			<i>Warren J. Weathers</i> Warren J. Weathers, Chairman <i>James P. Foster for</i> <i>Ronald N. Short</i>	
Mr. Chillura	x				
Dr. Gonzalez	x				
Dr. Hinton	x				
Mr. Michal	x				
Mr. Rodriguez	x				
Mr. Scarboro	x				
Ms. Silver			x		
Mr. Weathers	x				
Mr. Williams			x		
Ronald N. Short, Executive Director					
On motion of <u>Dr. Brunhild</u>		Seconded by <u>Dr. Gonzalez</u>			

The following resolution was adopted:

WHEREAS, The Hillsborough County City-County Planning Commission has developed an amended Land Use Element for unincorporated Hillsborough County which was adopted by the Board of County Commissioners and became effective October 27, 1982, as part of the Comprehensive Plan entitled Horizon 2000 Plan; and

WHEREAS, The Hillsborough County City-County Planning Commission has received a request to consider amendment of the Horizon 2000 Plan Land Use Plan Map in the Brandon Planning Area, in the vicinity of Faulkenburg Road and State Road 60; and

WHEREAS, The Hillsborough County City-County Planning Commission has reviewed the proposal and finds that the proposed change to Public/Semi-Public is consistent with community facilities, transportation, and development of the area; and

WHEREAS, The Hillsborough County City-County Planning Commission finds that the proposed public facilities to be located

PA-83-09

on the site are compatible with the current Light Industrial designation without a Plan Amendment; and

WHEREAS, The Public/Semi-Public designation may be used to show the location of future major public facilities; and

WHEREAS, The Hillsborough County Board of County Commissioners has requested such a designation be shown on the Land Use Plan Map; and

WHEREAS, The Hillsborough County City-County Planning Commission finds this request to be in conformance with the Goals, Objectives, and Policies of the Comprehensive Plan.

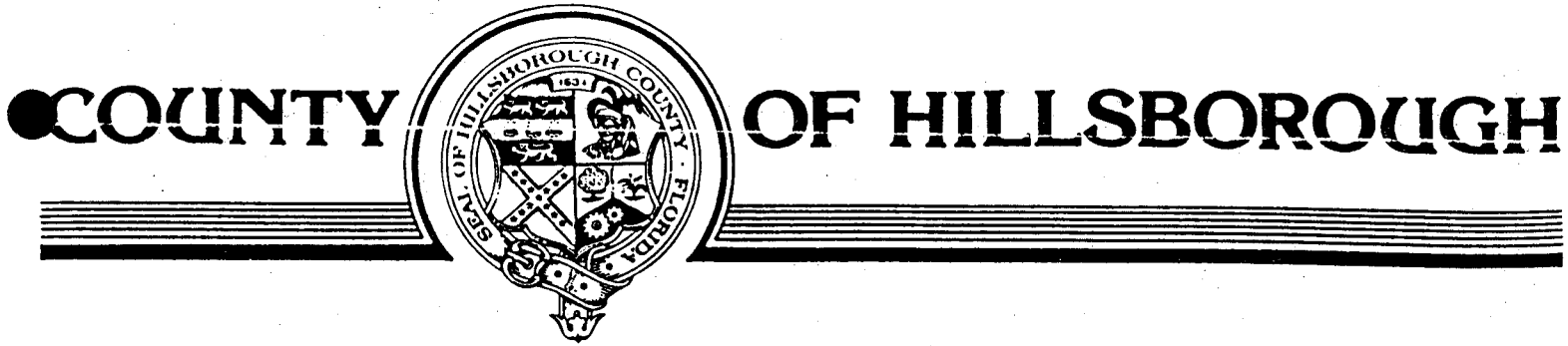
NOW, THEREFORE, BE IT RESOLVED, That the Hillsborough County City-County Planning Commission recommends that the Land Use Plan Map be amended to Public/Semi-Public for the property with the following legal description:

PA-83-09

Commence at the Southeast corner of Section 18, Township 29 South, Range 20 East, Hillsborough County, Florida; thence North $00^{\circ}08'40''$ East, along the East boundary of said Section 18, a distance of 1130.12 feet; thence North $89^{\circ}51'20''$ West, a distance of 30 feet to a point on the West Right of Way line of Faulkenburg Road, said point being the Point of Beginning. Continue thence North $89^{\circ}51'20''$ West a distance of 680.0 feet; thence South $00^{\circ}08'40''$ West, a distance of 288.00 feet to the beginning of a curve concave to the Northwest, having a radius of 905.37 feet; thence Southwesterly along said curve, running from said Section 18 into Section 19, Township 29 South, Range 20 East, a distance of 1288.96 feet, (chord bearing South $40^{\circ}55'47''$ West, 1182.83 feet) to a point on a curve concave to the South, having a radius of 11,560.00 feet, said point being on the Northerly Right of Way line of the Seaboard Coastline Railroad; thence Northwesterly along said curve, (the same being said Northerly Right of Way line of the Seaboard Coastline Railroad), a distance of 538.74 feet, (chord bearing North $84^{\circ}41'15''$ West, 538.69 feet) to the end of said curve; thence North $84^{\circ}12'39''$ West, along said Northerly Right of Way line, a distance of 18.08 feet to a point on the North boundary of said Section 19, (South boundary of said Section 18); thence North $89^{\circ}25'05''$ West, along said South boundary of Section 18 and Northerly Right of Way line, a distance of 403.54 feet to a point being South $89^{\circ}25'05''$ East 205.01 feet from the Southwest corner of the Southwest 1/4 of the Southeast 1/4 of said Section 18; thence North $00^{\circ}00'40''$ West, along a line 205.00 feet East of and parallel with the West boundary of the Southeast 1/4 of said Section 18, a distance of 1336.49 feet; thence South $89^{\circ}51'20''$ East a distance of 2412.30 feet to a point on the West Right of Way line of Faulkenburg Road, said point lying 30 feet West of the East boundary of the Southeast 1/4 of said Section 18; thence South $00^{\circ}08'40''$ West, along a line 30 feet West of and parallel with said East boundary of the Southeast 1/4 of Section 18, a distance of 225.00 feet to the Point of Beginning.

APPENDIX 10.3.3

FEBRUARY 2, 1984 MEMO CONCERNING ONSITE
RELOCATION OF THE RESOURCE
RECOVERY FACILITY AND WWTP



MEMORANDUM

Date: February 2, 1984

TO: Joe Bell, Principal Planner, Hills. Co. City/Co. P.C.

FROM: *WNS* Warren N. Smith, Director, Dept. of Solid Waste

SUBJECT: Relocation of the Resource Recovery Facility
and Proposed Sewage Treatment Plant - Impact on
Land Use Plan Amendment

On Wednesday, February 1, 1984, during their regular session, the Board of County Commissioners authorized the purchase of 356 acres on Faulkenburg Road from Seaboard System Railroad as stipulated in the attached Purchase-Sale Agreement.

One of the terms of the Agreement is to locate the main structure of the resource recovery facility as close as possible to the north line of the initial 50 acre site, but no less than 800 feet north of the railroad right-of-way line which is the south boundary of the property. The access road off of Faulkenburg Road will remain the same.

Additionally, due to the relocation of the resource recovery facility within the 50 acres, the proposed wastewater treatment plant may have to be moved off of the original 50 acres and relocated within the remaining acreage north of the resource recovery facility.

Concerning the Planning Commission's Resolution dated June 27, 1983, for the 50 acre Land Use Plan Amendment, will either of the above-stated site plan alternations, either together or individually, affect the existing approved resolution? Also, will a separate Land Use Plan Amendment be required for the sewage treatment facility if it is located off of the original 50 acre tract of land? A site plan revision will be submitted to the Department of Development Coordination prior to the rezoning hearing. A copy of the

Joe Bell
Page Two
2/2/84

revision will also be sent to the Planning Commission for their review.

Please respond, in writing, to the points raised concerning the Plan Amendment so that we may proceed as quickly as possible toward receiving the necessary approvals.

WNS/pd
Attachment

cc: Ed Copeland, Asst. Co. Admin., Public Works
Rick Davis, Asst. County Attorney
Elliott Dunn, Asst. County Attorney
Gary Englehardt, Zoning Administrator
Bruce Kennedy, Director, Water/Wastewater Util.

PURCHASE-SALE AGREEMENT

THIS AGREEMENT, Made and entered into this 1st day of February, 1984, by and between SEABOARD SYSTEM RAILROAD, INC., a Virginia corporation, hereinafter called "GRANTOR"; and HILLSBOROUGH COUNTY, a political subdivision of the State of Florida, whose mailing address is Post Office Box 1110, Tampa, Florida, 33601, hereinafter called "GRANTEE".

WITNESSETH: That, for and in consideration of One Hundred Thousand Dollars (\$100,000.00) earnest money paid to Grantor, receipt of which is hereby acknowledged, and of the premises and subject to the terms and conditions hereinafter set forth, Grantor hereby contracts to sell to Grantee and Grantee hereby contracts to purchase from Grantor the land shown described in Exhibit "A", and as shown in yellow on Exhibit "B", both attached hereto and made a part hereof, which land is located in Tampa, Hillsborough County, Florida.

The terms and conditions of this sale and purchase are as follows:

1. The agreed price for said premises is Thirty Thousand Seven Hundred Fifty Dollars (\$30,750.00) per acre, making an approximate sale price of \$10,947,000.00 with exact price to be determined by registered survey.

2. Grantor, at the closing, shall execute and deliver a warranty fee simple deed to Grantee conveying good and marketable or insurable title to the property, subject to the usual exceptions contained in title insurance binders (such as exceptions for survey, current taxes, zoning ordinances, covenants, restrictions and easements of record or apparent from an inspection of the premises).

3. Consideration shall be paid in full at closing on or before April 30, 1984, less the \$100,000.00 earnest money deposit.

4. The Grantor will provide Grantee with a copy of its abstracts to the property as of the date Grantor purchased the property in 1960. The Grantee will have the abstracts brought up to date and advise Grantor of any title defects within 30 days from date of this agreement. Grantor will promptly cure said defects. If Grantor cannot reasonably do so, then Grantee, at its option, may waive such defects. In the event Grantee refuses to do so, this agreement shall become null and void, and earnest money paid shall be refunded.

5. Survey required for preparation of deed shall be provided at the expense of Grantee.

6. Taxes on the above described land will be prorated as of the date of delivery of said deed of conveyance. Any proration shall be based on the taxes assessed against the Grantor in the year of the delivery or shall allow the maximum discount permitted by law. When applicable, interest, insurance, rents and other expenses or revenues shall be prorated as of date of closing.

7. Any certified governmental assessments or liens for improvements on said property which are due and payable at the time of closing shall be paid by Grantor and any pending liens or assessments for improvements, not yet due and payable at closing, shall be paid by Grantee.

8. Closing costs shall be paid as follows:

(a) Grantor shall pay all excise taxes (such as documentary stamps, surtax or realty transfer tax) on the deed of conveyance.

(b) Grantee shall pay cost of recording deed.

9. This purchase and sale contract may not be assigned without the written consent of the Grantor.

10. The Grantee will locate the main structure for the Resource Recovery Facility as close as possible to the north line of the initial 52-acre site, but no less than 800 feet northwardly from the Grantor's north railroad right-of-way line at the south edge of the property.

11. The Grantor at closing will transfer and assign, in whole or in part to Grantee and Grantee will accept the transfer and assignment of the following contracts, a copy of which are attached as Exhibits C-1, C-2, and C-3:

(C-1) Contract dated September 27, 1974 between L. B. Foster Company and SBD covering 20 acres more or less of land on the west side of Faulkenburg Road. The contract was extended by memorandum agreement dated August 29, 1983 for a term of one year terminating October, 1984. The contract can be cancelled by either party on six months notice after April 30, 1984. Present rental is \$91,476.00 per annum.

(C-2) Contract dated October 25, 1974 between W & A Cattle and Dairy Company covering lease of 437 acres for a rental of \$2,184.00 per annum cancelable on 30 days written notice.

(C-3) Contract dated May 12, 1966 between Brandon Gas Company and SBD covering 1.05 acres adjacent to the north end of property at a rental of \$1,323.00 per year cancelable on 30 days written notice.

12. The Grantor reserves unto itself, its successors and assigns, an easement for the operation and maintenance of the spur track serving Consolidated Bagging Company, Inc., between the north boundary of the described property and north boundary of property owned by the Bagging Company as presently existing on the ground and shown in blue on Exhibit "B".

13. In addition to the conditions in Section 2, the conveyance will be subject to the following items, which are shown in red on Exhibit "B" and a copy of each attached as Exhibit D-1, and D-2 :

(D-1) An easement granted Tampa Electric Company dated April 17, 1974 by SBD at the southwest corner of the property.

(D-2) Easement dated October 22, 1965, whereby Atlantic Coast Line Railroad Company granted Consolidated Bagging Company, Inc., a 60-foot right-of-way for ingress and egress from the west right-of-way line of Faulkenburg Road to the west line of Consolidated Bagging Company's property.

14. This purchase-sale agreement is subject to the approval of Grantor's Chief Executive Officer and CSX Board of Directors on February 8, 1984.

15. This Purchase-Sale Agreement is subject to Grantee obtaining final approval of an amendment to the Horizon 2000 Land Use Element with respect to the initial 52 acre site as well as obtaining final approval of any necessary rezoning of such 52 acre site prior to date of closing. If this sale is not consummated by April 30, 1984, this Agreement is null and void and the Grantor will retain the earnest money as liquidated damages. Should Grantee not consummate the sale, Grantee ^{acknowledges that} ~~agrees to amend~~ the Horizon 2000 Land Use Element ^{should be the same} ~~or-zoning of the 52 acre site to the condition~~ that existed on January 1, 1984. *JK*

This contract embodies the entire agreement and understanding of the parties to the contract and may not be changed, altered or modified except by an instrument in writing signed by the party against whom the enforcement of any change, alteration or modification is sought.

IN WITNESS WHEREOF the parties hereto have caused this agreement to be executed in duplicate the day and year first above written.

Signed, sealed and delivered
in the presence of:

SEABOARD SYSTEM RAILROAD, INC.

William C. Bos

By *J. L. Kiesler*

Assistant Vice President

E. C. C. C. C.

Signed, sealed and delivered
in the presence of:

HILLSBOROUGH COUNTY, FLORIDA

ATTEST:

James F. Taylor, Jr., Clerk
By *J. E. H. Smith*

Deputy Clerk

By *Richard L. ...*

Chairman, Hillsborough County
Board of County Commissioners

APPENDIX 10.3.4

FEBRUARY 9, 1984 MEMO CONCERNING
ONSITE RELOCATION OF THE
RESOURCE RECOVERY FACILITY
AND WWTP

HCCPC

HILLSBOROUGH COUNTY CITY-COUNTY PLANNING COMMISSION

RECEIVED
FEB

RONALD N. SHORT
EXECUTIVE DIRECTOR

MEMORANDUM

TO: Warren Smith, Director, Dept. of Solid Waste
FROM: Joe Bell, Principal Planner *JB*
DATE: February 9, 1984
SUBJECT: Relocation of the Resource Recovery Facility and
Sewage Treatment Plant, and its impact on the
Resource Recovery Plan Amendment Study (PA 83-09)

J. L. MICHAL
CHAIRMAN

IRENE SILVER
VICE CHAIRMAN

JACK RODRIGUEZ
MEMBER AT LARGE

WARREN J. WEATHERS
IMMEDIATE PAST CHAIRMAN

JOE CHILLURA, JR.
BUFORD W. COUNCIL
DR. RANDOLPH GONZALEZ
ELTON L. HINTON
O. E. MELO, PE.
WILBERT WILLIAMS

In your memo of February 2, 1984, you have outlined three changes possible in the siting of the resource recovery/sewage treatment facility. First, the resource recovery unit would be moved north, within the 50 acre site, originally studied. Second, the subregional sewage treatment facility would be moved to another area within the 50 acre site. And third, the subregional sewage treatment facility would be moved beyond the original 50 acre site, but within the larger acreage purchased from Seaboard Coastline Railroad.

Under all three scenarios, the plan amendment study would remain applicable, and would not necessitate restudy or further action by the Planning Commission.

The changes you have noted would not affect the substance of the resource recovery project, nor the impacts studied by the Planning Commission in its report. Further, as noted in the Planning Commission resolution on this study, dated June 27, 1983, the resource recovery project was found to be consistent with the Light Industrial Plan designation, and as such did not require amendment to a Public/Semi-Public designation. The amendment, from Light Industrial to Public-Semi-Public, was initiated by request of the Board of County Commissioners, and simply references a major public or semi-public facility, as do the other public/semi-public designations, under the plan.

Therefore, changes to the site plan, or construction of the subregional wastewater treatment plant, off-site, would have to be found consistent with the Horizon 2000 Plan, Land Use Element, but would not, otherwise require a specific plan amendment study.

As such, it is the conclusion of this office that changes outlined above, would not effect the status of the approved resolution on the Resource Recovery Plan Amendment Study (PA 83-09), nor would it necessitate an additional plan amendment study.

ts

APPENDIX 10.3.5

HILLSBOROUGH COUNTY BOARD OF
COUNTY COMMISSIONERS ORDINANCE #84-5
AMENDING THE LAND USE PLAN MAP
FEBRUARY 27, 1984

ORDINANCE #84-5

RED:2/27/84
Draft #1
FINAL:2/27/84

1 AN ORDINANCE AMENDING SECTION 1 OF HILLSBOROUGH
2 COUNTY ORDINANCE 77-25, AS AMENDED, TO PROVIDE
3 FOR SPECIFIC AMENDMENT OF THE LAND USE ELEMENT
4 OF THE HILLSBOROUGH COUNTY HORIZON 2000 COMPRE-
5 HENSIVE PLAN PURSUANT TO THE PROVISIONS CONTAINED
6 IN CHAPTER 75-390, LAWS OF FLORIDA (1975), AS
7 AMENDED; AMENDING THE LAND USE DESIGNATION FROM
8 LIGHT INDUSTRIAL TO PUBLIC/SEMI-PUBLIC ON A PAR-
9 CEL OF LAND COMPRISING LESS THAN FIVE PERCENT
10 (5%) OF THE LAND AREA OF UNINCORPORATED HILLS-
11 BOROUGH COUNTY; AMENDING THE LAND USE MAP;
12 PROVIDING FOR APPROVAL UPON A FOUR-FIFTHS MAJORITY
13 VOTE OF THE BOARD OF COUNTY COMMISSIONERS;
14 PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN
15 EFFECTIVE DATE.

16 WHEREAS, Section 12 of Chapter 75-390, Laws of Florida (1975),
17 as amended, provides that the governing body may, by a four-fifths
18 majority vote, amend the comprehensive plan (Horizon 2000 Plan) for
19 parcels comprising less than five percent (5%) of the land area of
20 unincorporated Hillsborough County; and,

21 WHEREAS, the Board of County Commissioners has proposed an
22 action which would delineate on the Land Use Map the public/semi-
23 public designation on a defined parcel of land; and,

24 WHEREAS, the purpose of said proposal is to identify on the
25 Land Use Map the proposed site for a resource recovery plant and
26 wastewater treatment facility, which plant and facility are declared
27 to be a public facility as contemplated by the adopted comprehen-
28 sive plan (Horizon 2000 Plan); and,

29 WHEREAS, the scheduled public hearing has been appropriately
30 noticed.

31 NOW THEREFORE BE IT ORDAINED BY THE BOARD OF COUNTY
COMMISSIONERS OF HILLSBOROUGH COUNTY, FLORIDA, IN REGULAR MEETING
ASSEMBLED THIS 27th DAY OF February, 1984:

SECTION 1. The Board of County Commissioners hereby estab-
lishes the following findings of fact:

a. The Board of County Commissioners has proposed an
action which would delineate on the Land Use Map the Public/
Semi-Public designation on a defined parcel of land.

b. The purpose of said proposal is to identify on the
Land Use Map the proposed site for a resource recovery plant
and wastewater treatment facility, which plant and facility
are declared to be a public facility as contemplated by the
adopted Comprehensive Plan (Horizon 2000 Plan).

1 c. The existing land use designation applicable to
2 the described parcel is Light Industrial, which designation
3 specifically permits compatible public facilities such as
4 the proposed resource recovery plant and wastewater treatment
5 facility.

6 d. The Board of County Commissioners received a favora-
7 ble recommendation from the Hillsborough County City-County
8 Planning Commission, which recommendation is attached hereto
9 as Exhibit A and incorporated herein by reference.

10 e. The identification of the described parcel as
11 Public/Semi-Public is intended to identify on the Land Use
12 Plan Map the location of the public facilities.

13 f. The identification of the described parcel as
14 Public/Semi-Public is not required as a threshold action for
15 location of the use but is rather an action designed to pro-
16 vide notice on the Land Use Map of the existence of a public
17 facility.

18 g. Allowing the parcel to remain in the existing
19 designation is not contrary to the public interest, however,
20 the identification of the described parcel as Public/Semi-
21 Public furthers the best interest of the public by virtue
22 of the identification of use. Therefore, the map designation
23 should be changed in the manner signified by the proposed
24 action.

25 h. The change in the Land Use Plan Map designation
26 is consistent with the other portions and features of the
27 Land Use Plan Map, the Goals, Objectives and Policies of the
28 Land Use Element, and the other elements of the adopted
29 Comprehensive Plan (Horizon 2000 Plan).

30 i. The failure or inability to economically recover
31 material and energy resources from solid waste results in the
unnecessary waste and depletion of our natural resources, and,
therefore maximum resource recovery from solid waste is con-
sidered a goal of the Board of County Commissioners, which goal
must be implemented in a timely fashion.

j. The Florida Legislature has, through the passage
of Chapter 403.701 et seq, (Florida Resource Recovery and
Management Act) and Chapter 83-415 Laws of Florida (1983)
(Hillsborough County Solid Waste Disposal and Resource Re-
covery Act of 1983) recognized the societal and environmental
importance of proceeding with the development of resource
recovery systems.

k. The Board of County Commissioners having received
testimony and other evidence finds that the proposed site
for location of a resource recovery plant and wastewater
treatment facility represents a site which is compatible with
the Light Industrial designation contained in the Comprehen-
sive Plan (Horizon 2000 Plan).

l. In terms of practical consequences, the Board of
County Commissioners concludes that the proposed redesignation
constitutes an action which benefits the public.

1 m. Certain provisions contained in the adopted Compre-
2 hensive Plan (Horizon 2000 Plan) constitute legislative
3 determinations that Hillsborough County should develop a re-
source recovery system as an alternative to continued reliance
on the use of land fills as a means of disposal of solid waste.

4 n. The Board of County Commissioners having received
5 testimony and other evidence finds that the proposed resource
6 recovery plant represents state of the art technology and shall
not have an adverse impact on the land uses in the area and
the environment.

7 o. The Board of County Commissioners having received
8 testimony and other evidence finds that the development of
9 the proposed resource recovery plant and wastewater treatment
facility promotes the public health, safety and welfare.

10 p. The public has been extensively involved in the
11 review process relating to the proposed location of the
public facility and has had an opportunity to present testi-
mony and other evidence relating to the issue of compatibility.

12 q. The Florida Public Service Commission has ruled
13 that a need exists, within the meaning of Chapter 403, Florida
Statutes, for the construction of the generating facility
14 proposed by Hillsborough County.

15 r. The Florida Legislature has concluded, pursuant to
16 the terms of Chapter 83-415, Laws of Florida (1983), that the
County will be performing essential and proper governmental
17 functions and fulfilling uniform State policy in providing for
the construction of resource recovery facilities.

18 SECTION 2. The Land Use Map as adopted by Section 1 of
19 Hillsborough County Ordinance 77-25, as amended, (a copy of the
map and ordinance is on file in the Office of the Clerk to the
Board of County Commissioners of Hillsborough County) is hereby
20 amended as follows:

21 The property described by legal description
22 below shall be changed from Light Industrial
to Public/Semi-Public. This amendment and
23 redesignation are intended to affect only the
provisions described and the land legally
24 described below. All other land use designa-
tions and provisions shall remain in full
force and effect.

Commence at the South East corner of Section 18 Township 29 South, Range 20 East, Hillsborough County, Florida; thence North $00^{\circ}08'40''$ East, along the East boundary of said Section 18, a distance of 1130.12 feet; thence North $89^{\circ}51'20''$ West, a distance of 30 feet to a point on the West Right of Way line of Faulkenburg Road, said point being the Point of Beginning. Continue thence North $89^{\circ}51'20''$ West a distance of 680.0 feet; thence South $00^{\circ}08'40''$ West, a distance of 228.00 feet to the beginning of a curve concave to the Northwest, having a radius of 905.37 feet; thence Southwesterly along said curve, running from said Section 18 into Section 19, Township 29 South, Range 20 East, a distance of 1288.96 feet, (chord bearing South $40^{\circ}55'47''$ West, 1182.83 feet) to a point on a curve concave to the South, having a radius of 11,560.00 feet, said point being on the Northerly Right of Way line of the Seaboard Coastline Railroad; thence Northwesterly along said curve, (the same being said Northerly Right of Way line of the Seaboard Coastline Railroad), a distance of 538.74 feet, (chord bearing North $84^{\circ}41'15''$ West, 538.69 feet) to the end of said curve; thence North $84^{\circ}12'39''$ West, along said Northerly Right of Way line, a distance of 18.08 feet to a point on the North boundary of said Section 19, (South boundary of said Section 18); thence North $89^{\circ}25'05''$ West, along said South boundary of Section 18 and Northerly Right of Way line, a distance of 403.54 feet to a point being South $89^{\circ}25'05''$ East 205.01 feet from the Southwest corner of the Southwest 1/4 of the Southeast 1/4 of said Section 18; thence North $00^{\circ}00'40''$ West, along a line 205.00 feet East of and parallel with the West boundary of the Southeast 1/4 of said Section 18, a distance of 1336.49 feet; thence South $89^{\circ}51'20''$ East a distance of 2412.30 feet to a point on the West Right of Way line of Faulkenburg Road, said point lying 30 feet West of the East boundary of the Southeast 1/4 of said Section 18; thence South $00^{\circ}08'40''$ West, along a line 30 feet West of and parallel with said East boundary of the Southeast 1/4 of Section 18, a distance of 225.00 feet to the Point of Beginning.

1 SECTION 3. The Ordinance shall be approved upon a four-fifths
2 vote of the Board of County Commissioners of Hillsborough County.

3 SECTION 4. If any provision of this Ordinance or the Appli-
4 cation thereof to any person or circumstance is held invalid, the
5 invalidity shall not affect other provisions or applications of
6 this Ordinance or the Hillsborough County Horizon 2000 Plan which
7 can be given effect without the invalid provision or application,
8 and to this end the provisions of this Ordinance are declared
9 severable.

10 SECTION 5. Effective Date. This Ordinance shall become
11 effective upon receipt of official acknowledgement from the Secre-
12 tary of State that said Ordinance has been filed.

13 STATE OF FLORIDA)
14)

15 COUNTY OF HILLSBOROUGH)

16 I, JAMES F. TAYLOR, JR., Clerk of the Circuit Court and Ex
17 Officio Clerk of the Board of County Commissioners of Hillsborough
18 County, Florida, do hereby certify that the above and foregoing is
19 a true and correct copy of an ordinance adopted by the Board at
20 its regular meeting of February 27, 1984
21 as the same appears on record in Minute Book 95 of the
22 Public Records of Hillsborough County, Florida.

23 WITNESS my hand and official seal this 29th day of
24 February, 1984.

25 JAMES F. TAYLOR, JR., CLERK

26 By: *James L. Carter*
27 DEPUTY CLERK

28 APPROVED BY COUNTY ATTORNEY

29 BY *[Signature]*

30 Approved As To Form And
31 Legal Sufficiency.

Packet No.	HILLSBOROUGH COUNTY CITY-COUNTY PLANNING COMMISSION			HCCCPC File
Zoning	MEETING DATE June 27, 1983			Agency File PA-83-09
Subdivision				
Amendment to Zoning Ordinance				
Other	Plan Amendment	RL	SM	

Members	Aye	Nay	Absent
Dr. Brunhild	X		
Mr. Chillura	X		
Dr. Gonzalez	X		
Dr. Hinton	X		
Mr. Michal	X		
Mr. Rodriguez	X		
Mr. Scarboro	X		
Ms. Silver			X
Mr. Weathers	X		
Mr. Williams			X

Warren J. Weathers
Warren J. Weathers, Chairman

James P. Foster for Ronald N. Short
Ronald N. Short, Executive Director

Motion of Dr. Brunhild Seconded by Dr. Gonzalez

The following resolution was adopted:

WHEREAS, The Hillsborough County City-County Planning Commission has developed an amended Land Use Element for unincorporated Hillsborough County which was adopted by the Board of County Commissioners and became effective October 27, 1982, as part of the Comprehensive Plan entitled Horizon 2000 Plan; and

WHEREAS, The Hillsborough County City-County Planning Commission has received a request to consider amendment of the Horizon 2000 Plan Land Use Plan Map in the Brandon Planning Area, in the vicinity of Faulkenburg Road and State Road 60; and

WHEREAS, The Hillsborough County City-County Planning Commission has reviewed the proposal and finds that the proposed change to Public/Semi-Public is consistent with community facilities, transportation, and development of the area; and

WHEREAS, The Hillsborough County City-County Planning Commission finds that the proposed public facilities to be located (con

EXHIBIT A

HILLSBOROUGH COUNTY CITY-COUNTY PLANNING COMMISSION

PA-83-09

on the site are compatible with the current Light Industrial designation without a Plan Amendment; and

WHEREAS, The Public/Semi-Public designation may be used to show the location of future major public facilities; and

WHEREAS, The Hillsborough County Board of County Commissioners has requested such a designation be shown on the Land Use Plan Map; and

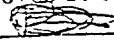
WHEREAS, The Hillsborough County City-County Planning Commission finds this request to be in conformance with the Goals, Objectives, and Policies of the Comprehensive Plan.

NOW, THEREFORE, BE IT RESOLVED, That the Hillsborough County City-County Planning Commission recommends that the Land Use Plan Map be amended to Public/Semi-Public for the property with the following legal description:

(cont.)

Commence at the Southeast corner of Section 18, Township 29 South, Range 20 East, Hillsborough County, Florida; thence North $00^{\circ}08'40''$ East, along the East boundary of said Section 18, a distance of 1130.12 feet; thence North $89^{\circ}51'20''$ West, a distance of 30 feet to a point on the West Right of Way line of Faulkenburg Road, said point being the Point of Beginning. Continue thence North $89^{\circ}51'20''$ West a distance of 680.0 feet; thence South $00^{\circ}08'40''$ West, a distance of 228.00 feet to the beginning of a curve concave to the Northwest having a radius of 905.37 feet; thence Southwesterly along said curve, running from said Section 18 into Section 19, Township 29 South, Range 20 East, a distance of 1288.96 feet, (chord bearing South $40^{\circ}55'47''$ West, 1182.83 feet) to a point on a curve concave to the South, having a radius of 11,560.00 feet, said point being on the Northerly Right of Way line of the Seaboard Coastline Railroad thence Northwesterly along said curve, (the same being said Northerly Right of Way line of the Seaboard Coastline Railroad), a distance of 538.74 feet, (chord bearing North $84^{\circ}41'15''$ West, 538.69 feet) to the end of said curve; thence North $84^{\circ}12'39''$ West, along said Northerly Right of Way line, a distance of 18.08 feet to a point on the North boundary of said Section 19, (South boundary of said Section 18); thence North $89^{\circ}25'05''$ West, along said South boundary of Section 18 and Northerly Right of Way line, a distance of 403.51 feet to a point being South $89^{\circ}25'05''$ East 205.01 feet from the Southwest corner of the Southwest 1/4 of the Southeast 1/4 of said Section 18; thence North $00^{\circ}00'40''$ West, along a line 205.00 feet East of and parallel with the West boundary of the Southeast 1/4 of said Section 18, a distance of 1336.49 feet; thence South $89^{\circ}51'20''$ East a distance of 2412.30 feet to a point on the West Right of Way line of Faulkenburg Road, said point lying 30 feet West of the East boundary of the Southeast 1/4 of said Section 18; thence South $00^{\circ}08'40''$ West, along a line 30 feet West of and parallel with said East boundary of the Southeast 1/4 of Section 18, a distance of 225.00 feet to the Point of Beginning.

APPROVED BY COUNTY ATTORNEY

BY 

Approved As To Form And
Legal Sufficiency.

Appendix 10.4

APPENDIX 10.4

EXISTING STATE PERMITS
OR APPROVALS

APPENDIX 10.4
EXISTING STATE PERMITS
OR APPROVALS

There are no active State construction or operation permits in effect for the site or development of the site for resource recovery.

An affirmative determination of need by the Florida Public Service Commission became effective and final on November 4, 1983 (Order No. 12610), through Florida PSC Consummating Order No. 12678 on November 14, 1983. Copies of Florida Public Service Commission's final report and consummating order are included as Appendix 10.4.1..

The residue from the energy recovery facility and non-processible items such as "white goods " will be transported and disposed of at the Southeast Hillsborough County Landfill. The applicable State permits for the construction and operation of the Class I Landfill are included here as Appendix 10.4.2.

As discussed in Chapter 3 of the Application for Power Plant Site Certification (Volume I), the Northwest Brandon Subregional Wastewater Treatment Plant will be co-located with the energy recovery facility. As currently planned, the application for construction of the wastewater treatment plant will be submitted to the Florida Department of Environmental Regulation in November 1984. As applications for the wastewater treatment plant are completed, copies will be forwarded to the DER Power Plant Siting Group for inclusion in Section 10.4.3 of this appendix.

APPENDIX 10.4.1

MATERIAL RELATED TO PUBLIC SERVICE
COMMISSION'S DETERMINATION OF NEED

HILLSBOROUGH COUNTY'S
PETITION FOR DETERMINATION OF NEED
FOR A SOLID WASTE-FIRED COGENERATION POWER PLANT

BEFORE THE STATE OF FLORIDA PUBLIC SERVICE COMMISSION

In Re:)
Hillsborough County, Florida)
Petitioner)
_____)

Docket No. 830419-EU

PETITION FOR DETERMINATION OF NEED FOR A
SOLID WASTE-FIRED COGENERATION POWER PLANT

PETITIONER, HILLSBOROUGH COUNTY, FLORIDA, pursuant to the provisions of Section 403.519, Florida Statutes, and Section 25-22.80, Florida Administrative Code, requests a determination of need for a solid waste-fired cogeneration power plant, and in support of the request states as follows:

1. The name and address of Petitioner is Hillsborough County, Department of Solid Waste, Post Office Box 1110, Tampa, Florida 33601. The name and address of the attorney representing Hillsborough County is Wilton R. Miller, 700 Barnett Bank Building, Tallahassee, Florida 32301.

2. Hillsborough County proposes to construct and operate a solid waste-fired electrical generating facility using 1,200 tons of municipal solid waste per day as its primary source. In anticipation of expected needs Hillsborough County seeks certification for ultimate site electrical generating capacity of 39-megawatts (gross), using 1,600 tons per day of municipal solid waste as fuel. The County plans to use both private and public solid waste haulers to deliver solid waste to the facility.

3. Hillsborough County has filed with the Florida Department of Environmental Regulation (DER) a "Notice of Intent to File a Site Certification Application" pursuant to Section 403.5063, Florida Statutes, a copy of which is attached hereto and incorporated by reference.

4. The power generated by the proposed plant will be used to operate and drive a single 39-megawatt (gross) generator which will produce electricity that will be sold to Tampa Electric Company.

5. The projected in-service date for the unit is July, 1987 with construction scheduled to begin in the summer of 1984.

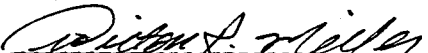
6. The incinerator/boiler and the generator will be constructed on site near Tampa in Hillsborough County, Florida. The projected capital costs for the project are approximately \$110 million.

WHEREFORE, Hillsborough County, Florida respectfully requests that the Public Service Commission:

1. Expeditiously review this petition and exhibits;
2. Enter and order, which will constitute the report of the Public Service Commission required by Section 403.507(1)(b), Florida Statutes, finding that there is a need for the proposed Hillsborough County 39-megawatt (gross) solid waste-fired cogeneration power plant; and
3. Grant such other relief as may be appropriate.

Dated this 30th day of August, 1983.

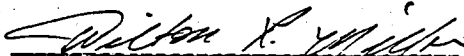
Respectfully submitted,


Wilton R. Miller
BRYANT, MILLER AND OLIVE, P.A.
700 Barnett Bank Building
Tallahassee, Florida 32301
(904) 222-8611

Michael Kavouklis
Hillsborough County Attorney
925 East Twigg Street
Tampa, Florida 33602
(813) 272-5670

Attorneys for HILLSBOROUGH
COUNTY, FLORIDA

I certify that a copy of the foregoing was hand delivered to William S. Bilenky, General Counsel, Public Service Commission, Fletcher Building, 101 East Gaines Street, Tallahassee, Florida 32301, this 30th day of August, 1983.


Wilton R. Miller

Copies furnished to:

Hamilton S. Oven, Jr., P.E., Esquire
Department of Environmental Regulation
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32301

C. Laurence Keesey, Esquire
Department of Community Affairs
Room 530, Carlton Building
Tallahassee, Florida 32301

William W. Deane, Esquire
Department of Environmental Regulation
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32301

Bonnie E. Davis, Esquire
Legal Department
Public Service Commission
Fletcher Building
101 East Gaines Street
Tallahassee, Florida 32301

Jim Hoffsis
Electric and Gas Department
Public Service Commission
Fletcher Building
101 East Gaines Street
Tallahassee, Florida 32301

PUBLIC SERVICE COMMISSION'S FINAL REPORT

State of Florida

Commissioners:

JOSEPH P. CRESSE
GERALD L. (JERRY) GUNTER, Chairman
SUSAN WAGNER LEISNER
JOHN R. MARKS, III
KATIE NICHOLS



Executive Director
DAVID L. SWAFFORD
(904) 488-7181

Public Service Commission

November 7, 1983

Mr. Hamilton S. Oven, Jr., P.E.
Administrator, Power Plant Siting
Department of Environmental Regulation
Twin Towers Office Building
2600 Blainstone Road
Tallahassee, Florida 32301

Dear Mr. Oven:

The attached orders constitute the Commission's final reports, as required by Section 403.507(1)(b) of the Power Plant Siting Act, on the applications of Pinellas and Hillsborough Counties for power plant certification.

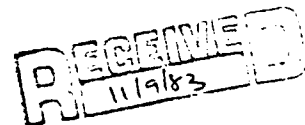
As the orders indicate, the matter was handled in the form of a Proposed Agency Action. No person requested a hearing within the required time; therefore, the Commission's finding that a need exists for the proposed plants has become final.

Sincerely yours,


DAVID L. SWAFFORD
Executive Director

DLS/cd

CC: Commissioners
Electric & Gas Department
Legal Department
Department of Community Affairs
Hillsborough County
Pinellas County



BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition by Hillsborough County) DOCKET 830419-FU
for determination of need for a solid) ORDER NO. 12610
waste-fired cogeneration power plant.) ISSUED: 10-14-83
)

The following Commissioners participated in the disposition of this matter:

GERALD L. GUNTER, Chairman
JOSEPH P. CRESSE
JOHN R. MARKS, III
KATIE NICHOLS
SUSAN W. LEISNER

NOTICE OF PROPOSED AGENCY ACTION

ORDER

BY THE COMMISSION:

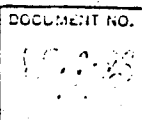
Under the Florida Electrical Power Plant Siting Act, Section 403.501, Florida Statutes, the Commission is charged with the responsibility of determining whether construction of a proposed electrical generation facility is necessary to meet the present or expected need for electricity in all or part of Florida. Under the Act, the Department of Environmental Regulation must determine whether the proposed plant will comply with all relevant environmental standards and whether the proposed site for the plant is suitable for that use. Weighing all of these determinations, the Governor and Cabinet, sitting as the Power Plant Siting Board, ultimately determine whether approval will be granted for construction of the proposed plant.

Certification under the Act must be obtained for the construction of any generating facility greater than 50 MW, and may be obtained for a smaller facility. Hillsborough County has elected to seek certification of its proposed 39 MW small power production facility, by a petition filed on August 30, 1983.

Hillsborough County proposes to construct and operate a solid waste-fired electrical generating facility using 1,200 tons of municipal solid waste per day as its primary fuel source. In anticipation of its expected needs, Hillsborough County seeks certification for an ultimate site electrical generating capacity of 39 megawatts (gross), using 1,600 tons per day of municipal solid waste fuel. This is a small power production facility within the meaning of PURPA and Rules 25-17.80 through 25-17.87, Fla. Admin. Code.

The proposed plant will ultimately produce 39-megawatts of power which will be sold to Tampa Electric Company. The projected in-service date for the unit is July, 1987, with construction scheduled to begin in the summer of 1984. In its first year of production, the plant will make available for sale to Tampa Electric, about 13 MW on an annual average basis. Generation will continue to increase as the supply of fuel increases and the ultimate capacity available for sale to Tampa Electric will reach about 30 MW on an annual average basis in the late 1990's.

While the Power Plant Siting Act requires the Commission to determine whether a need exists for the proposed generating facility, the purpose of the Commission's need determination is to protect electric utility ratepayers from unnecessary expenditures. The statute lists four criteria the Commission must consider in determining need:



- 1) the need for electrical system reliability and integrity;
- 2) the need for adequate electricity at a reasonable cost;
- 3) whether the proposed plant is the most cost effective alternative available; and
- 4) conservation measures taken or reasonably available that might mitigate the need for new plant (Sec. 403.519, F.S.)

Congress and the Florida Legislature have determined that cogeneration and small power production should be encouraged on the premise that they constitute alternate sources of power that either displace production of fossil fuel electricity or use fossil fuels more efficiently. Moreover, the proliferation of cogeneration and small power production facilities may obviate the need for construction of additional generating facilities by electric utilities. Therefore, in the present context, we find that the County's proposed small power production facility will increase electrical system reliability and integrity and will maintain the supply of adequate electricity at a reasonable cost while reducing our dependence on fossil fuel. When viewed as an alternative to construction of additional generating facilities by electric utilities, and considering the permissible level of payments to small power producers outlined in Rules 25-17.80 through 25-17.87, Florida Administrative Code, the proposed facility is the most cost effective alternative available. Finally, construction of the plant is a conservation measure which we have encouraged precisely because it may mitigate the need for additional construction by electric utilities. Therefore, the relief sought in this petition, an affirmative determination of need, will be and the same is hereby granted. It is, therefore,

ORDERED by the Florida Public Service Commission that this Order constitute the final report required by Section 403.507(1)(b), Florida Statutes, the report concluding that a need exists, within the meaning of Chapter 403, Florida Statutes, for the construction of the 39 MW generating facility proposed by Hillsborough County, Florida. It is further

ORDERED that a copy of this Order be furnished to the Department of Environmental Regulation, as required by Section 403.507(1)(b), Florida Statutes. It is further

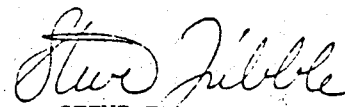
ORDERED that any person adversely affected by the action proposed herein may file a petition for a formal proceeding, as provided in Rule 25-22.29, within 21 days of the date of this order, November 4, 1983, in the form provided by Rule 25-22.36(7)(a) and (f). It is further

ORDERED that in the absence of such a petition, this Order shall become effective and final as provided by Rule 25-22.29(6), as stated in a subsequent order.

By Order of the Florida Public Service Commission, this
14th day of OCTOBER 1983.

(S E A L)

BED


STEVE TRIBBLE
COMMISSION CLERK

PUBLIC SERVICE COMMISSION'S CONSUMMATING ORDER

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition of Hillsborough County) DOCKET NO. 830419-EU
for determination of need for a solid) ORDER NO. 12678
waste-fired cogeneration power plant.) ISSUED: 11-14-83

CONSUMMATING ORDER

BY THE COMMISSION:

By Order No. 12610, this Commission proposed to take certain action, subject to a Petition for Formal Proceeding as provided in Rule 25-22.29, Florida Administrative Code. No response has been filed to the order and it has become effective. It is, therefore,

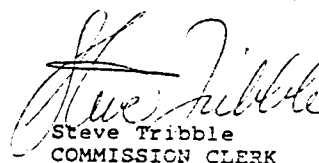
ORDERED by the Florida Public Service Commission that this Order constitute the final report required by Section 403.507(1)(b), Florida Statutes, the report concluding that a need exists, within the meaning of Section 403, Florida Statutes, for the construction of the 39 MW generating facility proposed by Hillsborough County, Florida. It is further

ORDERED that a copy of this Order be furnished to the Department of Environmental Regulation, as required by Section 403.507(1)(b), Florida Statutes. It is further

ORDERED that Order No. 12610 be and the same is hereby determined to be effective and final on November 4, 1983, as provided in Rule 25-22.29(6), Florida Administrative Code. It is further

ORDERED that this docket be closed.

By ORDER of the Florida Public Service Commission, this day 14th of November, 1983.


Steve Tribble
COMMISSION CLERK

(S E A L)

BED

DOCUMENT NUMBER-DATE

09537 NOV 14 1983

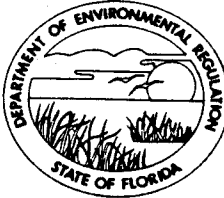
FPSC COMMISSION CLERK


RECEIVED
11/15/83

APPENDIX 10.4.2

PERMITS FOR CONSTRUCTION AND OPERATION OF
THE SOUTHEAST COUNTY CLASS I SANITARY LANDFILL

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION



SOUTHWEST DISTRICT

7601 HIGHWAY 301 NORTH
TAMPA, FLORIDA 33610-9544

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

Richard D. Garrity
DISTRICT MANAGER

February 22, 1984

Mr. Warren N. Smith, Director
Department of Solid Waste
Hillsborough County
Post Office Box 1110
Tampa, Florida 33601

Warren
Dear Mr. Smith:

Southeast Hillsborough County Landfill

Enclosed is Permit Number SC29-66321 dated Feb. 22, 1984, to construct the subject pollution source, issued pursuant to Section 403.061(14), Florida Statutes.

Should you object to this permit, including any and all of the conditions contained therein, you may file an appropriate petition for administrative hearing. This petition must be filed within fourteen (14) days of the receipt of this letter. Further, the petition must conform to the requirements of Florida Administrative Code Rule 28-5.201, (copy enclosed). The petition must be filed with the Office of General Counsel, Department of Environmental Regulation, Twin Towers Office Building, 2600 Blair Stone Road, Tallahassee, Florida 32301.

If no petition is filed within the prescribed time, you will be deemed to have accepted this permit and waived your right to request an administrative hearing on this matter.

Acceptance of the permit constitutes notice and agreement that the department may periodically review this permit for compliance, including site inspections where applicable, and may initiate enforcement action for violation of the conditions and requirements thereof.

Sincerely,

Richard D. Garrity
Richard D Garrity, Ph. D.
District Manager

Enclosures

cc: Roger Stewart
David Slonena
John Reese
Louis R. Tortora, Jr. P.E.
Thomas W. Reese

DER Form 17-1.201(7)

RULES OF THE ADMINISTRATION COMMISSION
MODEL RULES OF PROCEDURE
CHAPTER 28-5
DECISIONS DETERMINING SUBSTANTIAL INTERESTS

PART II
FORMAL PROCEEDINGS

28-5.201 Initiation of Formal Proceedings.

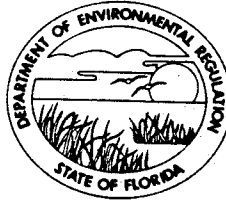
- (1) Initiation of formal proceedings shall be made by petition to the agency responsible for rendering final agency action. The term petition as used herein includes any application or other document which expresses a request for formal proceedings. Each petition should be printed, typewritten or otherwise duplicated in legible form on white paper of standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double-spaced and indented.
- (2) All petitions filed under these rules should contain:
 - (a) The name and address of each agency affected and each agency's file or identification number, if known;
 - (b) The name and address of the petitioner or petitioners, and an explanation of how his/her substantial interests will be affected by the agency determination;
 - (c) A statement of when and how petitioner received notice of the agency decision or intent to render a decision;
 - (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
 - (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief;
 - (f) A demand for relief to which the petitioner deems himself entitled; and
 - (g) Other information which the petitioner contends is material.

A petition may be denied if the petitioner does not state adequately a material factual allegation, such as a substantial interest in the agency determination, or if the petition is untimely. (Section 28-5.201 (3) (a), FAC).

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHWEST DISTRICT

7601 HIGHWAY 301 NORTH
TAMPA, FLORIDA 33610-9544



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

Richard D. Garrity
DISTRICT MANAGER

PERMITTEE:

Mr. Warren N. Smith, Director
Department of Solid Waste
Hillsborough County
Post Office Box 1110
Tampa, Florida 33601

PERMIT/CERTIFICATION

Permit No.: SC29-66321
Date of Issue: 2/22/84
Expiration Date: 2/15/89
County: Hillsborough
Project: Southeast
Hillsborough County Landfill

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 17-3, 17-4 and 17-6. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with department and made a part hereof and specifically described as follows:

Construct and operate a Class I Landfill of approximately 175 acres in a site of approximately 1,100 acres in Southeast Hillsborough County.

Location: 3.2 miles west of CR 39, North of CR 672
Latitude: 27°46'25"
Longitude: 82°11'15"

PERMITTEE:

Mr. Warren N. Smith, Director Permit No.: SC29-66321
Southeast Hillsborough County Landfill

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the department will review this permit periodically and may initiate the enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the department.
3. As provided in Subsections 403.087(6) and 403.712(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor infringement of federal, state or local laws or regulations. This permit does not constitute a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in the permit.
4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.
5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefore caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and department rules, unless specifically authorized by any order from the department.

DER Form 17-1.201(5) Page 2 of 6.

PERMITTEE:

Mr. Warren N. Smith, Director Permit No.: SC29-66321
Southeast Hillsborough County Landfill

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized department personnel, upon presentation of credentials or other documents as maybe required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purposes of;

a. Having access to and copying any records that must be kept under the conditions of the permit;

b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the department with the following information:

(a) a description of and cause of non-compliance; and

(b) the period of non-compliance, including exact dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the department for penalties or revocation of this permit.

PERMITTEE:

Mr. Warren N. Smith, Director Permit No.: SC29-66321
Southeast Hillsborough County Landfill

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the department, may be used by the department as evidence in any enforcement case arising under the Florida Statutes or department rules, except where such use is proscribed by Section 403.73 and 403.111, Florida Statutes.
10. The permittee agrees to comply with changes in department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or department rules.
11. This permit is transferable only upon department approval in accordance with Florida Administrative Code Rules 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the department.
12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.
13. This permit also constitutes:
 - () Determination of Best Available Control Technology (BACT)
 - () Determination of Prevention of Significant Deterioration (PSD)
 - () Certification of Compliance with State Water Quality Standards (Section 401. PL 92-500)
 - () Compliance with New Source Performance Standards
14. The permittee shall comply with the following monitoring and record keeping requirements:
 - a. Upon request, the permittee shall furnish all records and plans required under department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the department, during the course of any unresolved enforcement action.

PERMITTEE:

Mr. Warren N. Smith, Director Permit No.: SC29-66321
Southeast Hillsborough County Landfill

14. (con't)

b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the date(s) analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the department, such facts or information shall be submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. This site will be classified as a Class I landfill and shall be operated in accordance with all applicable requirements of Chapter 17-7, Florida Administrative Code.
2. Any surface waters discharged from this site shall meet the water quality standards of Chapter 17-3 and 17-4, Florida Administrative Code.
3. The operating authority shall be responsible for the control of odors and fugitive particulates arising from this operation. Such control shall prevent the creation of nuisance conditions on adjoining property.

PERMITTEE:

Mr. Warren N. Smith

Permit No.: SC29-66321

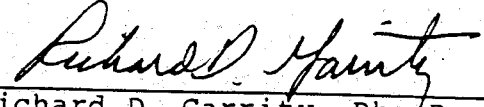
Southeast Hillsborough County Landfill

SPECIFIC CONDITIONS (CON'T)

4. All solid wastes shall be properly compacted and covered with a minimum of six (6) inches of compacted earth or other suitable material as approved by the Department, at the end of each working day.
5. Within 30 days after issuance of the permit, the Department may establish groundwater and surface water monitoring requirements. Otherwise, proposed monitoring as submitted in permit application documents will be required.
6. The operating authority shall institute and maintain a program which prohibits the disposal of bulk industrial wastes which operating personnel reasonably believe to either be or contain hazardous waste, without first obtaining a chemical analysis of the material showing the waste to be non-hazardous. The chemical analysis of any such material so placed in the landfill, along with the customers name and date of disposal, shall be kept on file by the operating authority on-site.
7. Solid waste shall be disposed of only in areas that have adequate bottom/sidewall liners, as proposed in the permit application.
8. The Engineer of Record shall make periodic inspections to insure that design integrity is maintained. Any deviation shall be reported in writing to the Southwest District Office and the Hillsborough County Environmental Protection Commission within five (5) days.
9. Hillsborough County will have a qualified employee on the site daily to ensure that the landfill and stormwater drainage system is being consistently operated properly.

Issued this 22 day of February
1988.

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION


Richard D. Garrity, Ph. D.
District Manager

EXPIRATION DATE: February 15, 1989

cc: Roger Stewart
David Slonena
John Reese
Louis R. Tortora, Jr., P.E.
Thomas W. Reese
DER Form 17-1.201(5) Page 6 of 6

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 SUNCOM 684-0111



• BRUCE A. SAMSON, Chairman, Tampa • Wm. O. STUBBS, JR., Vice Chairman, Dade City •
• JAMES H. KIMBROUGH, Secretary, Brooksville • RONALD B. CAMBERT, Treasurer, Wauchula •
• DONALD R. CHANE, JR., Assistant Secretary, St. Petersburg • MARY A. KUMPE, Assistant Treasurer, Sarasota •
• WALTER H. HARKALA, Plant City • JACK STRAUGHN, Winter Haven • MICHAEL J. AGORAC, JR., Belleair •
• GARY W. KUHL, Executive Director • STEPHEN A. WALKER, General Counsel • JAMES M. HARVEY, Deputy Executive Director



December 9, 1983

DEC 12 1983

Mr. Warren N. Smith
Hillsborough County, Dept. of Solid Wastes
800 Twiggs Street, 3rd Floor, Edgecomb Public Serv.
Tampa, Florida 33601

DEPARTMENT OF SOLID WASTE

Re: Application for Permit No. 100330 - Southeast County Sanitary Landfill

Dear Mr. Smith:

The above referenced Application for Permit was approved by the Board of Governors of the District on December 7, 1983.

A Permit may be required from the Department of Environmental Regulation (7601 U.S. Highway 301 North, Tampa, FL 33610) and it would be your responsibility to obtain it.

The Application for Permit, when signed by the Surface Permits Coordinator, Resource Regulation Department, constitutes your approved Permit.

Sincerely,

OLIVER R. DEWITT
Surface Permits Coordinator
Resource Regulation Dept.

ORD:aa

Enclosure: Approved Permit
Completion Report

cc: J.E. Curren

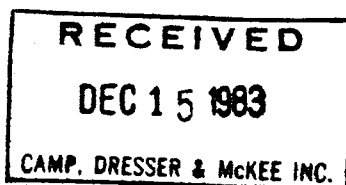


Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.

NO CARBON REQUIRED

APPLICATION FOR PERMIT

Number 100330

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
5060 US Highway 41 South
Brooksville, Florida 33512

1. Description of construction or use: five (5) detention basins and associated facilities to collect, store, and treat the runoff from the first inch of rainfall from a 25-year storm for water that will enter State waters from a new sanitary landfill.
2. Location: See Section II of Permit Application
County Hillsborough Section: 13, 14, 15 Township: 31S Range: 21E
See Sections III and IV of Permit Application
Block: _____ Lot: _____ Subdivision: _____
3. Body of water involved: unnamed tributary to Long Flat Creek
4. Name of applicant: Hillsborough County Mr. Warren Smith, Director
Department of Solid Waste Phone: (813) 272-6674
Street or P.O. Box: 800 Twiggs Street, 3rd Floor, Edgecomb Public Service Center
City: Tampa State: Florida Zip: 33601
5. Name of owner if other than applicant: See Section III Phone: _____
Street or P.O. Box: _____
City: _____ State: _____ Zip: _____
If applicant is not the owner, a letter dated and signed by owner authorizing the applicant to act for him/her must accompany this application.
6. Area (acre) proposed to be served: (If application is for drainage or irrigation connection, list the acreages involved.) Basin A-32 acres; Basin B-64 acres; Basin C-96 acres; Basin D-293 acres; Basin E-3 acres.
7. How soon after receipt of the permit will work commence? unknown days. When will work be completed? August, 1983
8. In the event that the requirements or interests of the Southwest Florida Water Management District indicate that the removal alteration or repair of any structure or works installed by the permittee is necessary, or becomes in an unsafe condition, the structure or works must be removed, altered or repaired within 60 days of notice and at no cost to the District. Should the permittee fail or refuse to perform the required action when so notified, the SFWMD may alter, repair or remove the structure or work and the costs incidental thereto must be paid by the permittee.
9. Any erosion or shoaling caused by the permittee's construction or operation of permitted facilities, upon written notice by the District, shall be repaired promptly by the permittee at no cost to the District.
10. This application including sketches, drawing or plans and specifications attached contains a full and complete description of the work proposed or use desired and for which permit is hereby applied. It shall be a part of any permit that may be issued.
11. This application becomes an APPROVED PERMIT upon affixing of signature of Director of Regulatory Division and transmittal to applicant.

Signature of Applicant _____ Date: 12-7-83

12-7-83
O.R. U.W.H.

Signature of Applicant Warren Smith

NOTARY PUBLIC STATE OF FLORIDA
MY COMMISSION EXPIRES 03-28-1983
BEFORE ME ON _____

10-10-83

APPENDIX 10.4.3

PERMITS FOR CONSTRUCTION AND
OPERATION OF THE NORTHWEST BRANDON
SUBREGIONAL WASTEWATER TREATMENT PLANT

MOST RECENT VERSION OF WWTP

PERMIT APPLICATION TO BE INCLUDED HERE

(Hillsborough County will forward copies
of this information to the DER Power
Plant Siting Group as it is prepared)

Appendix 10.5

APPENDIX 10.5

MONITORING PROGRAMS

APPENDIX 10.5

MONITORING PROGRAMS

This appendix describes the data gathering and monitoring procedures used to establish the existing conditions at the proposed Faulkenberg Road site as well as those procedures used to predict the impacts that are expected to result from construction and operation. This appendix is divided into three subsections:

- o Data Gathering Monitoring
- o Construction Monitoring
- o Operational Monitoring

Hillsborough County recognizes that monitoring programs other than those presented herein may be required as conditions to site certification. The construction and operational monitoring discussed in this appendix specifically address monitoring of potential impacts of the energy recovery facility as presented in the application. Performance (compliance) testing is assumed to be required in accordance with Chapter 17-2.700 and 40 CFR 60 and therefore is not included in the discussion that follows.

APPENDIX 10.5.1

DATA GATHERING MONITORING

APPENDIX 10.5.1

DATA GATHERING MONITORING

This section provides specific information or raw data as appropriate, relative to data gathering and monitoring procedures used to establish the existing conditions at the site as presented in Chapter 2 of the application (Volume I).

Archaeological and Historic Sites

Information, correspondence, and data collected for baseline conditions are contained in Appendix 10.8. This information specifically includes:

- o Correspondence with Florida Department of State, Division of Archives, History and Records Management, relative to request for Cultural Resource Assessment Review of Archaeological and Historic Survey,
- o List of entries for Hillsborough County which are included on the National Register of Historic Places provided by the Historic Tampa/Hillsborough County Preservation Board, and
- o Archaeological and Historical Survey of the Faulkenburg Road Site conducted by J. Raymond Williams, et al.

The archaeological and historical survey has been reviewed by the Florida Department of State, Division of Archives, History and Records Management. In a correspondence dated June 21, 1983, to Hillsborough County, the DAHRM noted that "...the proposed project is unlikely to affect any significant archaeological or historic resources, and may proceed without further involvement with this agency." A copy of this correspondence is also included in Appendix 10.8. The material presented in that appendix supplements and expands upon the discussions in Sections 2.2.6, 4.8, and 5.10 in the application.

Surface and Groundwater Related Information

Information, correspondence and data collected in relation to baseline site and vicinity conditions relative to surface and groundwater information are contained in Appendix 10.9. These data include:

- o Well water analysis reports provided by Hillsborough County Department of Health,
- o Well completion reports provided by the Southwest Florida Water Management District,
- o Well construction inventory provided by the Southwest Florida Water Management District,
- o Consumptive Use Permits Inventory provided by the Southwest Florida Water Management District, and
- o Laboratory analyses of surface water samples taken in October 1983.

In addition, Sections 2.3.2, 2.3.3, and 2.3.4 of the application provide additional information relative to baseline groundwater and surface water quality data collection in the vicinity of the site. These are summarized below.

Baseline groundwater quality conditions in the vicinity of the site were established by retrieving water sample analytical results for private wells located in proximity to the site. These data were provided by the Hillsborough County Department of Health and support the discussion in Section 2.3.3 of the application.

In order to characterize the chemical condition of the two streams in the vicinity of the site, a limited sampling program was conducted on October 31, 1983. Grab samples were collected at each of five stations in appropriately washed containers. The sampling station locations are shown on a figure in Section 2.3.4 of the application. Samples for dissolved oxygen

(Winkler technique), ammonia, total kjeldahl nitrogen and total phosphate were preserved as specified in "Methods for Chemical Analysis of Water and Wastes" (EPA-600/4-79-020). All samples were immediately placed on ice for transport to the laboratory. Temperatures and pH were measured according to methods specified in either "Standard Methods for the Examination of Water and Wastewater" (APHA, 1982) or "Methods for Chemical Analysis of Water and Wastes" (EPA 600/4-79-020). Results of these analyses may be found in Appendix 10.9.5. The material presented in that appendix supplements the discussion presented in Section 2.3.4 of the application.

Ecology

A limited biological sampling program to examine benthic invertebrates in the two streams adjacent to the site was conducted on October 31, 1983. At five stations, as described in Section 2.3.6, single 0.0225 m² sediment grabs were taken using a petite ponar dredge. Samples were sieved through a No. 30 mesh screen and immediately placed on ice. Upon return to the laboratory, each sample was sorted and identified. The two taxonomic keys used primarily were:

- o Tennack, R.W., 1953. Freshwater Invertebrates of the United States. Ronald Press Co., NY.
- o U.S. EPA., 1973. An Introduction to the Identification of Chironomid Larvae. Analytical Quality Control Laboratory, Cincinnati, OH.

In addition, further correspondence and information related to ecology is presented in Appendix 10.11. That appendix includes the findings of the Hillsborough County Environmental Protection Commission relative to the occurrence of any jurisdictional wetlands onsite, as well as a comprehensive listing of wetland vegetation indicators as prescribed in Chapter 1-11.03(g) of the Rules of the Hillsborough County Environmental Protection Commission.

Meteorology and Air Quality

The meteorological and ambient air quality data used in the air quality analysis of the PSD (Appendix 10.1.5) is presented in Sections 2.3.7.1, 2.3.7.2 and 2.3.7.3 of the application.

In general, the meteorological data from Tampa International Airport is compared in Section 2.3.7.1 to other available meteorological data. The Tampa data are found to be the most representative of the area in the immediate vicinity of the site. The refined air quality analysis presented in the PSD (Appendix 10.1.5) uses hourly meteorological data from Tampa International Airport for the 5-year period 1970 through 1974.

Sections 2.3.7.2 and 2.3.7.3 of the application present ambient air quality data and the program used to obtain that data. The Hillsborough County EPC (HCEPC) is responsible for monitoring air quality data within the County. HCEPC runs 65 monitoring stations and receives information from other private monitors totaling an air quality network of 83 stations, many of which monitor for more than one pollutant. A complete set of Standard Operating Procedures govern all aspects of the monitoring activities including installation, calibration, collection, and validation. A quality assurance program which governs the network operation is contained in HCEPC's "Air Monitoring Quality Assurance Plan" and published in Environmental Quality. This plan is summarized in Section 2.3.7.3 of the application. Hillsborough County EPC 1983 ambient air quality data were used in conjunction with the air quality analysis presented in the PSD.

Noise

A complete technical analysis of baseline ambient noise conditions was completed for this application and is contained in its entirety in Appendix 10.12. This study includes detailed methodologies which were utilized in order to estimate operational impacts associated with the facility. Appendix 10.12 also includes the correspondence relative to this issue.

Raw data results of 24-hour continuous monitoring performed by the Hillsborough County EPC is presented in Appendix 10.12, as are the results of monitoring completed using a hand-held sound pressure level meter. These measurements were made at predetermined locations that were coordinated with the Florida DER and Hillsborough County EPC.

Transportation

A comprehensive technical analysis of baseline ambient traffic conditions in the vicinity of the site was completed for this application and is contained in its entirety in Appendix 10.13. This transportation analysis includes identification of roadway segments, critical intersections, time and roadway distribution of project traffic, roadway capacity analysis, as well as predicted changes in ADT volumes.

The transportation analysis was prepared by Camp Dresser & McKee with the assistance of Kimley-Horn and Associates, Inc., traffic consultants. A supplemental transportation analysis conducted by Kimley-Horn and Associates responds to specific comments from the Hillsborough County Road Department to the traffic analysis presented in the County's Resource Recovery Facility and Wastewater Treatment Plant Rezoning Application #83-274. The transportation analysis and supplemental analysis are presented in Appendix 10.13. These analyses supplement the information presented in Sections 2.3.9 and 5.9 of the application.

APPENDIX 10.5.2

CONSTRUCTION MONITORING

APPENDIX 10.5.2

CONSTRUCTION MONITORING

Chapter 4 of the application describes the environmental effects of site preparation and construction of the proposed plant and any associated facilities. Because the impact analysis of that chapter concluded generally that impacts from the planned construction of this project are expected to be minimal, no specific construction monitoring programs are proposed at this time, with the possible exception of groundwater monitoring during dewatering initially proposed by the Southwest Florida Water Management District (SWFWMD) and which is discussed briefly below.

The modeling techniques utilized in the assessment of possible effects from the planned dewatering system are summarized in Section 4.3.1 of the application. A more detailed description is found in Appendix 10.15. On-site data were obtained in order to assess possible dewatering impacts. The specifics of the data obtained are described in Section 2.3.1 of the application.

The proposed construction dewatering monitoring program would consist of a system of perimeter wells installed to monitor the hydraulic gradients during dewatering activities. The planned location of the monitoring wells would be established after additional discussions with SWFWMD. As mentioned previously, SWFWMD has expressed an interest in providing support in developing and implementing this monitoring program. At this time the specifics of the program have not been developed.

As presented in Appendix 10.1.2 a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge has been applied for from U.S. EPA Region IV. This permit is specifically requested for the construction dewatering aspect of the project. Any groundwater or surface water monitoring required as part of the NPDES permit will be performed.

APPENDIX 10.5.3

OPERATIONAL MONITORING

APPENDIX 10.5.3

OPERATIONAL MONITORING

Chapter 5 of the application describes the environmental effects of the operation of the plant and directly associated facilities, and also describes the County's plans and programs for monitoring the environmental impacts resulting from plant operation. As noted in the introduction to this appendix, there may be additional monitoring required by DER as conditions of certification. Clarification and further description of the monitoring programs presented in this appendix will be submitted to DER as they are developed. As noted in the Instruction Guide for Certification Applications [DER Form 17-1.211(1)] "The program for the plant operational period may be submitted to the department no later than six months and preferably one year before the plant start-up target date."

Currently proposed environmental monitoring during the operational phase of the facility is limited to three areas:

- o virological/bacteriological monitoring of the treated domestic wastewater used as cooling water;
- o stack testing (continuous monitoring); and,
- o combustion residue analysis

Cooling Towers

A virological and bacteriological monitoring program will be conducted at the co-located Northwest Brandon Subregional Wastewater Treatment Plant.

Samples of influent and chlorinated effluent will be collected daily for one week during compliance testing. Sufficient sample volumes will be collected to allow the accurate quantification of virus particles. Samples will be analyzed for total bacteria, total and fecal coliform bacteria,

fecal streptococci and total virus particles (as plaque forming units). Analysis techniques specified in Standard Methods for the Examination of Water and Wastewater (AOHA, 1982) and by the U.S. Environmental Protection Agency will be followed. Virus groups found in the effluent stream will be identified in addition to obtaining a total virus count.

Once construction of both facilities is completed, monthly sampling of the circulating cooling waters will be conducted. This program will be undertaken for the first year of operation to assure that no viruses are detected. These samples will also be analyzed for the indicator bacteria mentioned above.

Stack Testing

Air quality monitoring and stack testing programs are outlined in Section 5.6 of the application and in Appendix 10.1.5 "Prevention of Significant Deterioration" (See Volume III - Air Quality).

As described in Section 5.6 of the application, air quality monitoring in the site is not being proposed because of the adequacy of the existing monitoring network. However, continuous stack monitoring devices for oxygen or carbon dioxide and opacity will be installed, calibrated, operated in accordance with Chapter 17-2.710 FAC and 40 CFR 51. As noted previously in this appendix, performance (compliance) testing is assumed to be required in accordance with Chapter 17-2.700 and 40 CFR 60.

Combustion Residue

A chemical analysis of the combustion residue will be conducted after commencement of operation. This analysis will measure at a minimum levels of Cadmium, Chromium, Zinc, and Lead, to determine the nature and potential toxicity or hazardousness of the residue.

Results of the residue analysis will be forwarded to the Florida DER.

APPENDIX 10.6

SITE AND ADJACENT AREA
PROPERTY OWNERSHIP

APPENDIX 10.6.1

DEED FOR PROPERTY AND
SURVEY OF 353 ACRE TRACT

CURVE	RADIUS	DELTA	ARC	TANGENT	CHORD	CHORD BEG
1	11800.00	3°22'40"	681.80	340.88	681.40	N 08°44'32"E
2	548.69	13°03'24"	126.00	63.28	125.72	N 17°01'06"W
3	598.69	11°57'34"	124.96	62.71	124.74	N 17°30'40"E

- Utility Pole and overhead Wire
- Utility Pole and Guy Anchor
- Railroad Track Centerline
- Set Concrete Manometer @ 50' Height & Associate:
- Area of Streets Recalled by Resolution Recorded in Hillsborough Co. Commission Book 33, Pg. 127

A horizontal scale bar with markings at 250, 125, 0, 250, 500, and 750 feet. The bar is divided into segments corresponding to these values.

[illegible]

LESS AND EXCEPT:

From the Northwest corner of the South 1/2 of the Southeast 1/4 of Section 7, run S. 89°19'P.E., 222.75 feet along the North line to a point; thence N. 89°19'W., 222.75 feet to a point; thence S. 89°19'W., 128.00 feet to a point; thence S. 89°19'W., 464.91 feet to the line of "Parcel B" (see Section 7, Township 36S., Range 20E., T.36S., R.20E., S. 89°19'W., 581.24 feet to a point; thence S. 89°19'W., 197.67 feet to a point; thence S. 89°19'W., 75.00 feet to a point; thence S. 89°19'W., 231.00 feet to a point; thence N. 89°19'W., 592.50 feet to a point; thence N. 89°19'W., 231.00 feet to a point; thence N. 89°19'W., 232.50 feet to a point on a line of "Parcel B" (see Section 7, Township 36S., Range 20E., S. 89°19'W., 581.24 feet) to the West, whose radius is 596.43 feet having a central angle of 192°37'44"; and whose chord bears N. 15°30'30"W., 126.74 feet to a point; thence S. 89°19'W., 126.74 feet to a point; thence S. 89°19'W., 126.74 feet to a point; thence N. 89°19'W., 592.50 feet along said line of "Parcel B" (see Section 7, Township 36S., Range 20E., S. 89°19'W., 581.24 feet) to the West whose radius is 596.43 feet having a central angle of 192°37'44"; and whose chord bears N. 15°30'30"W., 126.74 feet to the Point of Beginning.

"Parcel B" contains 7.96 Acres more or less.

"Parcel B" containing 7.00 Acres more or less

AND LESS AND EXCEPT

A parcel of land in the Southwest 1/4 of the Southeast 1/4 of Section 7, Township 28 North, Range 30 East, and in the Northwest 1/4 of the Northeast 1/4 of Section 18, Township 28 South, Range 30 East, Hillsborough County, Florida, described as follows:

From the Northern corner of said Southwest 1/4 of the Southeast 1/4 of Section 7, run S. 89°46'13"E., 343.81 feet along the North boundary to the point of intersection of the North boundary of said Southwest 1/4 of the Southeast 1/4 of Section 7 and the North boundary of said Northwest 1/4 of the Northeast 1/4 of Section 18; thence N. 89°46'13"E., 343.81 feet Easterly of and parallel to the West boundary of the Southwest 1/4 of the Southeast 1/4 of said Section 7, to the Point of Beginning; thence S. 89°46'13"E., 343.81 feet along the East line to a point; thence S. 89°58'34"E., 336.96 feet; thence N. 0°01'28"E., 336.96 feet to a point; thence S. 89°58'34"E., 336.96 feet; thence S. 89°58'34"E., 33.37 feet to the Point of Beginning.

"Parcel A" containing 346.00 acres more or less which includes 0.20 acres of platted right-of-way as shown on the Plat of South Tampa Subdivision in Plat Book 6 at Page 3, but excludes 7.00 acres in "PARCEL B".

NOTE

The information shown on this map is based upon Commitment No. 80-091182 by Lawyers Title Insurance Company, dated March 23, 1989.

Heldt & Associates, Inc. makes no representations or guarantees pertaining to assessments, rights-of-way, setback lines, reservations, agreements and other similar matters.

BOUNDARY SURVEY
LAND AT FAULKENBURG ROAD

C-1-77

[illegible]

BOUNDARY SURVEY OF 353-ACRE TRACT

4JP0522841 21

THIS DEED, Made this 25th day of May, A.D., 1984, between SEABOARD SYSTEM RAILROAD, INC., a Virginia corporation, formerly Seaboard Coast Line Railroad Company, formerly Seaboard Air Line Railroad Company and as successor by merger to Atlantic Coast Line Railroad Company, hereinafter called "Grantor"; HILLSBOROUGH COUNTY, a political subdivision of the State of Florida, hereinafter called "Grantee"; and UNITED STATES TRUST COMPANY OF NEW YORK, Corporate Trustee under the First (formerly General) Mortgage dated March 1, 1950, made by the former Atlantic Coast Line Railroad Company, to which Seaboard System Railroad, Inc., is successor by merger, and CHEMICAL BANK, Corporate Trustee under the Consolidated Mortgage dated as of March 15, 1971, made by the former Seaboard Coast Line Railroad Company, to which Seaboard System Railroad, Inc., is successor by merger, hereinafter called "Trustees";

(Wherever used herein, the terms "Grantor" and "Grantee" shall be construed in the singular or plural as the context may require or admit and shall include the heirs, legal representatives and assigns of individuals and the successors and assigns of corporations.)

WITNESSETH: That Grantor, for and in consideration of the sum of TWO HUNDRED FIFTEEN THOUSAND TWO HUNDRED FIFTY AND 00/100 DOLLARS (\$215,250.00), to it in hand paid by Grantee, the receipt of which is hereby acknowledged, has granted, bargained and sold, and by these presents does grant, bargain, sell and convey unto Grantee that certain tract or parcel of land situate, lying and being at Tampa, County of Hillsborough, State of Florida, and described as follows, to wit:

A parcel of land in the S $\frac{1}{2}$ of the SE $\frac{1}{4}$ of Section 7, Township 29 South, Range 20 East, more particularly described as follows: From the northwest corner of the S $\frac{1}{2}$ of the SE $\frac{1}{4}$ of Section 7, run S 89°40'13" E, 322.40 feet along the north boundary thereof to a point; run thence S 00°03'11" E, 120.00 feet to a point; run thence S 89°40'13" E, 664.41 feet to the point of beginning; from said point of beginning, run thence S 03°59'15" W, 581.28 feet to a point; thence S 89°58'34" E, 197.07 feet to a point; thence S 00°01'26" W, 75.00 feet to a point; thence S 89°58'34" E, 312.00 feet to a point; thence N 00°01'26" E, 592.50 feet to a point; thence N 89°43'25" W, 125.59 feet to a point; thence N 00°01'29" E, 60.00 feet to a point; thence N 89°40'13" W, 292.50 feet to a point on a curve; thence northerly 124.96 feet along the arc of said curve concave to the west, whose radius is 598.69 feet having a central angle of 11°57'34" and whose chord bears N 15°30'40" W, 124.74 feet to a point on the north boundary of said S $\frac{1}{2}$ of the SE $\frac{1}{4}$ of Section 7; thence N 89°40'13" W, 54.24 feet along said north boundary to a point on a curve; thence southerly 126.00 feet along the arc of said curve concave to the west whose radius is 548.69 feet through a central angle of 13°09'24" and whose chord bears S 17°01'06" E, 125.72 feet to the point of beginning; containing 7.00 acres, more or less, as shown on print of survey dated March 23, 1984, last revised May 21, 1984, prepared by Heidt & Associates, Inc.

GRANTOR, its successors or assigns, reserve a 20-foot wide track right of way, i.e., 10 feet wide on each side of the center line of Grantor's tracks as located thereon.

TOGETHER with all and singular the rights, members, hereditaments and appurtenances to said premises belonging or in anywise incident or appertaining.

TO HAVE AND TO HOLD said premises unto Grantee in fee simple forever; SUBJECT, However, to reservations, conditions, restrictions and easements of record, or apparent from an inspection of the premises, including but not limited to that portion of Reeves Road as located thereon.

Except as to the matters referred to in the preceding paragraph, Grantor hereby binds itself that the premises are free from encumbrances, that it is seized of said premises in fee and that it will fully warrant and forever defend all and singular said premises unto Grantee against Grantor and all other persons lawfully claiming or to claim the same or any part thereof.

The recitals of fact made hereinabove are to be taken only as recitals made by Grantor and not by Trustees.

The property hereinabove conveyed is subject to the lien of the First (formerly General) Mortgage made by the former Atlantic Coast Line Railroad Company, dated as of March 1, 1950, as supplemented and modified, under which mortgage United States Trust Company of New York is Corporate Trustee, and Trustee joins herein for the purpose of releasing and does hereby release the property hereinabove conveyed from the lien of said mortgage pursuant to the provisions of Section 6.01 of Article Six thereof.

The property hereinabove conveyed is subject also to the lien of the Consolidated Mortgage made by the former Seaboard Coast Line Railroad Company, dated as of March 15, 1971, as supplemented, under which mortgage Chemical Bank, a New York corporation, is Corporate Trustee and L. F. Sadler of Jacksonville, Florida, is Individual Trustee, and Corporate Trustee joins herein for the purpose of releasing and does hereby release the property hereinabove conveyed from the lien of said mortgage pursuant to the provisions of Section 5.17 of Article Five thereof; Individual Trustee being relieved of any obligation to join in such release by Section 10.06 of Article Ten of said mortgage.

IN WITNESS WHEREOF Grantor and Trustees have caused these presents to be duly signed and sealed the day and year first above written.

Signed, sealed and delivered
in the presence of:

James L. Kusler
James P. McKee

Signed, sealed and delivered
in the presence of:

Stan Nam
John H. Butler

SEABOARD SYSTEM RAILROAD, INC.

By

J. J. Rice
Vice President

Attest

R. A. B. B.
Corporate Secretary

UNITED STATES TRUST COMPANY OF
NEW YORK, as Corporate Trustee
as aforesaid.

By

David J. [Signature]
Asst. Vice President

Attest

William L. [Signature]
Assistant Secretary

- 3 -

Signed, sealed and delivered
in the presence of:

J. J. Cash
W. J. (M.)

CHEMICAL BANK, as Corporate Trustee
as aforesaid.

By J. Murray
TRUST COMPANY
Attest Charles

FLORIDA FORM

STATE OF NEW YORK
COUNTY OF NEW YORK

I hereby certify that on this day before me, an officer duly authorized to take acknowledgments in the State and County above set forth, personally appeared JAMES E. LOGAN and Thomas G. Moser respectively, ASST. Vice President and Assistant Secretary of

UNITED STATES TRUST COMPANY OF NEW YORK, a corporation under the laws of the State of New York

to me known to be the persons described in and who executed the foregoing instrument, and they severally acknowledged before me the execution thereof as such officers, by virtue of due and proper corporate authority in them vested, and that the said instrument is the act and deed of said corporation.

And the said Thomas S. Moser Assistant Secretary as aforesaid, also acknowledged before me that he affixed to said instrument the corporate seal of said corporation, by like authority in him vested.

WITNESS my signature and official seal in the County and State above set forth, this 30TH day of

May 1967

John M. Guiliano
Notary Public

My commission Expires

JOHN M. GUILIANO
Notary Public, State of New York
No. 41-4035572
Qualified in Suffolk County
Commission Expires March 30, 1968

FLORIDA FORM

STATE OF FLORIDA
COUNTY OF DUVAL }

I hereby certify that on this day before me, an officer duly authorized to take acknowledgments in the State and County above set forth, personally appeared J. T. Rice and Robert A. Bernard respectively, Vice President and Corporate Secretary of SEABOARD SYSTEM RAILROAD, INC., a corporation under the laws of the State of Virginia, to me known to be the persons described in and who executed the foregoing instrument, and they severally acknowledged before me the execution thereof as such officers, by virtue of due and proper corporate authority in them vested, and that the said instrument is the act and deed of said corporation.

And the said Robert A. Bernard Corporate Secretary as aforesaid, also acknowledged before me that he affixed to said instrument the corporate seal of said corporation, by like authority in him vested.

WITNESS my signature and official seal in the County and State above set forth, this 25th day of May 19 84.

Angelina C. Goodell
Notary Public.

NOTARY PUBLIC, STATE OF FLORIDA
My commission Expires Sept. 15, 1987
Bonded Thru Patterson Becht Agency

THIS DEED, Made this 1st day of June, A.D., 1984, between SEABOARD SYSTEM RAILROAD, INC., a Virginia corporation, formerly Seaboard Coast Line Railroad Company, formerly Seaboard Air Line Railroad Company and as successor by merger to Atlantic Coast Line Railroad Company, hereinafter called "Grantor"; HILLSBOROUGH COUNTY, a political subdivision of the State of Florida, hereinafter called "Grantee";

(Wherever used herein, the terms "Grantor" and "Grantee" shall be construed in the singular or plural as the context may require or admit and shall include the heirs, legal representatives and assigns of individuals and the successors and assigns of corporations.)

WITNESSETH: That Grantor, for and in consideration of the sum of TEN MILLION SIX HUNDRED FORTY-ONE THOUSAND THREE HUNDRED FORTY-FIVE DOLLARS (\$10,641,345.00), to it in hand paid by Grantee, the receipt of which is hereby acknowledged, has granted, bargained and sold, and by these presents does grant, bargain, sell and convey unto Grantee that certain tract or parcel of land situate, lying and being at Tampa, County of Hillsborough, State of Florida, and described as follows, to wit:

A parcel of land located in Hillsborough County, Florida, more particularly described as follows: From a point in the center line of Faulkenburg Road marking the section corner of Section 17, 18, 19 and 20, Township 29 South, Range 20 East; run thence N 89°39'27" W, 30.00 feet along the south line of the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Section 18 to a point in the west line of said Faulkenburg Road, said point being the point of beginning; continue thence N 89°39'27" W, 691.94 feet along said south line of said SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Section 18 to a point; thence S 00°03'30" W, 176.54 feet to a point in the northerly right of way line of Seaboard System Railroad, said point being 100 feet from and at right angles to said Seaboard System main track; thence N 81°05'32" W, 626.57 feet along said Railroad right of way, which continues to be 100 feet from and at right angles to said Railroad main track, to the point of curvature of a curve concave to the southwest; thence continue 681.50 feet along said Railroad right of way and the arc of said curve whose radius is 11,560.00 feet, with a central angle of 03°22'40" and whose chord bears N 82°46'52" W, 681.40 feet to the point of tangency; thence continue N 84°28'12" W, 18.08 feet along said Railroad right of way to a point that is 100 feet from and at right angles to said Railroad main track and that is on the south line of the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Section 18; thence N 89°39'27" W, 408.54 feet along said Railroad right of way and said south line of Section 18 to a point on the east line of a 200-foot easement granted to Tampa Electric Company as recorded in Court Order Book 128, Page 104, of the Public Records of Hillsborough County, Florida; thence N 00°15'17" W, 2649.15 feet along said east line of said Tampa Electric Company easement to a point of intersection with the south boundary of the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of said Section 18; thence S 89°46'23" E, 462.48 feet along said south boundary of the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ to the southeast corner thereof; thence N 00°10'09" W, 662.42 feet along the east boundary of said SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ to the northeast

corner thereof; thence N 89°45'31" W, 463.31 feet along the north boundary of said SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ to a point on the said east line of said Tampa Electric Company easement; thence N 00°14'28" W, 1988.10 feet along the east line of said Tampa Electric Company easement to a point on the north line of said Section 18; thence N 00°01'26" E, 1338.78 feet along the east line of said Tampa Electric Company easement to a point on the north line of the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 7, Township 29 South, Range 20 East; thence S 89°40'13" E, 122.40 feet along said north line of the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ to a point marking the northwest corner of a tract described in O.R. Book 1710 at Page 252; thence S 00°03'11" E, 120.00 feet along the westerly boundary of above said tract to a point; thence S 89°40'13" E, 664.41 feet along the south boundary of above said tract and Tract B as described in O.R. Book 1772 at Page 966 to a point on a curve and marking the southeast corner of above said Tract B; thence northwesterly 126.00 feet along the easterly boundary of above said Tract B and the arc of a curve concave to the southwest, whose radius is 548.69 feet with a central angle of 13°09'24" and whose chord bears N 17°01'06" W, 125.72 feet to a point on the north boundary of the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Section 7, marking the northeast corner of above said Tract B; thence S 89°40'13" E, 54.24 feet along the north boundary of the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Section 7, to a point on a curve marking the northwest corner of Tract A as also described in O.R. Book 1772 at Page 966; thence southerly 124.96 feet along the arc of a curve concave to the southwest, whose radius is 598.69 feet, with a central angle of 11°57'34" and whose chord bears S 15°30'40" E, 124.74 feet to the southwesterly corner of said Tract A; thence S 89°40'13" E, 292.50 feet along the southerly boundary of said Tract A to the southeast corner thereof, on the north boundary of Reeves Road; thence S 00°01'29" W, 60.00 feet to the south boundary of Reeves Road; thence S 89°44'54" E, 1299.89 feet to a point on the west line of Faulkenburg Road, said point being 30.00 feet westerly of and at right angles to the east boundary of the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Section 7; thence S 00°00'24" W, 1152.10 feet along the west line of Faulkenburg Road, said line being 30.00 feet westerly of and parallel to the east boundary of the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Section 7 to a point on the north boundary of Section 18, Township 29 South, Range 20 East; thence continuing S 00°02'04" E, 2654.11 feet along the west line of Faulkenburg Road, said line being 30.00 feet westerly of and parallel to the east boundary of the NE $\frac{1}{4}$ of said Section 18; thence continuing along the west line of Faulkenburg Road, said line being 30.00 feet westerly of and parallel to the east boundary of the SE $\frac{1}{4}$ of said Section 18, S 00°05'50" E, 2653.92 feet to the point of beginning.

LESS AND EXCEPT, a parcel of land in the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 7, Township 29 South, Range 20 East, and in the NW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 18, Township 29 South, Range 20 East, Hillsborough County, Florida, described as follows: From the

northwest corner of said SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 7,
run S 89°40'13" E, 943.85 feet along the north
boundary thereof to a point; run thence
S 00°01'26" W, 753.61 feet along a line that is
943.85 feet easterly of and parallel to the west
boundary of the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Section 7, to
the point of beginning; from said point of beginning,
continue S 00°01'26" W, 746.51 feet to a point;
thence S 89°58'34" E, 200.00 feet; thence
N 00°01'26" E, 800.00 feet to a point; thence
N 89°58'34" W, 197.07 feet to a point; thence
S 03°09'33" W, 53.57 feet to the point of beginning;

AND less and except seven acre parcel conveyed separately
dated May 25, 1984 recorded in Official Record Book _____
on Page _____ of the Public Records of Hillsborough County,
Florida.

Containing 346.06 acres, more or less, as shown
on print of survey dated March 23, 1984, last revised
May 21, 1984, prepared by Heidt & Associates, Inc.

TOGETHER with all and singular the rights, members, hereditaments and
appurtenances to said premises belonging or in anywise incident or
appertaining.

TO HAVE AND TO HOLD said premises unto Grantee in fee simple forever;
SUBJECT, However, to reservations, conditions, restrictions and easements of
record, or apparent from an inspection of the premises. SUBJECT ALSO to
easement dated October 22, 1965, whereby the former Atlantic Coast Line
Railroad Company granted Consolidated Bagging Company, Inc., a 60-foot wide
right of way for ingress and egress from the west right of way line of
Faulkenburg Road to the west line of Consolidated Bagging Company's property,
a 20-foot utility easement as recorded in O.R. Book 766, Page 694, of
Hillsborough County, Florida, a 20-foot utility easement as recorded in O.R.
Book 726, Page 593, of Hillsborough County, Florida, a utility easement
granted Tampa Electric Company dated April 17, 1974, as recorded in O.R.
Book 2893, Page 842, Hillsborough County, Florida, and all fences, ponds, and
roads as located thereon.

Except as to the matters referred to in the preceding paragraph, Grantor
hereby binds itself that the premises are free from encumbrances, that it is
seized of said premises in fee and that it will fully warrant and forever
defend all and singular said premises unto Grantee against Grantor and all
other persons lawfully claiming or to claim the same or any part thereof.

IN WITNESS WHEREOF Grantor has caused these presents to be duly signed
and sealed the day and year first above written.

Signed, sealed and delivered
in the presence of:

Joseph C. Wee
James R. [illegible]

SEABOARD SYSTEM RAILROAD, INC.

By *James L. Kiesler*
James L. Kiesler,
Assistant Vice-President-Real Estate

APPENDIX 10.6.2

LIST OF ADJACENT PROPERTY
OWNERS WITHIN 150 FEET OF THE SITE
AND
ADJACENT PROPERTIES WITHIN
250 FEET OF THE SITE BY
SUBDIVISION TITLE, PLOT BOOK AND PAGE

OWNERSHIP WITHIN 150 FEET
OF PROPOSED SITE
(per 1982 Tax Rolls)

As to proerties abutting proposed site:

- (1) Seaboard Coast Line Railroad Company
500 Water Street
Jacksonville, Florida 32202

As to properties on East side of Faulkenburg Road:

- Folio 67897.0002 (1) James A. & Beverly A. Taylor
2109 E. Lumsden Road
Valrico, Florida 33594
- 67897.0030 (2) Thomas L. & Elizabeth I. Fahringer
P. O. Box 1412
Brandon, Florida 33511
- 67895.0000 (3) Samuel E. and Aurea Leon
Rt. 3 Box 95
Tampa, Florida 33619
- 67896.0000 (4) McDonald - Logan Inc.
P. O. Box 5357
Tampa, Florida 33675
- 67774.0000 (5) J. L. and Mary Coker
Rt. 3 Box 97
Tampa, Florida 33619
- (6) Ken Foster
128 N. Parsons Ave.
Brandon, Florida 33511

Folio #'s
67977.0000
68001.0000
68017.0000
67983.0000

As to properteis South of Seaboard Coast Line Railroad

- (1) Interstate Park of Commerce Ltd.
519 E. Madison Street
Tampa, Florida 33602
- 68052.0514 (2) OKI Realty Corporation
2643 Crescent Springs Road
Erlanger, Kentucky 41018
Local Agent: John Swart
P. O. Box 23804
Tampa, Florida 33623

Folio #'s
68052.0516
68052.0518
68052.0520

IDENTIFICATION OF SUBDIVISIONS
WITHIN 250 FEET
OF PROPOSED SITE:

- 1) South Tampa Subdivision, Plat Book 6, page 3.
2) Faulkenburg Industrial Park, Plat Book 47, page 58
3) Fisher's Farms, Plat Book 26, page 1.
4) Interstate Park Commerce, Plat Book 52, page 32.

67977.0000	18-29-20	41200-TRANS-COMM-UTIL	503.07-AC	91-MISC		\$44,944.15T \$2,516.68SL UNIMPROVED
SEABOARD COAST LINE RR CO C/O TAX DEPT # 500 WATER ST JACKSONVILLE FL 32202 E 1/2 OF NE 1/4 LESS E 30 FT FOR R/W NW 1/4 OF NE 1/4 LESS N 160.62 FT OF E 200 FT OF W 1143.85 FT TRACTS 11 12 & 14 NE 1/4 TRACTS 9 10 15 & 16 IN NW 1/4 GOV LOT 1 N 1/2 OF GOV LOT 2 NE 1/4 OF SW 1/4 NE 1/4 OF SW 1/4 OF SE 1/4 NE 1/4 OF SE 1/4 LESS E 30 FT FOR R/W AND TRACTS 3 4 5 AND 6 IN SE 1/4 & ALL SITS & RDS & S 1/2 OF SW 1/4 OF SE 1/4 AND SE 1/4 OF SE 1/4 LESS E 30 FT FOR FAULKENBURG RD R/W AND LESS TRACT BEG ON W R/W LINE OF FAULKENBURG RD 60 FT N AND 30 FT W OF SE COR OF SE 1/4 AND RUN W 1321.8 FT N 577.78 FT E 1322.43 FT TO RD AND S 578.31 FT ALONG RD TO BEG SHOWN ON PLAT OF SOUTH TAMPA PLAT 5 PG 3 ADJ OR CONTAINED IN TRACTS 1 TO 16 INCL V3 FLA/58 CARD 7 ACL						
67983.0000	18-29-20	41200-TRANS-COMM-UTIL	17.55-AC	91-MISC		\$9,047.87T \$114.800L \$351.580T
SEABOARD COAST LINE RR CO C/O TAX DEPT # 500 WATER ST JACKSONVILLE FL 32202 TRACT BEG ON WLY R/W LINE OF FAULKENBURG RD 60 FT N AND 30 FT W OF SE COR OF SE 1/4 AND RUN N 89 DEG 52 MIN 25 SEC W 1321.8 FT N 0 DEG 26 MIN 05 SEC W 577.78 FT S 89 DEG 8 ACL						
68001.0000	18-29-20	41200-TRANS-COMM-UTIL	55.80-AC	91-MISC		\$12,178.28T \$627.700L UNIMPROVED
SEABOARD COAST LINE RR CO C/O TAX DEPT # 500 WATER ST JACKSONVILLE FL 32202 TRACT BEG AT NW COR OF S 1/2 OF SW 1/4 AND RUN S 116.81 FT SELY ALONG A CURVE RAD 503 34 FT AN ARC DIST OF 435.7 FT S 84 DEG 51 MIN E 1210.03 FT SELY ALONG A CURVE RAD 1935 08 FT AN ARC DIST OF 172.24 FT S 89 DEG 37 MIN E 381.03 FT SELY ALONG A CURVE RAD 1935 V P/L TO NLY R/W OF SAL RR 1240.8 FT NLY ALONG A CURVE RAD 453.34 FT AN ARC DIST OF 244.1 FT N 53 DEG 40 MIN W 622.96 FT NLY ALONG A CURVE RAD 453.34 FT AN ARC DIST OF 121.78 FT N 84 DEG 31 MIN W 13.6 FT TO W BDRY OF S 1/2 OF SW 1/4 S 109.66 FT MOL TO NLY R/W OF HOWELL RD S 53 DEG 40 MIN E ALONG RD TO INTER WITH NLY R/W OF SAL RR S 84 DEG 31 MIN E ALONG R/W TO E LINE OF S 1/2 OF SW 1/4 N TO NE COR & W TO BEG & NW 1/4 OF SW 1/4 OF SE 1/4 SUBJ TO 1 EASEMENT V3 FLA/58 CARD 6 ACL						
68017.0000	19-29-20	41200-TRANS-COMM-UTIL	2.40-AC	91-MISC		\$304.20T \$15.680L UNIMPROVED
SEABOARD COAST LINE RR CO C/O TAX DEPT # 500 WATER ST JACKSONVILLE FL 32202 THAT PT OF NE 1/4 OF NE 1/4 N OF RR DEFS AS BEG 722.21 FT W OF NE COR AND RUN W 600 FT S 86.08 FT S 81 DEG 21 MIN 45 SEC E 607.23 FT AND N 176.41 FT TO BEG--THAT PART OF NW 1/4 OF NE 1/4 N OF RR R/W V3 FLA/58 CARD 9 ACL						

57397.2002	17-29-20	91000-UNDEVELOPED LND		00-VACANT RES	3720-0943	1980	\$426.80T \$22.000L UNIMPROVED
TAYLOR JAMES A AND BEVERLY A # 5109 E LINDEN VALRICO FL 33534 FAULKENBURG INDUSTRIAL PARK LOT 1							
67847.2030	17-29-20	91000-UNDEVELOPED LND		00-VACANT RES	3691-1751	1980	\$234.15T \$12.060L UNIMPROVED
FAHRINGER THOMAS J AND ELIZABETH J # P O BOX 3412 BRANDON FL 33511 FAULKENBURG INDUSTRIAL PARK LOT 7							

57894.0000	17-29-20	81598-RESOURCE-AGRIC	5.97-AC	1926	68-AGRICULTURAL EX-M		\$159.22T \$24.017L \$9.190T \$134.015A
COLER J L AND MARY # RT 3 BOX 97 TAMPA FLA 33619 FISHER S FARMS S 1/2 OF LOT 44							
67895.0000	17-29-20	11100-RESIDENTIAL		01-RESIDENTIAL EX-M	3876-0740	1981	\$4.620L \$11.070T
LEON SAMUEL E AND AUREA # RT 3 BOX 95 TAMPA FLA 33619 FISHER S FARMS LOT BEG AT NW COR OF LOT 44 AND RUN E 200 FT S 83 FT W 200 FT AND N 83 FT TO BEG							
67896.0000	17-29-20	11100-RESIDENTIAL	1956	01-RESIDENTIAL	3781-1441	1981	\$1,096.89T \$36.370L \$20.170T
MC DONALD-LOGAN INC # P O BOX 3357 TAMPA FLA 33675 FISHER S FARMS S 1/2 OF N 1/2 OF LOT 44							

68052.0514	19-29-20	91000-UNDEVELOPED LND		00-VACANT RES	3600-1912	1979	\$3,995.47T \$205.650L UNIMPROVED
2643 OKI Realty Corp. cresent Springs Rd. Erlanger, Kentucky 41018							
68052.0516	19-29-20	91000-UNDEVELOPED LND		00-VACANT RES	3600-1912	1979	\$4,423.83T \$128.050L UNIMPROVED
INTERSTATE PARK OF COMMERCE LTD # 519 E MADISON ST TAMPA FL 33602 INTERSTATE PARK OF COMMERCE LOT 8							
68052.0518	19-29-20	91000-UNDEVELOPED LND		00-VACANT RES	3600-1912	1979	\$4,259.60T \$219.363L UNIMPROVED
INTERSTATE PARK OF COMMERCE LTD # 519 E MADISON ST TAMPA FL 33602 INTERSTATE PARK OF COMMERCE LOT 9							
68052.0520	19-29-20	91000-UNDEVELOPED LND		00-VACANT RES	3600-1912	1979	\$4,295.59T \$221.420L UNIMPROVED
INTERSTATE PARK OF COMMERCE LTD # 519 E MADISON ST TAMPA FL 33602 INTERSTATE PARK OF COMMERCE LOT 10							

Appendix 10.7

APPENDIX 10.7

CORRESPONDENCE RELATED TO
GOVERNMENTAL JURISDICTIONS



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33702

April 13, 1984

F/SER23:AM:cf

Ms. Jane W. Wheeler
Camp Dresser & McKee, Inc.
One Center Plaza
Boston, MA 02108

Dear Ms. Wheeler:

This responds to your April 11, 1984, letter requesting the National Marine Fisheries Service (NMFS) to identify federal properties under our jurisdiction which occur in the area of a proposed solid waste resource recovery facility for Hillsborough County. The project area lies to the west of the City of Tampa, Florida, near S.R. 60 and Interstate 75.

The NMFS has no properties within a five-mile radius of the project site which occur under our jurisdictional responsibilities under the federal categories you specified.

If you haven't done so, we suggest you also contact:

District Engineer
Jacksonville District, Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232

U.S. Fish and Wildlife Service
Region IV
75 Spring Street
Suite 1276
Atlanta, GA 30303

If I can be of further assistance, please advise.

Sincerely yours,

Andreas Mager, Jr.
Fishery Biologist
Protected Species Management Branch

cc:
F/SER11





FLORIDA DEPARTMENT OF STATE

George Firestone

Secretary of State

HISTORIC TAMPA/HILLSBOROUGH COUNTY PRESERVATION BOARD

April 16, 1984

Ms. Jane W. Wheeler
Camp Dresser & McKee Inc.
One Center Plaza
Boston, Mass. 02108

Re: Resource Recovery Facility on 50.4 Acre Site
on Faukenburg Road, Hillsborough County, Florida

Dear Mrs. Wheeler:

There are no properties listed on the National Register of Historic Places located on the 50.4 acre site proposed for the construction of a resource recovery facility in Hillsborough County. Our office, however, has not surveyed the site and is unaware whether or not any historic sites eligible for listing on the National Register or located on the property. For information on significant archaeological sites you should contact Mr. Louis Tesar, Florida Division of Archives, History and Records Management, R. A. Gray Building, Tallahassee, Florida 32301, (904) 487-2333.

Should you wish someone from our office to examine the site for significant historic properties, please let us know and we will make every effort to cooperate with you.

Sincerely yours,

W. Carl Shiver
Historic Preservationist

WCS:lm

FLORIDA-State of the Arts

452 West Kennedy Boulevard • Tampa, Florida 33606 • 813/272-3843

FLORIDA GAME AND FRESH WATER FISH COMMISSION

WILLIAM G. BOSTICK, JR.
Chairman, Winter Haven

CECIL C. BAILEY
Vice Chairman, Jacksonville

C. TOM RAINEY D.V.M.
Miami

THOMAS L. HIRES SR.
Tampa

J.H. BAROCO
Pensacola

ROBERT M. BRANTLY, Executive Director
F. G. BANKS, Assistant Executive Director



2202 Lakeland Hills Blvd.
Lakeland, Florida 33801

April 16, 1984

Jane W. Wheeler
Camp Dresser & McKee, Inc.
One Center Plaza
Boston, Massachusetts 02108

Dear Ms. Wheeler:

I have reviewed your information request regarding the Hillsborough County Department of Solid Waste resource recovery facility and its proximity to State Game Management areas. There are no Game Management areas within a five mile radius of the site. The Florida Game and Fresh Water Fish Commission's jurisdictional responsibilities of these areas are as follows:

Pursuant to Florida Statute 372.121 Control and management of state game lands. -

- (1) The Game and Fresh Water Fish Commission is authorized to make, adopt, promulgate, amend, repeal, and enforce all reasonable rules and regulations necessary for the protection, control, operation, management, or development of lands or waters owned by, leased by, or otherwise assigned to, the commission for fish or wildlife management purposes, including but not being limited to the right of ingress and egress. Before any such rule or regulation is adopted, other than one relating to wild animal life or freshwater aquatic life, the commission shall obtain the consent and agreement, in writing, of the owner in case of privately owned lands or waters, or the owner or primary custodian in the case of public lands or waters, and the formal approval of the board of county commissioners of the county or counties in which such areas are situated.
- (2) Any person violating or otherwise failing to comply with any rule or regulation so adopted is guilty of a misdemeanor of the second degree, punishable as provided in s 775.082 or s 775.083.

You also requested information regarding which agency has management responsibility over the following categories:

Jane W. Wheeler
Page 2
April 16, 1984

State Parks - Department of Natural Resources, Bureau of Park Lands and Development (904) 488-2191

State Forests - Department of Agriculture and Consumer Services, Division of Forestry (904) 488-4274

Areas of Critical State Concern - Department of Community Affairs, Bureau of Land and Water Management (904) 488-4925

Conservation and Recreation Lands - Department of Natural Resources, Bureau of State Lands, Upland Section (904) 488-2297

State Archaeological Landmarks or Landmark Zones - Department of State, Bureau of Historic Sites and Properties (904) 487-2333

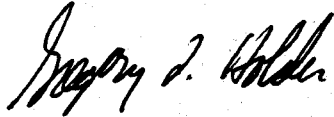
Aquatic Preserves - Department of Natural Resources, Bureau of State Lands Management, Submerged Lands Section (904) 488-2297

Outstanding Florida Waters - Department of Environmental Regulations, Division of Environmental Programs (904) 487-1855

Scenic and Wild Rivers - Department of Natural Resources, Bureau of State Lands, Upland Section (904) 488-2297

If I can be of further assistance, please feel free to call.

Very truly yours,



Gregory L. Holder
REGIONAL WILDLIFE BIOLOGIST

GLH/bw



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33702

April 17, 1984

F/SER113/EJK
904-234-5061

Ms. Jane Wheeler
Camp Dresser and McKee Inc.
One Center Plaza
Boston, MA 02108

Dear Ms. Wheeler:

This is in response to your letter of April 11, 1984, in which you requested our assistance in the identification of properties under National Marine Fisheries Service jurisdiction within a five mile radius of the proposed Hillsborough County resource recovery facility.

The National Marine Fisheries Service does not have jurisdiction over any of the types of properties listed in your letter nor are we aware of any such properties within the five mile radius. The National Marine Fisheries Service is responsible for the management, in conjunction with the states, of the nation's living marine resources for the benefit of the nation. We would provide comments to any federal permitting or licensing agency regarding any proposed dredging or filling of wetlands. The National Marine Fisheries Service also has responsibility under the Endangered Species Act for marine organisms designated as threatened or endangered and would provide comments to federal permitting or licensing agencies regarding the impact of any proposed work on these organisms.

If we can be of further aid, please contact Dr. Ed Keppner of our Panama City Area Office at 904-234-5061.

Sincerely yours,

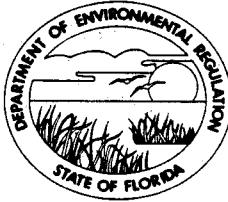
Edwin J. Keppner

Richard J. Hoogland
Chief, Environmental Assessment Branch



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

April 20, 1984

Ms. Jane Wheeler
Camp Dresser and McKee, Inc.
One Center Plaza
Boston, Mass. 02108

Dear Ms. Wheeler:

I spoke with Tom Tetreault this morning regarding your request for information. To the best of my knowledge there are no federal wildlife refuges, wildlife areas, marine sanctuaries, estuarine areas, RARE areas, Wild and Scenic Rivers, Critical Habitats, Indian Reservations or military lands within five miles of the project site. I couldn't locate any information regarding memorials or monuments although I doubt that any are within the five miles radius.

With regard to State lands, I have researched our materials and have determined that there are no state parks, state forests, game management areas, areas of critical state concern, conservation and recreation lands (CARL), aquatic preserves, Outstanding Florida Waters or Scenic and Wild Rivers within a five mile radius of the site. For your information, I have enclosed Chapter 17-3 F.A.C. which describes the types and locations of waters within the Outstanding Florida Waters classification. I gave Tom names and numbers of the agencies involved with the Area of Critical State Concern program, as well as History and Archives. I believe that the information that I sent earlier in the week should answer many of your questions. If I may be of service in any additional manner, please let me know.

Cordially,

Richard Tucker

Richard Tucker
Office of Coastal Management

RT/mh
enclosure



United States Department of the Interior

FISH AND WILDLIFE SERVICE

2747 Art Museum Drive
Jacksonville, Florida 32207

May 24, 1984

Ms. Jane W. Wheeler
Camp Dresser & McKee, Inc.
One Center Plaza
Boston, Massachusetts 02108

Dear Ms. Wheeler:

This responds to your letter of April 26, 1984, to Mr. David Smith in our Vero Beach Field Office, regarding the proposed Hillsborough County Resource Recovery Facility, Hillsborough County, Florida. You requested the assistance of the Fish and Wildlife Service in identifying environmentally sensitive resources within a five-mile radius of the proposed 50-acre site facility which is located north of State Road 60.

This office is not aware of the presence of any Federally designated wildlife refuges or critical habitats of endangered species within five miles of the proposed facility. However, the site does lie within the range of four Federally listed threatened and endangered species as follows: Wood stork, bald eagle, Arctic peregrine falcon (endangered), and the American alligator (threatened). Critical habitat has not been designated for any of these listed species. This office is responsible under provisions of the Endangered Species Act to cooperate with Federal agencies through their programs of permits, grants, or funding to ensure that their activities do not jeopardize any listed species or destroy or adversely modify designated critical habitat. If the proposed activity involves any Federal participation, and if the activity would have an effect on any listed species, the Federal agency proposing that action should initiate consultation with the Fish and Wildlife Service under Section 7 of the Act. The service subsequently issues a Biological Opinion detailing the anticipated impacts of the proposed project and makes appropriate recommendations.

Based upon the information provided in your letter, we do not anticipate that the proposed resources recovery facility will create a conflict with any listed species.

We appreciate the opportunity to comment on this proposal. Should you have any questions regarding this letter, feel free to contact Mr. Smith at 305/562-3909.

Sincerely yours,



David J. Wesley
Field Supervisor
Endangered Species Field Station

Appendix 10.8

APPENDIX 10.8
HISTORIC AND ARCHEOLOGICAL

APPENDIX 10.8.1

CORRESPONDENCE WITH
FLORIDA DEPARTMENT OF STATE
DIVISION OF ARCHIVES, HISTORY AND RECORDS MANAGEMENT

Memorandum FLORIDA DEPARTMENT of STATE

TO: Ms. Jane W. Wheeler
Camp, Dresser & McKee, Inc.
FROM: Frederick Gaske, Historic Sites Specialist
Division of Archives, History & Records Management
DATE: May 11, 1984
SUBJECT: Your Letter of April 26, 1984
Cultural Resource Assessment Request
Faulkenburg Road Resource Recovery Facility, Hillsborough
County, Florida

Dear Ms. Wheeler:

As discussed in our telephone communication of this date, the subject tract was surveyed for archaeological and historic sites in 1983. The results of this investigation were reviewed by this office in our letter of June 21, 1983, a copy of which is enclosed for your reference. Please note that it was the opinion of this agency that no significant cultural resources would be affected by the proposed project.

If I can be of any further assistance, please do not hesitate to contact me.

Sincerely,

Frederick Gaske



FLORIDA DEPARTMENT OF STATE

George Firestone
Secretary of State

DIVISION OF ARCHIVES,
HISTORY AND RECORDS MANAGEMENT
The Capitol, Tallahassee, Florida 32301
(904) 488-1480

JUN 27 1983

June 21, 1983

In Reply Refer to:

Frederick P. Caske
Historic Sites Specialist
(904) 487-2333

Ms. Patricia A. Vogel
Environment Engineer
Resource Recovery Project
Hillsborough County Department
of Solid Waste
P.O. Box 1110
Tampa, Florida 33601

Re: Your Letter and Attachment of May 26, 1983
Cultural Resource Assessment Review Request
"An Archaeological and Historic Survey of the
Faulkenburg Road Resource Recovery Facility Tract,
Hillsborough County, Florida" by Dr. J. Raymond Williams,
Christine Newman, Richard Estabrook and William Johnson.

Dear Ms. Vogel:

As per the provisions of Chapter 17-17, Florida Administrative Code ("Rules of the State of Florida Department of Environmental Regulation, Electrical Power Plant Siting"), we have reviewed the above cited report prepared under the direction of Dr. J. Raymond Williams of the University of South Florida.

On the basis of the information contained in their report, we concur with the authors in concluding that the identified isolated prehistoric artifact finds located during the archaeological and historic site location survey do not constitute a significant archaeological site.

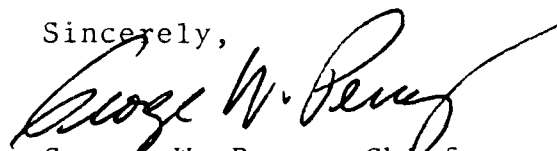
It is, therefore, the opinion of this office that the proposed project is unlikely to affect any significant archaeological or historic resources, and may proceed without further involvement with this agency.

If you have any questions concerning our comments, please feel free to contact us.

Ms. Patricia A. Vogel
June 21, 1983
Page Two

Your interest and cooperation in helping to protect
Florida's archaeological and historical resources are
appreciated.

Sincerely,



George W. Percy, Chief
Bureau of Historic Preservation

GWP:Gcm

cc: Patrick Lewis
William Ockunzzi
Hamilton S. Oven, Jr.
Paul J. Stoller
Dr. J. Raymond Williams

APPENDIX 10.8.2

NATIONAL REGISTER ENTRIES FROM
HILLSBOROUGH COUNTY

SOURCE: HISTORIC TAMPA/HILLSBOROUGH COUNTY PRESERVATION BOARD
June 11, 1984

REC'D JUNE 11, 1984

NATIONAL REGISTER ENTRIES FROM
HILLSBOROUGH COUNTY

The official name of the entry is listed first followed by the date of construction, type of entry, and address.

Union Railroad Station, 1912, building, 601 North Nebraska Avenue, Tampa
Tampa City Hall, 1915, building, 315 East J. F. Kennedy Boulevard, Tampa
Old School House, 1858, building, University of Tampa Campus, Tampa
U. S. Post Office, 1905, building, 601 North Florida Avenue, Tampa
Tampa Bay Hotel, 1891, building, 401 West J. F. Kennedy Boulevard, Tampa
Ward-Taliaferro House, 1890, building, 305 South Hyde Park Avenue, Tampa
Leiman House, 1915, building, 716 South Newport Avenue, Tampa
Stovall House, 1909, building, 4621 Bayshore Boulevard, Tampa
Chapin-Logan House, c. 1890, building, 4607 Bayshore Boulevard, Tampa
Johnson-Wolfe House, 1885, building, 6823 South De Soto Street, Port Tampa
Centro Asturiano, 1914, building, 1913 North Nebraska Avenue, Tampa
Centro Espanol de West Tampa, 1912, building, 2306 North Howard Avenue,
Tampa
First National Bank Facade, 1894, object, 1415 North Franklin Street, Tampa
Ybor Cigar Factory, 1886, building, 1910 Avenida Republica de Cuba, Ybor City
El Pasaje, 1886, building, 1318 East 9th Avenue, Ybor City
Cuban Club, 1907, building, 2010 Avenida Republica de Cuba, Ybor City
Ruskin Women's Club, 1914, building, 508 Tamiami Trail, Ruskin
Plant City Railroad Station, 1908, building, Plant City (downtown)
Fort Foster, 1836, archaeological site, NE Hillsborough County
Cockroach Key, 700-1500 A. D., archaeological site, SW Hillsborough County
Ybor City Historic District, late 19th century, Ybor City, Tampa

OLD PLANT CITY HIGH SCHOOL, 1914, N. Collins St., Plant City

ANDERSON-FRANK HOUSE, Building, 1901, 341 Plant Avenue, Tampa

KRESS BUILDING, building, 811 N. Franklin Street, Tampa

WEST TAMPA HISTORIC DISTRICT

APPENDIX 10.8.3

ARCHAEOLOGICAL AND HISTORICAL SURVEY
OF THE SITE BY J. RAYMOND WILLIAMS, ET AL

AN ARCHAEOLOGICAL AND HISTORICAL SURVEY OF THE FAULKENBURG ROAD
RESOURCE RECOVERY FACILITY TRACT, HILLSBOROUGH COUNTY, FLORIDA

conducted for

The Department of Solid Waste
Hillsborough County, Florida

by

J. Raymond Williams
Christine Newman
Richard Estabrook
William Johnson

May 1983

ABSTRACT

This report details an archaeological and historical survey of a 50 acre tract in central Hillsborough County, Florida, conducted for the Solid Waste Department of Hillsborough County. The Florida Master Site File listed no historic or prehistoric sites known to be present within the tract boundaries. However, 34 sub-surface test pits were excavated to determine if any sites could be located. Testing was done since surveys in nearby, similar areas indicate that there may be sites present even though there is no surface indication of them.

Two chert flakes were recovered in a random testing design. More intensive testing near the location of these cultural materials was then undertaken, but no other material was found and no archaeological site is present. An historic assessment indicated that no significant historic sites have existed on the property. Furthermore, no significant historic events have occurred on the property.

Thus, the project will have no impact on any cultural resources, pre-historic or historic.

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INTRODUCTION

This report details the archaeological and historical survey of the 50 acre Faulkenburg Road Resource Recovery Facility Site tract in Sections 18 and 19, Township 29 South, Range 20 East, in Hillsborough County, Florida (see Figures 1 and 2).

The Florida Master Site File indicated no known sites on the property. However, since sites are known to exist in similar geographical and environmental areas nearby, a survey was recommended by the State Historic Preservation Officer (SHPO), State Division of Archives, History and Records Management. Because ground cover is usually heavy in Florida, there are few surface exposures. Also, buried sites do not always have surface expression. As a result of these factors, it was decided, in addition to a walk-over reconnaissance survey, that sub-surface testing was needed to locate any cultural resources.

Testing began by the authors on April 2, 1983, but ended at noon because of rain. A second half-day of field work took place on April 15, 1983, which concluded the field work portion of the project. A total of 32 person hours was spent in the field portion of the project digging 34 test pits and checking any exposed surface areas within the boundaries of the tract.

The only cultural materials found were two chert flakes. These were recovered in two different test pits. Intensive testing near these pits resulted in no other cultural materials and no site.

Most of the land has been cleared and consists of improved pastureland. Thus, some surface disturbance has occurred in the past.

The tract has one standing structure of recent construction. This structure is associated with the agricultural activities on-going at the property and is not considered significant. Some farm machinery is still stored near this structure.

The planned use of the project area by the Solid Waste Department of Hillsborough County will, then, have no impact on any prehistoric or historic cultural resources.

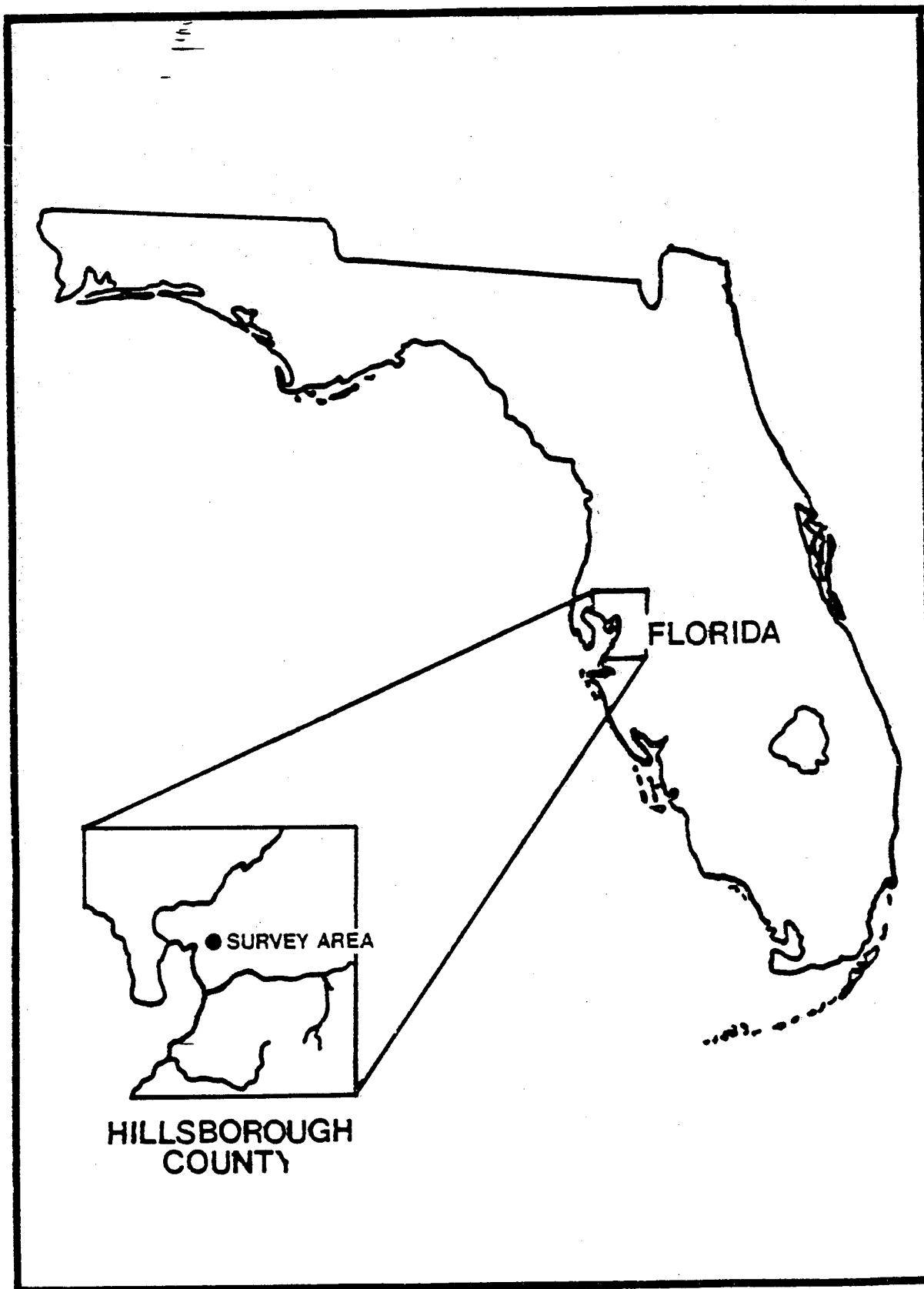


Figure 1. General Area of the Survey Tract.

SUMMARY OF PREVIOUS ARCHAEOLOGICAL WORK IN THE GULF COAST REGION

The major piece of literature that describes the history of archaeological research in the Central Peninsula Gulf Coast Region is Willey (1949). The sources in this short summary of work in these areas of Florida are to a great extent taken from Willey's volume.

Among the earliest published sources that relate to the area are those of Allen (1846) and Conrad (1846). Both Allen and Conrad discussed shell mounds and concluded that they were of natural origin. In fact, little of value was published about the archaeology of the area until the last quarter of the 1800s with two of the writings of S.T. Walker (1880a, 1880b). Walker not only excavated, but noted changes in stratigraphy and ceramic types by level. The last major figure of the Nineteenth Century was F.H. Cushing who excavated several sites including Key Marco far to the south of the Tampa Bay region. Cushing's report (1897) is shy of detail and he had a rather active imagination.

Although there are numerous references to specific sites in the Central Peninsula Gulf Coast Region in the late 1880s, most are accounts of dilettantes and are not worth referencing here. It was the work of Clarence Moore which laid "the groundwork for any synthesis of Florida Prehistory" (Willey 1949:21). Moore's first sojourn to the Gulf Coast was in 1900. Heading south from Clearwater Harbor in the north, he excavated numerous sites (mainly sand mounds) in the Central Peninsula Gulf Coast Region (Moore 1900). He returned to this area of Florida in 1903 and explored the lower reaches of several southern Central Peninsula Gulf Coast Rivers (Moore 1903).

Although Walker and Moore were as scientifically oriented as any other archaeologists of the day, their work leaves much to be desired by modern standards. Moore's greatest contribution is the volume of his work. He did, however, note intersite and regional differences, but his work can be characterized as conservative, if not almost devoid of ideas. Perhaps this was best after the rampant speculations of earlier investigators.

Although W.W. Holmes is associated with ceramic typology for the Eastern United States (Holmes 1903), Florida archaeologists were indebted to him for the order he gave to Moore's great collections (Holmes 1894a). His classifications do not relate specifically to the Central Peninsula Gulf Coast Region, however, he recognized the unique Weeden Island types and discussed their possible West Indies and Yucatan origins (Holmes 1894b).

Two famous archaeological sites were investigated in the Tampa Bay Region in the 1920s, both associated with M.W. Stirling. A burial mound at the famous Weeden Island site in Tampa Bay was excavated in 1923-1924 by J.W. Fewkes and Stirling (Fewkes 1924). Later, Stirling, who by this time was Chief of the Bureau of American Ethnology, returned to dig at the Safety Harbor site, also in the southern

Central Peninsula Gulf Coast archaeological region. Stirling headed the Smithsonian Federal Relief project excavations. Sites such as Perico Island and Englewood, other type sites for cultural periods, were excavated between 1933 and 1936 (Stirling 1935; Willey 1949).

The federally financed excavations were continued by the old Florida State Board of Conservation under the direction of J.C. Simpson (Willey 1949:31). Simpson excavated several sand mounds in Hillsborough County (Bullen 1952) between 1935 and 1938.

Although several other important sites were excavated or re-excavated in the 1930s, such as Griffin's work at Safety Harbor (Griffin and Bullen 1950), it was Gordon Willey whose major synthesis, Archaeology of the Florida Gulf Coast (Willey 1949), laid the foundation for all recent work. Although Willey obtained a considerable amount of data himself, others such as John Goggin, Charles Fairbanks, Ripley Bullen, Hale Smith, John Griffin, M.W. Stirling, R.B. Woodbury, Preston Holder, J. Clarence Simpson and Marshall T. Newman contributed significantly in terms of excavation data and knowledge of Florida archaeology. Willey's book and sites reported through the 1950s and 1960s may be referred to as "old archaeology," but they are the bases for our understanding of the temporal and spatial aspects of the Central Peninsula Gulf Coast Region of Florida. The most recent synthesis of Florida archaeology is that of Milanich and Fairbanks (1980). This book updates what is known throughout the state, but is aimed at overview rather than detail.

The major impetus to increasing archaeological work in the vicinity of the survey tract during the 1970s has been the state and federal requirements for cultural resource investigations in relation to Development of Regional Impact or Environmental Impact studies. The results of these investigations are discussed in detail in another section of this report.

Early research problems in the Florida Gulf Coast area were concentrated on the development of a regional chronological framework (Willey 1949) and its extension into the interior areas more removed from the coast. As discussed above, these cultural historical problems have not been completely solved and many questions remain.

Now, archaeologists have begun to turn their attention to more contemporary problems. Hypotheses testing, site prediction models and explanatory issues are examples of goals of research in more recent survey projects, particularly those covering large numbers of acres. This level of research is discussed more thoroughly in another section of this report.

OTHER SURVEYS NEAR THE PROJECT AREA AND THE USE OF SITE LOCATION MODELS

The 50 acre Faulkenberg Road Resource Recovery Facility tract is, when viewed within a large geographical context, in an area which has been subjected to several archaeological surveys within the past 10 years as a result of both state and federal historic preservation legislation.

To the east is the 868 acre Hopewell Land Corporation property (Piper, Piper and Fryman 1980). To the south is the Brandon Town Center tract of approximately 300 acres (Piper, Hardin and Piper 1982), the Big Bend tract which consisted of 1900 acres (Deming and Almy 1981), the 300 acre Hillsborough County South 201 Facilities tract (Deming 1981) and the Alderman's Ford Park tract of approximately 640 acres (Grange and Williams 1977). To the northwest, two large parcels have been surveyed, specifically, the seven recreation resource sites in the Lower Hillsborough River Flood Detention Area (Daniel, Wisenbaker and Fryman 1979) and the Deltona Corporation's Tampa Palms property (Grange, Fryman and Williams 1979; Rom 1979). These latter two projects total nearly 6000 acres. The I-75 corridor running through western Hillsborough County was also surveyed (Jones 1979). Though narrow, one of the interesting facts about this survey was that it crossed through several varied environmental zones and allows analysis of these zones in terms of site presence or absence. Somewhat more distant in eastern and southeastern Hillsborough County, Western Polk County and in Manatee and Hardee Counties, there have been numerous surveys, both large and small, associated with phosphate mining. These will not be mentioned here, although many are used in other parts of this section and in this report.

These surveys provide a substantial data base for planning survey work on new tracts of land within the region. They indicate that site density is low and many sites are referred to as "fragile patterns" and yield only sparse surface materials. Some sites have been substantial enough to warrant salvage excavations, however. Data from these and other surveys in the Central Gulf Coast Region are all useful in developing a preliminary prediction model of potential site locations prior to the actual field survey phase of a project.

The use of predictive models in archaeological survey has been growing since 1969, but most published examples post date 1975 (King 1978:122-124). Predictive surveys have been successful in west Florida in Hillsborough, Manatee and Polk counties (Grange and Williams 1977, 1978a, 1978b, 1978c, 1979a, 1979b; Grange, Williams and Almy 1977; Almy and Williams 1978; Williams and Grange 1980). The predictive models have been developed in conjunction with both specific surveys and on the basis of more general, county-wide studies (Almy 1976, 1978; Deming 1976, 1980; Grange 1978).

One factor which has been used effectively in site location prediction is soil type. The non-random association of archaeological sites with specific soil types was demonstrated by Almy in Sarasota County (Almy 1976, 1978). Soil itself is probably not the significant factor involved, but soils reflect drainage patterns and may be useful indicators of better drained areas suitable for habitation. Grange (1978) and Deming (1980)

showed, in a county-wide evaluation of site data for Hillsborough County, that a similar non-random association of prehistoric sites with soils was present. The soil type data have been employed in predictive surveys by Almy and Reed (1978), Almy and Williams (1978), and Grange and Williams (1977). Soils also reflect elevation, vegetation and the species of fauna which would be associated with specific vegetation communities. All of these played an important role in prehistoric site location.

A fairly direct association of prehistoric sites with permanent or semi-permanent water sources is also a well known settlement factor (Deming 1975, 1976). In her survey of the Beker mine tract, Deming developed some specific site location prediction models for hunting camps and village sites. Specifically, she indicated that hunting camps would be between 1 meter and 926 meters from a semi-permanent water source, and less than 1200 meters from a hardwood hammock. They would be in the flood-plain or bottom slope, not on upland terrain, and on relatively flat, moderately to poorly drained soil. Village sites would be expected, in her model, to be between 100 and 1200 meters from semi-permanent water, on moderately well-drained soils in an upland location (Deming 1976:37, 94-95).

These are not new predictive factors. A number of archaeologists have noted the consistent association of sites with valley slopes close to water (Hemmings 1975:48; Batcho and Milanich 1978:6; Padgett 1976:45; Wood 1976:75). Miller (1976) found a similar pattern of site location in Hookers Prairie where sites were at the margin of the prairie water source. Deming's contribution was an effort to express the association in quantitative terms for predictive purposes. In a review of Hillsborough County data, Grange (1978) found that two-thirds of the sites were within 742 meters of a permanent water source, skewed closer to the source since 90 percent of the sites are within 579 meters of a water source (Grange 1978:38). This distance factor proved to be very useful during the re-examination of the Duette tract (Grange and Williams 1978c). Willis (1979:114) has shown that 14 aboriginal sites found in the AMAX Pine Level survey are all within 700 meters of water, and 12 of the 14 are within 300 meters which is virtually identical with Deming's mean distance of 299 ± 314 meter distance prediction, and 927 meter maximum limit for 95 percent of all sites (Deming 1975:91).

In the survey of the Hookers Prairie tract, Miller found six sites. Five of them were at the edge of the prairie water source and one was 150 meters distant from the water.

Deming estimated that sites would also be within 1200 meters of a hardwood hammock. It is presumed that such environments contain a significant resource base attractive to prehistoric hunters and gathers (Batcho and Milanich 1978:4). In a recent examination of a Hillsborough County location adjacent to the Hillsborough River (Daniel *et al.* 1979:79), it was found that the ecotonal break between uplands and river valley forest habitats, i.e., the margins of hardwood hammocks, was a primary site location. Another sample on the Hillsborough River showed the average

distance to a hardwood locus to be 1065 feet within a range of 300 to 3000 feet (Grange, Fryman and Williams 1979:28). In the Little Payne survey, the attraction of wooded area resources for prehistoric people was noted (Batcho and Milanich 1978:4).

Willis also showed a high correlation between sites and mesic hardwood locations in the AMAX survey (Willis 1979:114). Miller discussed the importance of live oak hammock strands as site locations and the potential for hydric hammock resources in the Hookers Prairie tract (Miller 1976: 20, 22).

Surveys of the two tracts of land that include the South Prong of the Alafia River--the Lonesome Mine (Hemmings 1975) and the Borden Big Four (Martin 1976)--clearly show that sites are located "in predictable locations along the valley slope-floodplain ecotone" (Hemmings 1975:48). Both Martin's and Hemmings' surveys were exclusively pedestrian, and involved no subsurface testing for buried sites that have no surface expression. Had they included this form of survey methodology, results could have been different and another perspective might have been added to site location prediction models.

PREHISTORY

The survey tract lies within what has been defined as the Central Peninsula Gulf Coast archaeological region (Milanich and Fairbanks 1980) which serves as both a geographical and cultural region. Geographically, the Central Peninsula Gulf Coast Region runs from Pasco County south to Charlotte Harbor and includes southern Pasco County, all of Pinellas, Hillsborough, Manatee and Sarasota Counties, the southwestern portion of Polk County, and the western portions of Hardee, DeSoto and Charlotte Counties. Two factors should be noted, however, first, these boundaries are "somewhat arbitrary" (Milanich and Fairbanks 1980:16), and second, although used as a cultural region, there is little cultural disparity between this and Florida's other cultural regions prior to 1000 B.C.

Prehistoric sites from all periods of the cultural sequence are found in this region. The cultural sequence begins with the Paleo-Indian Period, dating from the time that humans entered Florida (circa 14,000 years ago) to about 6500 B.C. There are few properly excavated sites dating from the Paleo-Indian Period in the Central Peninsula Gulf Coast Region, and site distribution is known primarily from scattered finds of cultural materials that date from this period.

One recently excavated site which has not yet been officially reported (Daniel and Wisenbaker n.d.) is the Harney Flats Site (8-Hi-507) in north central Hillsborough County, approximately two miles east of Temple Terrace. This site is located on a scarp overlooking Harney Flats, a low, swampy area. Although a later Middle Archaic Period component exists at the site, the Paleo-Indian component of the site is of primary interest because it contains more than a two meter deposit within a homogeneous sand matrix. Preliminary analysis, based on tool types and use wear, indicates that Harney Flats was a habitation site, or base camp. Furthermore, it is the only Paleo-Indian Period site with an extensive, controlled excavation by professional archaeologists in Florida. When analysis is complete and the report is published, it will contribute extensively to knowledge of this early period of human occupation in Florida.

Examples of possible Paleo-Indian artifacts are found at the Kellogg Fill (Warren 1970), Apollo Beach (Warren 1968b), Caladesi Causeway (Warren 1968a), Bear Creek (Warren 1967), an unnamed site near State Road 584, the Boot Ranch site near Oldsmar (Warren 1966), and the Fish Creek site in Tampa (Karklins 1970). It might be noted that most of these are isolated finds, or artifacts from dredged sites and dated relatively late within the Paleo-Indian Period.

It has long been suspected that prehistoric sites along bays, estuaries, rivers and coastal areas were inundated by the rising sea level at the end of the Wisconsin glaciation. Warren (1963, 1964, 1970) reported finding Archaic and Paleo-Indian cultural

material in fill that had been dredged along old, now underwater river channels in Tampa Bay, and in Boca Ciega Bay. The modern dredged channels in Tampa Bay follow the routes of the natural channels, and the natural channels were old river bottoms. There is reason to believe, then, that the rivers which now flow into Tampa Bay once flowed over a land surface when the sea level was lower, and that prehistoric people lived on the banks of these rivers. Unfortunately, little of this early cultural material was discovered in situ.

More recent finds, dating to 10,000 B.C. have been excavated underwater with excellent provenience control of artifacts, human skeletal material and associated faunal and floral remains. These discoveries at Warm Mineral Springs (Cockrell 1973:3; Clausen et al. 1975) and at Little Salt Springs (Clausen 1972:1-3, Clausen et al. 1979) are among the earliest documented finds in Eastern North America. The human skeletal material indicates that the individuals were buried, above water, when the water was 60 - 90 feet below present sea level.

The Paleo-Indian Period is followed by what is called the Archaic Period which dates from approximately 6500 to 1200 B.C. This period is usually divided into Early, Middle and Late stages. Early Archaic dates from 6500 to 5000 B.C., Middle Archaic from 5000 to 3000 B.C., and Late Archaic from 3000 to 1200 B.C. (Milanich and Fairbanks 1980). Environmental and cultural changes, which are of course related, mark the introduction of this period. The land became less arid and pine-palmetto forests replaced the hardwood forests (Milanich and Fairbanks 1980). Whereas Paleo-Indian peoples had hunted the large Pleistocene mammals (though they hunted the smaller ones too) which died out at the end of that period, Archaic peoples hunted deer and smaller animals and learned to efficiently exploit their environment for food. Population increased, as did the number of sites.

Again, there are few reported sites properly excavated with reliable provenience data. This situation has improved with data from several Archaic sites recently excavated in Hillsborough County by the State Division of Archives. These sites include the Deerstand Site (8-Hi-483), which Daniel (1982:161) considered to be a "short-term extraction station" occupied throughout the Archaic Period. Further, he stated (1982:161) that "it appears that the area was utilized as a biface workshop where quarried material from nearby sources was finished into tools." Other sites recently excavated within this program include 8-Hi-4500, an Early and Middle Archaic Period site (Daniel and Wisenbaker:1981), and Wetherington Island (8-Hi-473), a quarry site, which was utilized by aboriginal populations for lithic procurement during the Middle and Late Archaic Periods (Chance 1982:9).

Archaic sites are known from both coastal and hinterland areas although they differ considerably. Whereas Paleo-Indian Period sites probably represent remains of nomadic peoples, Archaic sites, at least those along the coast, represent a more sedentary or semi-sedentary way of life based on the acquisition of a relatively reliable year-around food resource--shellfish and other marine foods.

Examples of Early Archaic sites are the Apollo Beach site (Warren 1968b), the Bear Creek site (Warren 1967) (these are multi-component sites with both Paleo-Indian and Archaic occupations), the Palmer site (Bullen and Bullen 1976) and the Crystal Beach site (Wolf 1975). Late Archaic is primarily distinguished from the Early Archaic by distinct forms of projectile points (Bullen 1975). Late Archaic sites are represented by components at the Pinellas Point site (Goodyear 1968), Culbreath Bayou (Warren et al. 1967), and the Maximo Park Beach site (Williams 1979). These are coastal midden sites in or near Tampa Bay. Archaic sites can be divided into various functional categories, however. For example, in addition to coastal midden (habitation) sites, there are quarries, large central-base villages, special use camps, etc. The latter tend to be found inland from the present coast. Undoubtedly, the same people occupied many of the different functional categories of sites at different times of the year as a result of seasonal exploitation of food and other resources such as stone. One recently excavated Late Archaic site in interior Hillsborough County is the Mizelle Creek One Site (8-Hi-374) (Swindell 1977). Swindell's analysis of cultural materials from this site enabled us to understand the function of interior or hinterland sites to a much greater degree. Recently two sites on Amax Phosphate, Inc. in southeast Hillsborough County were excavated by Welch (1983). One site (8-Hi-425) was, to a great extent, previously destroyed as a result of road borrowing activities. The other (8-Hi-418), had surface areas damaged as a result of borrowing and clearing, but extensive testing at the site has given us further insight into interior sites. Basically, 8-Hi-418, the South Prong I site, appears to have been utilized over a long chronological time period, but by short-term occupants. The same is true for 8-Hi-425, the Cates Site. Both appear to be hunting camps used by seasonal people or migrating bands since the lithic materials resulted primarily from secondary reduction activities (Welch 1983).

The first ceramics appear at the end of the Archaic Period and mark the beginning of the third cultural period--the Orange. In west-central Florida, this period dates from approximately 2000 to 1000-500 B.C. (Milanich and Fairbanks 1980:23). As the overlapping dates indicate, it is difficult to define the end of the Archaic and the beginning of the Orange Period. The Orange Period is sometimes considered a continuation of the Archaic lifestyle with the addition of ceramics. However, the presence of pottery does signify an increasingly sedentary pattern of living as well as food storage. Orange Period ceramics are tempered with vegetable fibers and frequently decorated. The presence of these ceramics at sites enables us to cross-date the strata since they can be used as a horizon marker. Orange Period ceramics have been found at the Kellogg Fill (Warren 1970), Maximo Point (Bushnell 1962; Sears 1958), the Palmer site (Bullen and Bullen 1976), Perico Island (Bullen 1950), and at the Yellow Bluffs-Whittaker Mound (Milanich 1972). All of these sites are in the Tampa Bay area south to Sarasota.

Following the Orange Period, a greater extent of cultural heterogeneity develops in Florida, and people's technologies more efficiently adapt to their local or microenvironmental settings. In the Tampa Bay area, the next period is the Deptford, dating from approximately

500 B.C. to A.D. 100-200 (Milanich and Fairbanks 1980). A great deal of research has been concluded on this period, and our understanding of it in relation to earlier periods is much more complete. However, this knowledge applies mainly to north Florida and Georgia, while little is known of its manifestation in the Tampa Bay area. Although the Deptford culture extends to Charlotte Harbor, little evidence of it is found in the Central Peninsula Gulf Coast region. Sites which produced Deptford cultural materials in the Tampa Bay area were the Bay Pines site in Pinellas County (Braley 1978) and the Culbreath Bayou site (Warren *et al.* 1967). The Deptford Period is characterized by distinct types of check-stamped pottery. The period also marks the beginning of burial mound construction in Florida and increasingly complex social and ceremonial activities associated with the burial of people in prepared earthen structures.

Following Deptford is the Weeden Island Period, dating from approximately A.D. 200-1300 (Milanich and Fairbanks 1980). Weeden Island is divided into several regional variations and the Tampa Bay Area lies within the Central Coast Peninsula (Manasota) culture. Weeden Island is also distinguished by distinctive types of ceramics, usually sand tempered, although some limestone tempered wares similar to those further north do occur. The Weeden Island culture has a wide geographical range including Florida, Georgia and Alabama. The site type is the famous Weeden Island prehistoric complex in Tampa Bay (Fewkes 1924; Willey 1949; Sears 1971). Other sites in the Tampa Bay area include the Thomas Mound (Bullen 1952), Cockroach Key (Walker 1880a; Moore 1900; Bullen 1952), Terra Ceia (Bullen 1951), Bay Pines (Gagel 1976; Braley 1978), and the Manatee Springs site (Bullen 1953). Inland sites also exist and may include the Stanley Mound in eastern Manatee County (Deming 1975) and the Cypress Creek site (8-Hi-471) which Almy (1982:179) believed was "utilized for short intervals as a special extractive task camp rather than a village or base camp." This site extends, Almy thought (1982:174-178), from the Deptford through Weeden Island Periods.

A sedentary village life is indicated and village sites are found both along the coast and inland. Villages frequently have associated mounds, but mounds may not be in the village area. Food resources seem to remain a result of hunting, gathering, and the utilization of marine life. No horticultural remains have been found, at least in sites in the Tampa Bay area, but they have been further north, and it is assumed that domesticated plants were becoming increasingly more important as a food resource and are linked to the increase in population, complex ceremonialism, and the growth in the political, social and economic substructures of the culture.

The last prehistoric manifestation in the Tampa Bay area is the Safety Harbor Period. This represents a continuation of Weeden Island traits with the infusion of Mississippian ideas from the north. Safety Harbor sites are more numerous than those of the Weeden Island Period and range from large coastal ceremonial sites to small inland sites. The type site is the Safety Harbor site at Phillipe Park (Griffin and Bullen 1950; Willey 1949), but other large coastal sites exist. Examples are Maximo Point (Bushnell 1962; Sears 1958),

Narvez (Bushnell 1966), the Tierra Verde Mound (Sears 1967), the Palm River Midden (Karklins 1968) and the sites on Rocky Point (Neill 1968). Inland sites include Buck Island (Bullen 1952) just north of the University of South Florida. Again, the coastal sites are most easily identified, but the inland areas of the state were undoubtedly utilized as an area of food procurement. Early archaeological research was not aimed at locating or excavating these sites.

According to Bullen (1978), a chiefdom level of sociopolitical organization developed during the Safety Harbor Period as reflected in the complexity of the sites. Burials were frequently in cemeteries as well as mounds, the construction of large pyramidal (ceremonial and residence) mounds occurred, and the use and variety of cultigens must have increased. Population must have expanded as more food resources were efficiently exploited.

Again, as with several of the earlier periods, ceramics provide the means of identification of Safety Harbor Period sites. In addition, however, these sites are also distinctive in other ways. These distinctions include new varieties of projectile points, village physical layout and artificially constructed mounds of sand and shell.

The prehistoric era was brought to an end by the Narvez expedition of 1528. Evidence of Spanish contact or influence with Safety Harbor peoples is indicated by the presence of historic period artifacts in Safety Harbor site contexts. However, the introduction of new diseases and the disruption of their cultural systems led to an end of the Safety Harbor culture as defined archaeologically. The vacuum created by the decline of aboriginal Florida populations, in conjunction with European and American political pressure in Georgia, caused Muskogean speaking peoples (Creeks, later called Seminoles) to migrate into Florida in the early 1700s. This era, however, is better understood from historical rather than archaeological studies.

A review of the prehistory of the area, then, indicates that prehistoric sites from any cultural period from 12,000 B.C. to A.D. 1500 might be found on the survey tract.

HISTORICAL ASSESSMENT

The purpose of this historical assessment is to ascertain whether the survey tract in parts of Section 18 and Section 19 of Township 29 South, Range 20 East, Hillsborough County, Florida contains any significant historic sites or remains that may be eligible for inclusion in the National Register of Historic Places. A study was conducted of pertinent state documents, local records, maps and other primary and secondary sources that pertained to the study area. This research indicates that the area contains no significant historic sites or remains.

While contact between the western world and Florida's west coast occurred as early as the first half of the Sixteenth century, Narvaez in 1528 and DeSoto in 1539, little knowledge was gained from these early expeditions. It was not until the 1800s that the first white settlers came to the Hillsborough County area. Before this time a few sporadic settlements had sprung up in this area but, due to the continued conflicts between the Seminoles and the settlers, only a few settlements resulted.

In 1821, Florida became a territory of the United States. Three years later Catonment (later Fort) Brooke was established on the south side of the mouth of the Hillsborough River where Robert J. Hackley had started a plantation (Guthrie 1974:10). Catonment Brooke was to become the "most important fort in Florida, often the headquarters of the Army in Florida and focal point of Indian removal" (Chamberlain 1968:63).

Along with the establishment of the fort, settlements began to emerge catering to the fort and in defiance of the Camp Moultrie Agreement of 1823. This agreement gave the Indians the right to settle the lands below a line just south of Ocala known as the Gadsen Boundary (Guthrie 1974:10). Scrimmages between Indians and settlers resulted and proved to be major factor in retarding development in the Hillsborough County area (Historic Tampa/Hillsborough County Preservation Board n.d.:1).

In 1830 the U.S. War Department established a military reservation around Fort Brooke of "16 miles square" (Chamberlin 1968:42). The survey property is included within these reservation lands since this boundary extended to the east of the survey tract (Florida Department of Natural Resources 1852). Apparently no effort was made by the military to remove any of the civilians that had homesteaded in any of the lands included within the reservation (Chamberlin 1968:43).

In 1836 an act requiring the entire Seminole Tribe to be reestablished in Arkansas resulted in the Second Seminole War, a war that was to last for seven years. During the first part of this period Hillsborough County saw little growth. At the end of the Second Seminole War the Fort Brooke reservation was reduced to "four miles square." In 1848, a further reduction to the limits of the military quarters took effect (Chamberlin 1968:111).

As the Second Seminole War was coming to an end, central Florida lands became available for settlement. The Armed Occupation Act of 1843 brought additional settlers to Central Florida. Arms, ammunition and acreage were supplied to people willing to occupy, defend and build upon lands for at least five years (Guthrie 1974:13). While many loci in Hillsborough County were occupied during this time, U.S. Government surveys conducted by Randolph (1843) and later by Hopkins (1853) make no mention of settlements in either Section 18 or Section 19. The lands within these sections consisted of "third rate pine" and swamp land (Randolph 1843).

While not within the specific survey tract, two roads did cross close to the property. To the north, the "Road to Thonotassassa" was illustrated on the Plat Map. It was later to become the Fort Mellon Road leading to present day Sanford, Florida (Chamberlin 1968:25). To the south, the "trail to Fort Alafia" is shown on an 1852 Plat Map of Township 29 South, Range 20 East (Florida Department of Natural Resources 1852).

No settlements are recorded in the areas outlying Tampa from 1868 to 1870 (Robinson 1928:51-52). In 1872, and again in 1884, a large portion of Section 18, including the survey property, was deeded to the Plant Investment Corporation (Florida Department of Natural Resources 1845). The Plant Investment Corporation was formed by several wealthy individuals: H.B. Plant, Henry M. Flagler, Morris Ketchum Jesup and William Thompson Walter. They controlled railroad lines, steamship lines, telegraph lines, hotels and real estate in Florida (Johnson 1965:144).

Another railroad company, the Jacksonville, Tampa and Key West Railroad, was to construct a line between Jacksonville and Tampa. This line, now owned by Seaboard Coastline, runs just south of the survey tract. They had been unable to secure the capital for construction of one section of the railroad track. In 1883 the Plant Investment Corporation bought this section of the route and the line was completed seven months later. This line played a major role in the development of the region. The line was extended to Port Tampa where, within the coming years, phosphate and tobacco were to become important export products (Johnson 1965:150-152). In 1902 much of the Plant Investment Corporation was sold to the Atlantic Coastline Railroad (Johnson 1965:182).

The remaining land in the survey tract was deeded in 1880 to the Florida Central and Peninsular Railroad. While completing a line that was to run from Tampa to Plant City, just south of the survey tract, problems arose with settlers on the edge of the old military reservation boundary. The railroad crew was forced to work between Saturday and midnight Sunday in order to avoid a court injunction. When the courts opened on Monday, the lands had already been crossed. The line was completed in 1890 with no further problems (Johnson 1965:97).

The Florida Central and Peninsular Railroad, incorporated from all properties of the Florida Railway and Navigation Company in addition to several other small railways, later merged with Florida Northern Railroad Company and in 1893 became Florida Central and Peninsular

railroad (Johnson 1965:98-100). As the Florida Central and Peninsular railroad, it linked lines from Florida to South Carolina. In 1903 it was taken over by the Seaboard Air Line Railroad Company (Bowman n.d.: 45; Johnson 1965:101).

During the 1880s in Florida, large grants of land were deeded to railroads for their investment in money, labor and equipment (Covington 1957). The railroads developed increased access to areas, thus stimulating growth and providing lines to other parts of the United States. At this time, citrus, cattle, lumber and phosphate became the major economic growth industries in the area.

Today the survey tract is still relatively undisturbed, improved pastureland. The two railroad lines running to Plant City, the Atlantic Coastline to the north of the survey tract and the Seaboard Air Lines to the south, merged in 1960 into the Seaboard Coast Line Railroad (Saunders 1978:202). The Seaboard Coast Line presently owns the survey property.

A comparison of the 1956 and the 1981 photorevised U.S.G.S. Brandon Quadrangle Maps indicates that additional construction to the south of the survey tract has occurred since 1956. This includes small railroad lines extending from the main track which do not appear on the 1981 Quadrangle Map.

In conclusion, a study of historic documents pertaining to the survey tract indicates there have been no significant events which have occurred and there are no significant historic sites or remains within this area that may be considered eligible for inclusion in the National Register of Historic Places.

ENVIRONMENTAL BACKGROUND

Geology, topography, soil association, relative elevation and nearby water resources are important factors to be considered in archaeological site locations. These factors have been determined to be useful as indicators of prehistoric land use and settlement patterning.

The survey tract is positioned on the Hawthorne Formation, a middle Miocene impermeable layer of phosphoritic sands, clays, marls and sandy limestones formed by the erosion of limestone strata which had accumulated during the Tertiary Period of the Cenozoic Era. Subsequent fluctuations in average global temperatures caused alternate periods of glaciation and melting, resulting in an advancing and receding shoreline. This action formed five terraces above the Hawthorne Formation. These terraces are divided by escarpments where the ancient shorelines existed (see Almy 1982). Weathering of these terraces by the action of streams and rivers gave rise to the present day topography of the Tampa Bay region.

Between approximately 14,000 and 7000 years ago, a relatively rapid rise in sea level affected the Paleo-environment of the Tampa Bay region. During this time, a cooler and dryer environment prevailed. According to Daniel and Wisenbaker (1981), much of Florida must have resembled the great Serengetti Plains of East Africa, with large herds of browsing and grazing herbivores being pursued by the many carnivores that also existed at that time.

Later, a warming trend developed and the vegetation slowly evolved into long-leaf pine forests, hammocks, marshes and cypress swamps which are typical of peninsular Florida today. Accompanied with these changes in vegetation came changes in the faunal community, reflected in undisturbed portions of present day central Florida.

The present topography of the area surrounding the survey tract is that of gently rolling land. The lower areas border creeks and swamps and rise to higher, sloping regions containing oak and pine. Extending further away are the pine flatwoods.

The soils on the survey tract are Leon fine sand, Leon fine sand, light-colored surface phase and Rutlege fine sand. The Leon fine sand and the Leon fine sand, light-colored surface phase are somewhat poorly drained soils with a slow surface runoff. The latter occupies slightly higher, better drained positions than the former and both are strongly acidic. The Rutlege fine sand occurs on level or nearly level relief or in slight depressions in the wet areas throughout the flatwoods. It is a strongly acidic and poorly drained to very poorly drained soil. Part of the year, areas of Rutlege fine sand are covered by several inches of water (Leighty et al. 1958).

The survey tract ranges in elevation from 25 to 40 feet above sea level, with only a small portion (5 acres) at the 40 foot level. During the archaeological survey, this small portion was noted as being the only

relatively dry area after heavy rains.

Water resources include small ponds around the survey tract as well as seasonal ponds on the survey tract (occurring on the Rutlege fine sand). Also, Sixmile Creek is located approximately 1.75 miles west of the property and serves as the major drainage for the area.

The natural vegetation occurring on the survey tract includes wiregrass, saw-palmetto, pine, scrub live-oaks, short grasses and shrubs (Leighty et al 1958). According to Daniel (1982), some of the well known mammals that inhabit eastern Hillsborough County (a similar physiographic region to the survey tract) include: bobcat, black bear, cottontail rabbit, gray fox and white-tailed deer (as well as others). The white-tailed deer is considered to be the most important of the above to the pre-historic peoples of this area. Also listed are some of the birds, amphibians, reptiles and fishes that may have been utilized by prehistoric people.

Historically, the original 19th century survey of this Section lists the area as "third rate pine" and suggests that the land might be utilized for grazing (Randolph 1843, Hopkins 1853). According to the soil survey map (Leighty et al 1958), the land was still in its natural state in 1958, therefore, clearing activities were relatively recent. Presently the survey tract is in improved pasture with a few pine trees in the western edge. Approximately 10% of the survey tract was noted as being under several inches of water, presumably reflecting the areas of Rutlege sand.

In summary, the survey tract offers minimal resources for prehistoric exploitation. The historic land use appears to have had a minimal impact on any site that might be situated on the property.

RESEARCH DESIGN: RESEARCH STRATEGIES AND GOALS

A research design is a plan to coordinate archaeological investigative activities from the inception to the completion of a project. This plan should minimally account for three considerations. It should make explicit the goals and intentions of the research. It should logically define the sequence of events to be undertaken in pursuit of the research goals. The research design should also provide a basis for evaluating the findings and conclusions drawn from the investigation. The assessment survey discussed in the Request for Services does not require a multi-stage research design, yet a statement of research goals and a discussion of research strategies is in order.

The goal of this archaeological and historic site assessment survey is to locate and document the existence of any evidence of potentially important historic or prehistoric behavior within the survey tract. The survey is the traditional and most cost-effective means of locating evidence of historic and prehistoric human behaviors within spatially defined boundaries (Schiffer et al. 1978). These behaviors usually manifest as archaeological or historic sites, historic structures, or non-site loci. Reconnaissance surveys attempt to locate all evidence of human behaviors that are archaeologically discernable with current investigative techniques. Survey techniques need to be exhaustive. These techniques must be able to document any material manifestation characteristic of any cultural period, yet be cost effective, as not to expose the contracting party to excessive expense. Toward this end, the investigation of the survey property employed a non-exclusive survey with systematic and judgementally placed sub-surface testing (King 1978:36) within a four part research strategy.

The research strategy is composed of four interrelated and roughly sequential components: the background investigation, the historic documents search, the formulation of an aboriginal site location predictive model, and the field survey. The background investigation involved several inquiries. A perusal of the relevant archaeological literature produced a summary of previous archaeological work in the Gulf Coast region and a discussion of previous survey work undertaken near the project area. The Florida Master Site File was checked for any previously recorded sites within the tract and to provide an indication of the prehistoric settlement and land-use patterns for the area. All current soil surveys, vegetation maps, and relevant literature were consulted to provide a description of the physiographic and geological region of which the survey tract is part.

The historic documents search involved research of the original township plat map, tract book entries and surveyor's field notes, and all relevant secondary historical sources for any information pertaining to the existence of historic structures, site of historic events, and historically occupied or noted aboriginal settlements within the survey tract area. An aboriginal site location predictive model for the survey tract was formulated based on the variables of soil drainage characteristics,

distance to permanent sources of potable water, and distance to a hardwood hammock. The field survey involved an on-site investigation consisting of a pedestrian transect survey and sub-surface investigation. The first two components the background investigations and the historic documents search, are discussed in separate sections of this report. The last two components, the aboriginal site location predictive model and the field survey, will define the present discussion topics.

Cultural resources surveys in the Central Gulf Coast region of Florida have successfully employed site location prediction models to assist in the location of archaeological resources (Grange, Fryman and Williams 1979; Grange and Williams 1983; Kammerer 1980). These models have been based on a variety of physiographic and hydrologic variables, three of the most salient being the relative location of potable (fresh) water, the distance from a hardwood hammock, and soil drainage characteristics.

The survey tract is characterized by three soil types: Rutlege fine sand (Rc), Leon fine sand (Lh), and Leon fine sand, light-colored surface phase (Lk). All three soil types are described as poorly to very poorly drained (Leighty *et al.* 1958). Almy (1976, 1978), and others, have established that prehistoric sites tend to co-occur with well-drained soils. Conversely, recent studies of site location and soil drainage characteristics for the combined known sites in Hernando, Citrus, Sumter, and Marion Counties produced an association between aboriginal site location and the poorly drained soil associations (Withlacoochee Regional Planning Council 1982). Deming and Almy (1983:18) interpret this apparent conflict in the data by noting that a large portion of the sites in the WRPC site sample are coastal sites, and could be biasing the study results.

Hardwood hammocks do not presently exist in the survey tract or in the surrounding area, nor does the area contain soils which would support such vegetation (Leighty *et al.* 1958). The potable water variable is of little use in microstratifying the survey tract as the entire survey area is within 1200 meters (Deming 1980) of some permanent or intermittent source of freshwater.

Site location prediction models, such as the one described here, are usually able to microstratify the survey tract into three zones, based on the relative co-occurrence of soil drainage characteristics, vegetation, and the location of sources of potable water. High probability areas for site location suggest areas with well-drained soils, hardwood hammocks, and adjacent freshwater sources, with which archaeological sites, historical sites, and non-site loci frequently co-occur. Medium probability areas for site location, are areas with fair to poorly drained soils, and either an adjacent water supply or a nearby hammock, with which cultural resources sometimes co-occur. Low probability areas for site location are associated with poorly drained to flooded soils and have neither an adjacent water source nor a nearby hammock.

Based on the presence or absence of these physiographic variables, and the suggested co-occurrence rates between these variables and prehistoric and

historic site locations, the survey tract can not be microstratified, but categorized as a single unit, medium probability zone for cultural resource location. This determination, and the relative size of the survey tract, suggest the use of a single survey sampling methodology and a moderately intensive regimen of sub-surface testing.

A non-exclusive survey with sub-surface investigation was chosen as the basis for the field survey strategy. A non-exclusive survey, as defined by King (1978:35) implies that survey coverage is complete, and no part of the project area is excluded from inspection. This is not to suggest that all parts of the survey tract will be covered, as total coverage will not be undertaken. Whenever survey coverage is not total, some form of sampling the area must be employed.

Transects were chosen as sample units and were preplotted on aerial photographs prior to the field investigation. Transects were placed at 100 meter intervals, running east west across the survey tract. The initial transect line was 25 meters south of the northwest property boundary. Each subsequent transect was then set in relation to the first at intervals of 100 meters. Five transects, including the initial transect, were established across the tract. The southernmost transect had to be moved north to include the southernmost extension of the property. The transect interval was shortened to 65 meters for this transect (see Figure 2).

The systematic sub-surface tests were placed along the transects at 100 meter intervals. Sub-surface test locations were preplotted on aerial photographs prior to the field investigation. Twenty-six systematic sub-surface tests were anticipated. The initial sub-surface test location was preestablished along the northernmost transect 50 meters from the west side of Faulkenberg Road. The sub-surface sample grid was established from this point. All sub-surface test locations were established along the transects, and within the sample grid, at 100 meter intervals (see Figure 2).

The location of four sub-surface tests were not predetermined, but were left to the discretion of the field archaeologists. This allowed for some flexibility in the field methodology so that unforeseen events could be accommodated, and any areas that intuitively "looked promising" could be investigated.

In sum, the field survey strategy called for five pedestrian transects, one every 100 meters, and 26 systematic and 4 judgementally placed sub-surface tests.

FIELD METHODOLOGY

The field methodology formally operationalized the field survey strategy. A four person field crew was employed and divided in half to form two crews of two persons each. The field work was initiated on April 2, 1983, but rain forced postponement. The field work was continued on April 15, 1983 and the survey was completed. All transect locations were determined from the base points indicated on the aerial photographs and were oriented by compass sightings. One crew was responsible for the two northernmost transect and sub-surface tests. The second crew was assigned to the remaining three transects and sub-surface investigation. The field survey was completed by the four person crew in 32 person-hours.

The surface investigation involved each of the two person teams walking transects and inspecting the ground surface. One person was responsible for compass readings and pacing off the distance between tests. The second person was responsible for visually inspecting all ground surfaces, animal burrows, and exposed areas. As the survey tract is entirely improved pasture with planted grass ground cover, visibility was considered very good. No problems were encountered during the surface investigation, and all transects and test pit locations were identified. A check of all transect locations indicated that all transects and sub-surface test locations are accurate to within five meters. No aboriginal or historic material culture was located during the surface investigation.

All systematic sub-surface tests were 30 to 40 centimeter round soundings, performed every 100 meters along the transects as predetermined on the aerial photographs. All soil removed from the tests was screened through one-quarter inch hardware mesh cloth. Observations regarding soil stratigraphy, soil condition, and the provenience of all cultural materials were recorded in the field. Test pits ranged from 60 to 110 centimeters in depth, with an average pit depth of 84 centimeters. Water was always encountered between 70 and 90 centimeters below ground surface. Testing continued until removing the soil from the test was no longer possible. All sub-surface tests were backfilled as completed. One flake was found in test pit 13, at approximately 25 centimeters below the ground surface. A second flake was discovered in test pit 18, at a depth of approximately 70 centimeters. Since these two test pits were within 100 meters of each other, the judgemental sub-surface testing focused in this area (see Figure 2).

Nine sub-surface tests were judgementally placed at 25 meter intervals in the vicinity of test pits 13 and 18. These tests were executed in the same manner as the systematic tests described above, except they were placed at the discretion of the Principal Investigator. Three tests, numbers 27, 28, and 29 were placed at 25 meter intervals on a north-south axis between the flake bearing test pits. Three tests, numbers 30, 31 and 32, were undertaken in the area around test pit 18. Two final tests, numbers 33 and 34, were undertaken 25 meters east and 25 meters north of test pit 13 respectively. No material remains were recovered from any of the judgemental sub-surface tests.

In sum, five pedestrian transects were traversed as part of the surface investigation, with negative results. Twenty-six systematically placed sub-surface tests were executed with positive results in two tests, numbers 13 and 18. Nine sub-surface investigations were undertaken in the areas between, and adjacent to, test pits 13 and 18. These tests failed to recover any historic or prehistoric remains.

ARTIFACT ANALYSIS AND LABORATORY PROCEDURES

All material remains recovered during the field investigation were returned to the University of South Florida Archaeology Laboratory for cleaning, labeling, and analysis. The material remains consisted of two chert flakes recovered from testpit numbers 13 and 18. No diagnostic artifacts were recovered. The recovered material was washed, dried, and labeled with the number of the testpit from which it was recovered. Each flake was then measured, weighed, and subjected to microscopic investigation. Each flake was examined under a Bausch and Lomb binocular microscope, (7x to 30x power), for evidence of usewear, modification, and determination of the stage of lithic reduction (the stage at which each flake was removed).

The chert flake from testpit 13 was recovered at a depth of 25 centimeters below surface. This non-thermally altered chert flake is 1.50 centimeters long, 1.46 centimeters wide, 0.23 centimeters thick, and weighs 0.5 grams. The striking platform is laterally faceted and crushed, and the ventral face exhibits a diffuse bulb of force. When the flake was originally removed, it terminated in a step fracture. This flake is classified as a non-decortication thinning flake, usually considered the result of late stage, or tertiary reduction.

The second flake was recovered from testpit 18 at a depth of 70 centimeters below surface. This non-thermally altered chert flake is 1.08 centimeters long, 1.13 centimeters wide, 0.16 centimeters thick, and weighs 0.15 grams. The striking platform is not prepared or modified, and the ventral face exhibits a diffuse bulb of force. The flake terminated in a step fracture when originally removed, and shows evidence of damage in the right lateral margin. This flake is classified as a non-decortication thinning flake, usually considered the result of late stage, or tertiary reduction.

Both flakes can be classified as non-decortication thinning flakes. It is possible that both are associated with the tertiary, or late stage of the lithic reduction continuum, or associated with the maintenance or resharpening of stone implements sometime during the 14,000 years of human occupation in this area. As the specimens were encountered 100 meters apart, it is assumed that they were the result of discrete maintenance or reduction episodes.

RESULTS, CONCLUSIONS AND RECOMMENDATIONS

A non-exclusive pedestrian survey and sub-surface testing scheme was conducted on the 50 acre tract. This survey was designed on the basis of previous archaeological and historical surveys in nearby areas. The results of these surveys have provided a basis for a prediction model used in prehistoric site location. No surficial cultural materials were found during the pedestrian survey. Two chert flakes were recovered from the sub-surface testing phase of the field investigation. These were found in test pits 13 and 18, located 100 meters apart. These two flakes resulted from prehistoric activity on the tract, this activity being associated with a late stage in the manufacture or rejuvenation of stone tools. The excavation of 8 other test pits near these activity loci did not produce any other cultural materials. Thus, no evidence of habitation or even a short-term camp site exists. Isolated finds such as these have been referred to as "non-site loci" (Batcho and Milanich 1978). They provide evidence of prehistoric activity on the survey tract, but are not considered to be what is normally termed a prehistoric "site"; neither are the activity loci considered significant in terms of National Register of Historic Places criteria. Further data recovery (excavation) would yield very little, if any, cultural materials. The significance of the information lies in the fact that archaeologists are now aware of this prehistoric activity at these particular loci. This information is now recorded. No further archaeological investigation is recommended.

The historical documents research provided insight into the historic period use of the tract and its immediate environs. This research concluded that the survey tract has no significant historic period cultural resources: a fact that was confirmed by the field investigations. Only one modern farm related building is located on the tract and it is not a significant architectural structure. No further historical research is recommended.

Based on the research and investigations undertaken during the study, it is concluded that the projected use of the property will not impact any historic or prehistoric cultural resources.

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Wood, Lewis N., Jr.

- 1976 An Archaeological and Historical Survey of the CF Industries, Inc. Property in Northwestern Hardee County, Florida. University of South Florida, Department of Anthropology, Archaeological Report, No. 2, Tampa, Florida.

BRIEF RESUME OF SENIOR AUTHOR

J. Raymond Williams

1958 B.S. Missouri State University (history)
 1962 M.A. University of Missouri (anthropology)
 1971 Ph.D. University of Missouri (anthropology)

Research interests: Southeastern U.S. Prehistory; Cultural Resource Management

Experience: University of Missouri: 1966-1969--Research Associate
 University of South Florida: 1969-present--Professor

Publications: 5 monographs
 8 refereed articles
 55 technical reports

Certification: Society of Professional Archaeologists

Professional Activities: Past President; Florida Anthropological Society
 President; Anthropological Sciences Section,
 Florida Academy of Sciences
 Editor; SOPANEWS, The Newsletter of the Society
 of Professional Archaeologists

REQUEST FOR ARCHAEOLOGICAL
AND
HISTORIC SITE ASSESSMENT SERVICES
FAULKENBURG ROAD RESOURCE RECOVERY FACILITY SITE
HILLSBOROUGH COUNTY, FLORIDA

I. PURPOSE:

Hillsborough County is proposing to build a Solid Waste Energy Recovery Facility. As part of the State of Florida's permitting process for the facility, an archaeological and historic site assessment survey must be undertaken. The Florida Department of State (Division of Archives, History and Records Management) has determined that there is a moderate to high likelihood of currently unknown significant archaeological or historic sites occurring within the parcel (described below) which has been previously unsurveyed for such sites.

Hillsborough County is therefore desirous of procuring the services of a professional archaeological consultant who has performed such site assessment surveys in Florida.

II. DELINEATION OF STUDY AREA:

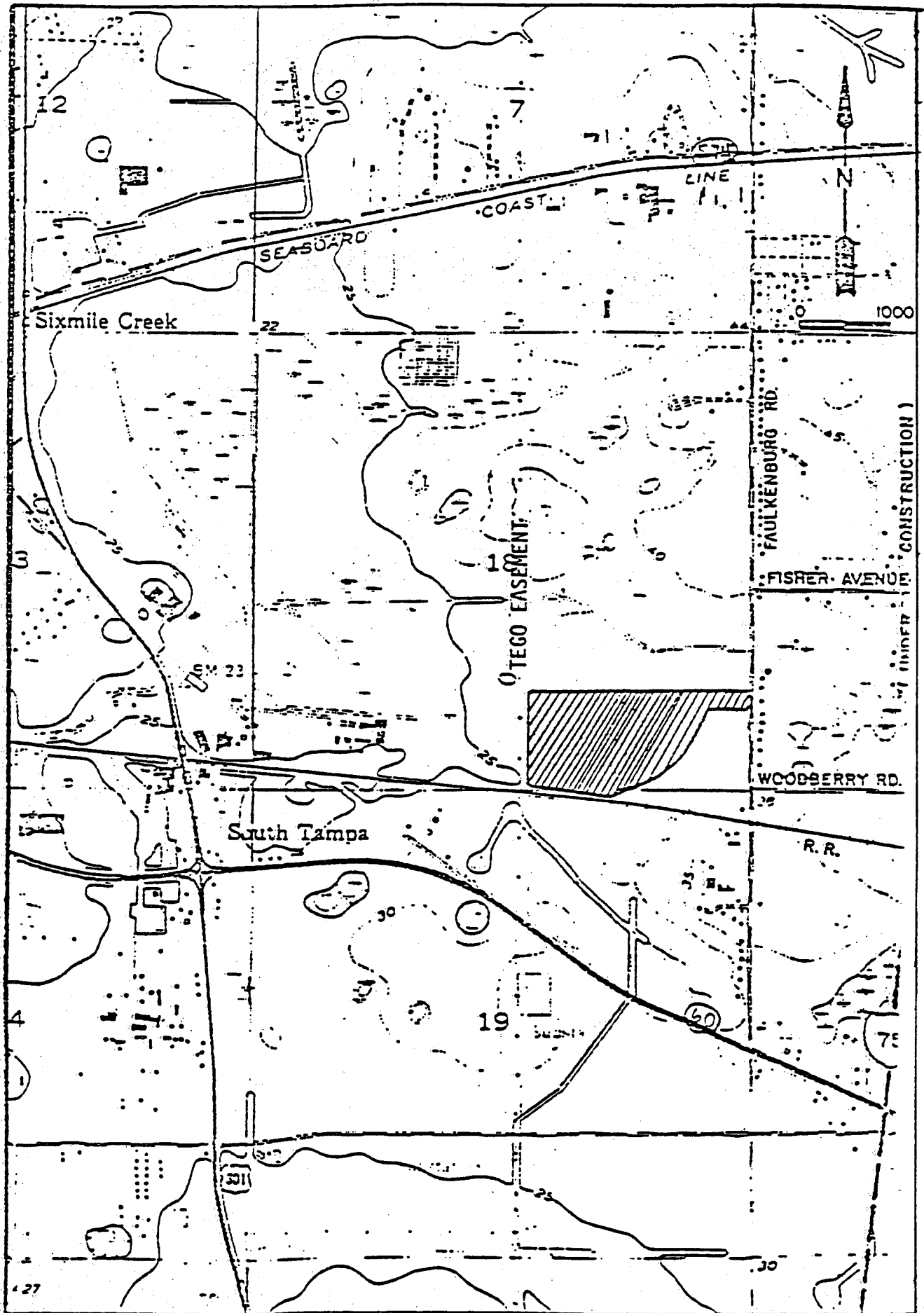
Figure 1 shows the location of the site. State Road 60 is located to the south of the site, County Road 574 to the north, and U. S. Route 301 is located to the west. The site area is bordered by Faulkenburg Road to the east, the Seaboard Coast Line Railroad (SCL) to the south, and the Tampa Electric Company powerline right-of-way to the west. The site is 50 acres M.O.L. and lies in Sections 18 and 19, Township 29 South, Range 20 East, Hillsborough County, Florida.

This property is now owned by SCL. Negotiations are underway with SCL to acquire the property for the Hillsborough County Resource Recovery Project. SCL has granted the County and its contractors permission to enter this property to complete engineering studies.

III. SCOPE OF SERVICES:

The contractor shall provide a high standard of professional archaeological service and will exert its best efforts with the time and funds available for this work program. The results of this study will be presented to the County in a written report following the guidelines which have been prepared by the Florida Archaeological Council and the Florida Department of State for the completion of such assessment studies (Attachment A). The contractor shall be responsible for coordination of all work to complete this site assessment survey and the provision of all labor, equipment and materials to perform the work. Hillsborough County shall assist consultant by placing at his disposal all available pertinent information including previous reports and any other data relative to the consultant's scope of services.

FIGURE 1 - RESOURCE RECOVERY SITE LOCATION



IV. SCHEDULE:

Due to the timing of other work activities in the Resource Recovery Program, the site assessment survey report must be completed expeditiously. The consultant shall provide the County with a draft report within 30 days after the start date. After review and comment by the County, the final report shall be submitted no later than 60 days after the original start date.

ATTACHMENT ASITE ASSESSMENT SURVEY REPORTS

Site assessment survey reports may vary in format from a long letter style report to a detailed lengthy formal report, depending upon the particular project. In all instances such reports should identify for whom, by whom and why the work was performed, as well as the location of the area surveyed (including a project location map), field methodology and reasons for same, survey findings and conclusions. When in doubt, individuals or agencies preparing to conduct or have conducted such work are urged to contact the Division's project review staff to discuss the particular minimum needs of a specific project. This suggested consultation may be particularly helpful in determining the amount of background research necessary for a project.

I. TITLE PAGE (Formal Reports)

- A. Report Title
- B. Sponsoring Agency or Organization
- C. Research Organization
- D. Author(s)
Note: The research organization may be the author in some instances
- E. Date of Report

II. ABSTRACT (Optional)

- A. Presents report title, type of project, regulatory authorities (federal, state, local), sponsoring agency and research organization
- B. Concise summary of report content including project location, field methodology, conclusions and any new information.
- C. Summary of management recommendations

III. TABLE OF CONTENTS (Formal Reports)

IV. INTRODUCTION (Formal Presentation in Formal Reports and Informal Presentation in Letter Reports)

- A. A statement of when, why and for whom the work was performed
- B. Mention of the project location, including a general project location map
- C. A general description of the nature and extent of the project
- D. Other information deemed appropriate by the author

V. LITERATURE REVIEW (Formal Presentation in Formal Reports;
Optional Brief Presentation in Letter Reports)

Note: This review should list previous studies in and around the project area. Its purpose is not to review the historical development of archaeological and historic studies in Florida; although, the author is not prohibited from making such a presentation. Its purpose is to demonstrate an awareness of the location, field methodology, and findings of previous researchers, including the information contained in the Florida Master Site File, in order to facilitate development of an adequate field methodology/research design. In areas containing historic structures or locales of historic activities, its purpose is also to identify associated research data and conclusions.

VI. BACKGROUND RESEARCH: DISCUSSION OF PREHISTORY/HISTORY (Formal Presentation in Formal Reports; Optional Brief Presentation in Letter Reports)

Note: This section summarizes the information derived from the Literature Review, and can be divided into two parts: Archaeological Review and Historical Review. The amount of detail devoted to each depends on the project's location as well as the type of project. For example, a pipeline or powerline right-of-way project through a historically undeveloped, poorly drained rural area with no extant or previously extant structures or roads over 40-50 years old will not require detailed historic background research; although, a general historic background presentation should be included in the report to document the rationale for the omission of a more detailed presentation. When in doubt, please call the Division's project review staff.

A. Archaeological Review

1. Presents a summary of the area's history and prehistory based on the archaeological record.
2. Its purpose is to provide a regional framework for the development of a site location predictive model, permit the analysis of recovered artifacts and evaluation of site significance, and to develop testable hypotheses.

B. Historical Review

1. Presents a summary of the area's history based on documentary records, biographies, etc.
2. Its purpose is to outline the major course of historical development in the area as it particularly relates to the project tract. Particular attention should be given to land use history for the subject tract and information relating to potentially significant historic structures or their remains and associated features.

VII: ENVIRONMENTAL BACKGROUND: DESCRIPTION OF PROJECT AREA AND VICINITY

- A. Description of Project Location and Area (Included in both formal and letter reports)

This should describe the project's location in terms of township, range, section and parts of sections and/or U.T.M. coordinates. And include a project location map. The dimensions of the project tract in terms of acres or hectares should be noted.

B. Description of Geologic and Physiographic Province in which Project Tract Occurs.

(Optional in letter reports, except for a very brief overview to indicate survey conditions; also optional in formal reports, except for brief overview, IF a source in which this subject is adequately presented is cited. For instance, project EIS's frequently have this as a special chapter or appendix, and, thus, the survey report would appear as a companion chapter or supporting documentation. Furthermore, the geologic development of an area prior to 50,000 B.P. should be omitted unless its particular relevance to a project can be demonstrated.)

1. For upland and wetland tracts, information of relevance would include topographic features, drainage, ground slope, soils, water sources, clay or hard mineral outcrops or near surface (aboriginally) exploitable features, the effects of sea level changes within the last 50,000 years, evidence of erosion, etc.;
2. For inundated locales, information of relevance would include depth below surface, topographic features, types of sediments and rock outcrops, current or wave surge conditions, stream flow, salinity, oxygen content, temperature regime, the effects of sea level changes within the last 50,000 years, erosion, etc.

C. Environment and Paleo-Environment

(Optional in letter reports except for a brief presentation of the present environment to indicate survey conditions. Also, beyond a brief overview, optional in formal reports IF a source in which the subject is adequately presented is cited. A noted exception is when a task of the survey is to investigate Paleo-Indian to Archaic site distribution in which case a discussion of the paleo-environment is required. However, a special report by a specialist may be attached as an appendix to the main survey report.)

1. The purpose of this section is to note the environmental conditions in which sites occur. Caution is urged for altered environments.

D. Historic Land Use Patterns

(Optional in letter reports, except for brief presentation to indicate survey conditions and potential site alteration. Formal presentation in formal reports; although, the amount of detail need not extend beyond a general overview except where it relates to site integrity and significance issues.)

1. The purpose of this section is to note known environmental changes and factors influencing site integrity. It is recognized that this information will not always be available to the researcher, in which case its unavailability should be noted.

VIII. FIELD METHODOLOGY/RESEARCH DESIGN

(Required for Both Formal and Letter Reports; Although, A Brief Presentation will be Appropriate in the Latter)

Note: Many factors influence survey methodology, including the size of the study area, its location (rural/urban; uplands/wetlands/coastal/submerged/etc.), vegetative cover, and present (and recent past) land use.

- A. Survey Techniques, Including Subsurface Survey Strategy: This should contain an explicit discussion of the rationale for the survey methodology employed to locate and assess archaeological sites and historic structures. Particular attention should be paid to the selection of subsurface testing methodology.
- B. Hypotheses to be Tested: (Generally Optional)
This would include a discussion of the analytical techniques required to test the hypotheses.
- C. Map of Survey Area: This should show the location of the survey transects or area of survey coverage; and areas not surveyed. Ideally this map should also include the approximate location of subsurface tests with some code to distinguish between the various kinds of subsurface testing techniques employed. The location of identified archaeological sites and historic structures and associated features should also be shown. However, it is recognized that the verbal description of survey methodology is often of sufficient detail to preclude the need of mapping the test hole locations, and the location of identified sites may be omitted if included in the survey results section.
- D. Constraints on Investigations: This would include limitations on access, poor ground visibility or other environmental limitations such as flooding, snowstorms, hurricanes, water currents, wave surge, wild hunters and attack dogs, etc.
- E. Description of Data Collection Techniques: It is particularly important to describe the manner in which the horizontal and vertical limits, internal integrity, and other necessary site assessment data was obtained for identified archaeological sites. A description of method for locating and evaluating historic buildings, structures and other sites should also be included when applicable.
- F. Listing and Justification For Any In-Field Modification of the Proposed Research Strategy
- G. Personnel and Work Organization Technique (If not presented elsewhere)

IX. LABORATORY METHODS AND ANALYSIS

(Formal Presentation in Formal Reports or Brief Informal Presentation In Letter Reports if Sites Found. Optional in Letter and Formal Report if no Sites Found, or if Only a Few Non-Significant Sites are Found.)

- A. Method For Artifact Processing and Accessioning: brief statement
- B. Method For Chronological Determination: brief statement (e.g., based on artifact types, carbon dating, stratigraphy, etc.)

C. Other Special Analytical Methods and Techniques: (Optional)

1. Paleo-ecological studies including soils, pollen, faunal and ethnobotanical analyses. (Note: A specialist is generally required for this type of work.)
2. Photographs and/or line drawings of all or a representative example of diagnostic artifact types or classes, and excavation unit profiles.
3. Artifact distribution tables and occurrence lists, etc.

D. Discussion of Changes in Proposed Laboratory Methods and Analysis

E. Discussion of Results

X. SURVEY RESULTS

(Formal in Both Formal or Letter Reports; although, the Presentation May be Brief if No Sites are Found. Site Forms Must Accompany All Reports When Sites are Located, Except for Isolated Find Sites.)

Note: Essentially this section should be an assessment inventory of the archaeological and historic sites, located within a survey area. For some projects where visual and other indirect impacts must be considered, it would also include the identification of nearby significant sites, particularly historic structures. It is important to remember that this will probably represent the only information which will ever be recorded for sites determined not significant. Also, information on the kinds of locations in which sites are not located is equally as important as locations with sites.

- A. Site Forms: Florida Master Site File site forms should be completed for all newly located sites and updated for previously identified sites. No site forms need to be completed for isolated artifact find sites, or for non-historical structures.
- B. Site-By-Site Description: Each site should be briefly described; although, artifact type and find location are sufficient for isolated artifact find sites. It is recommended that the location and approximate boundaries of each site be depicted on appropriate portions of U.S.G.S. Quadrangle maps. These descriptions need not repeat the detailed information contained in the accompanying site forms. They should, however, contain information on the location size, cultural/temporal affiliation, artifact sample size, function (if apparent), and such other information needed to assess site significance. An opinion of site significance, the need for further work before a final determination of significance can be made and the need for mitigative excavation should be offered.
- C. Comparative Site Information: (Optional) The site distribution, chronological position and other related comparative information should be presented in tabular form and an effort made to generate or refine known site distribution models for the area in which the project occurs.

NOTE: It is recommended that an architectural historian or historic architect be consulted for describing and assessing the significance of historic structures. Furthermore, Sections IX and X are often combined as a single section in many projects.

XI. CONCLUSIONS AND RECOMMENDATIONS: (Formal in Formal Reports, Brief Informal in Letter Reports)

- A. Summary of Survey Results, Including Number of Significant and Potentially Significant Sites Identified: This would include a discussion of why each site so identified is deemed significant or potentially significant.
- B. Site-By-Site Discussion of Potential Project Impacts to Significant and Potentially Significant Sites.
- C. Specific Recommendations for Additional Survey Work (if any); Test Excavations or Additional Documentation at Potentially Significant Sites to Make a Final Determination of Significance; or, Mitigative Data Recovery at Significant Archaeological or Historic Sites.

Note: Such recommended additional work would only be necessary IF project activities will disturb and/or destroy the identified sensitive areas, rather than protect them through inclusion in passive recreation parks or preservation areas.

D. Other Cultural Resource Management Recommendations Such As:

- 1. Restoration, rehabilitation or retrofitting historic structures using "The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings";
- 2. Preservation of significant archaeological resources by inclusion in "green space" sensitive environment preservation areas.
- 3. Preservation of significant archaeological sites, or a representative sample of a larger site, by use as passive recreation parks.
- 4. Site preservation monitoring program for significant and potentially significant sites set aside for preservation.
- 5. Preparation of brochures describing the cultural resources represented in the project area, the significance of those resources, and directions to visit identified significant resources for which protective measures from vandalism and sites looting can be enforced.

XII. REFERENCES

(Optional in Letter Reports)

- A. Use American Antiquity's Style Guide (44:193-205)

XIII. APPENDICES

(Optional, Except For Florida Master Site File Site Forms.)

- A. Florida Master Site File Site Forms: (Required)
These should be completed for all previously unidentified sites, except for isolated artifact find sites and (with a few exceptions) post-1940's structures. Also, current data supplemental site form pages should be completed for previously recorded sites; and, a listing and location map of isolated find sites is suggested, as their distributional pattern may be culturally significant.
- B. Ancillary Studies: (e.g., paleo-environment, palynological, experimental lithic studies, hydrological, etc. reports)
- C. Supporting Data: (e.g., computer printouts)
- D. Peer Reviews
- E. Scope of Work
- F. Abbreviated Vita of Principal Investigator and Field Supervisor
- G. Location of Artifacts Fieldnotes, etc.

Note: The above information could be incorporated into the text of the main report.

Appendix 10.9

APPENDIX 10.9 SURFACE AND GROUNDWATER
RELATED INFORMATION

10.9.1 WELL WATER ANALYSIS REPORTS



F.H.A./V.A. WATER ANALYSIS REPORT

Orlando Laboratories, Inc.

3314 Bay to Bay Blvd. - Tampa, FL. 33609 - (813) 839-8802

Report to: DIVERSIFIED DRILLING CORP.

Appearance: CLEAR

Date: August 11, 1978

Sampled by: Client

Report Number: T-1314

Identification: Control and Weighing Systems

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

RESULTS

Determination	mg/l	Determination	mg/l
Total Dissolved Solids, @ 105°C.	<u>265</u>	Total Hardness, as CaCO ₃	<u>228</u>
Phenolphthalein Alkalinity, as CaCO ₃	<u>0</u>	Calcium Hardness, as CaCO ₃	<u>216</u>
Total Alkalinity, as CaCO ₃	<u>240</u>	Magnesium Hardness, as CaCO ₃	<u>12</u>
Carbonate Alkalinity, as CaCO ₃	<u>0</u>	Calcium, as Ca	<u>86</u>
Bicarbonate Alkalinity, as CaCO ₃	<u>240</u>	Magnesium, as Mg	<u>2.9</u>
Carbonates, as CO ₃	<u>0</u>	Iron, as Fe	<u>0.08</u>
Bicarbonates, as HCO ₃	<u>293</u>	Manganese, as Mn	<u>< 0.05</u>
Hydroxides, as OH	<u>0</u>	Copper, as Cu	<u>< 0.1</u>
Carbon Dioxide, as CO ₂	<u>30</u>	Silica, as SiO ₂	<u>23.2</u>
Chloride, as Cl	<u>3</u>	Color, Standard Platinum Cobalt Scale	<u>5</u>
Sulfate, as SO ₄	<u>1.0</u>	Odor Threshold	<u>2</u>
Fluoride, as F	<u>0.22</u>	Turbidity, Jackson Units	<u>3.8</u>
Phosphate, as PO ₄	<u>4.0</u>	Hydrogen Sulfide, H ₂ S (field-fixed)	<u>0.49</u>
pH (Laboratory)	<u>7.2</u>	Sodium, as Na	<u>9.5</u>
pHs	<u>7.3</u>		
Stability Index	<u>7.4</u>		
Saturation Index	<u>-0.1</u>		

Signed: Alan Dillon
Chemist

ROUTINE WATER ANALYSIS REPORT



Orlando Laboratories, Inc.

3314 Bay To Bay Blvd. • Tampa, Florida 33609 • 813/839-8802

Report to: Dennis Fourqurean

Appearance: Clear

Date: January 31, 1979

Sampled by: Client

Report Number: T-1621

Identification: Henderson Homes Office Building
Hwy 60, Brandon

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

RESULTS

Determination	Data Significance	mg/l	Determination	Data Significance	mg/l
Total Dissolved Solids	x.	<u>150</u>	Total Hardness, as CaCO ₃	x.	<u>138</u>
Phenolphthalein Alkalinity, as CaCO ₃	x.	<u>0</u>	Calcium Hardness, as CaCO ₃	x.	<u>114</u>
Total Alkalinity, as CaCO ₃	x.	<u>114</u>	Magnesium Hardness, as CaCO ₃	x.	<u>24</u>
Carbonate Alkalinity, as CaCO ₃	x.	<u>0</u>	Calcium, as Ca	x.	<u>46</u>
Bicarbonate Alkalinity, as CaCO ₃	x.	<u>114</u>	Magnesium, as Mg	x.	<u>5.8</u>
Carbonates, as CO ₃	x.	<u>0</u>	Sodium, as Na	x.	<u>5.0</u>
Bicarbonates, as HCO ₃	x.	<u>139</u>	Iron, as Fe	x.	<u>0.05</u>
Hydroxides, as OH	x.	<u>0</u>	Manganese, as Mn	x.	<u><0.05</u>
Carbon Dioxide, as CO ₂	x.	<u>5.5</u>	Copper, as Cu	x.	<u><0.1</u>
Chloride, as Cl	x.	<u>12</u>	Hydrogen Sulfide, H ₂ S (field-fixed)		<u><0.05</u>
Sulfate, as SO ₄	x.	<u>10</u>			
Fluoride, as F	x.	<u>0.15</u>			
pH (Laboratory)	x.	<u>7.6</u>			
pHs	x.	<u>7.9</u>			
Stability Index	x.	<u>8.2</u>			
Saturation Index	x.	<u>-0.3</u>			
Color, PCU	x.	<u>0</u>			
Odor Threshold	x.	<u>0</u>			
Turbidity, NTU	x.	<u>1.2</u>			

Signed [Signature]

Chemist

CRAFT'S Sons

#13

THORNTON LABORATORIES, INC.

CHARLES C. THORNTON, PRESIDENT
K. KHAJEH-NOORI, VICE-PRES.

ANALYTICAL AND CONSULTING CHEMISTS

1145 EAST CASS STREET

TAMPA, FLORIDA 33601
February 6, 1975TELEPHONE 229-2641
AREA CODE 813
P. O. BOX 2880

Laboratory Mark 460976
 Sample of Water
 Date Received January 28, 1975
 For Tampa Well Drilling
 12704 Nebraska Ave.
 Marks: Tampa, Florida 33612
 Woodberry Road

Attn: L.F. Williams

PH-685-7745

CERTIFICATE OF ANALYSIS

	Parts per Million
Total Solids	177
Loss on ignition	69
Fixed Solids	108
Calcium as Ca	55
Magnesium as Mg	0.95
Sodium and Potassium as Na	9.3
Iron as Fe	0.05
Silica as SiO ₂	9.2
Sulphates as SO ₄	7.7
Chlorides as Cl	8.4
Equivalent to Salt as NaCl	14
Nitrates as NO ₃	0.38
Alkalinity (Methyl Orange) as CaCO ₃	142
(Phenolphthalein) as CaCO ₃	0.00
Total Hardness as CaCO ₃	142
Carbonate Hardness as CaCO ₃	142
Non-carbonate Hardness as CaCO ₃	0.00
pH Value	7.9
Color (Standard platinum-cobalt scale)	#10
Odor (Qualitative only)	None
Fluorine (F)	0.28
Hydrogen Sulphide (H ₂ S)	None found

*Molybdate-reactive dissolved silica, colorimetric.

THORNTON LABORATORIES, INC.

Kamran Noori

ENVIRONMENTAL ASSOCIATES, INC.

ARCHITECTS • ENGINEERS • PLANNERS • ENVIRONMENTAL SCIENTISTS

11602 51st STREET • TAMPA, FLORIDA 33617 • PHONE (813) 985-8565

CERTIFIED DRINKING WATER ANALYSIS**SAMPLE IDENTIFICATION**System name: Separation EquipmentADDRESS: Faulkenburg Rd. &Fairville, Tampa, FLSample Site: at well

Phone: _____

EAI REPORT NUMBER: 81.2979Date/Time Collected: 10/1/81 8:30 am Collector: Picc's Pump Co.Raw or Treated: Raw Temperature (Field): _____ F/C Field Chlorine, mg/l: _____CHECK ONE: 1. ☐ Community Public Water System 2. ☒ Non-community Public Water System
3. ☐ Other Public Water System 4. ☐ Private Water SystemCHECK ONE: 1. ☐ HRS Compliance 2. ☐ HRS Recheck 3. ☐ VA Loan 4. ☐ FHA Loan
5. ☐ Other

Special Instructions/Notes: _____

ANALYSIS RESULTS (all results in mg/l, unless otherwise indicated)**PRIMARY STANDARDS****SECONDARY STANDARDS**

Parameter	Result	Analyst	Method	Parameter	Result	Analyst	Method
Arsenic as As				Chloride as Cl	8.6	RC	
Barium as Ba				Color, Pt-Co Units	1	RC	
Cadmium as Cd				Copper as Cu	<0.01	DH	
Chromium as Cr				Corrosivity			
Lead as Pb				Foaming Agents			
Mercury as Hg				Hydrogen Sulfide	0.06	RC	
Selenium as Se				Iron as Fe	<0.02	DH	
Silver as Ag				Manganese as Mn	<0.01	DH	
Nitrate as N	2.7	RC		Odor, T.O.N.	1	RC	
Fluoride as F	0.09	RC		pH, pH Units	7.98	RC	
Turbidity, NTU	0.12	RC		Sulfate as SO ₄	13.1	RC	
Organics	See Separate Report			TDS	180	RC	
				Zinc as Zn	0.17	DH	

GENERAL

Parameter	Result	Analyst	Parameter	Result	Analyst
Temperature (LAB), °C	25.3	RC	Metals:		
Hardness:			Calcium as Ca	48	CB
Total as CaCO ₃	126	RC	Magnesium as Mg	1.4	CB
Calcium as CaCO ₃	120	RC	Sodium as Na	5.9	DH
Magnesium as CaCO ₃	6	CB	pH _s (saturation) (c)	7.65	CB
Carbonate as CaCO ₃	114	CB	Stability Index, 2 pH _s -pH	7.32	CB
Non-Carbonate as CaCO ₃	12	CB	Saturation Index, pH-pH _s	0.33	CB
Alkalinity:					
Total as CaCO ₃	114	RC			
Bicarbonate as CaCO ₃	114	RC			
Hydroxyl as CaCO ₃	0	RC			
Free CO ₂ as CO ₂	2.1	CB			

BACTERIOLOGY

Total Coliform, MF, #/100ml	
Standard Plate Count, #/ml	

Date/Time
Sample ReceivedHRS Laboratory Certification
Identification Number

84181

REMARKS:

Analysis Certified by: Catani Boalke Date: 10/7/81

ENVIRONMENTAL ASSOCIATES, INC.

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11602 51st STREET • TAMPA, FLORIDA 33617 • PHONE (813) 985-8565

CERTIFIED DRINKING WATER ANALYSIS

SAMPLE IDENTIFICATION

System name: Mathes & Outlaw

ADDRESS: P.O. Box 78

Cypress Gardens

Sample Site: Faulkenburg Road

Phone: 971-4512

EAI REPORT NUMBER: 82.4170

Date/Time Collected: 3/17/82, 1 PM

Collector: Tommy Rigsby-Tampa Well Drill

Raw or Treated: Raw Temperature (Field): F/C Field Chlorine, mg/l:

CHECK ONE: 1. ☐ Community Public Water System 2. ☒ Non-community Public Water System
3. ☐ Other Public Water System 4. ☐ Private Water System

CHECK ONE: 1. ☒ HRS Compliance 2. ☐ HRS Recheck 3. ☐ VA Loan 4. ☐ FHA Loan
5. ☐ Other

Special Instructions/Notes:

ANALYSIS RESULTS (all results in mg/l, unless otherwise indicated)

PRIMARY STANDARDS

SECONDARY STANDARDS

Parameter	Result	Analyst	Method	Parameter	Result	Analyst	Method
Arsenic as As				Chloride as Cl	11.3	RC	
Barium as Ba				Color, Pt-Co Units	12	DB	
Cadmium as Cd				Copper as Cu	<0.01	DB	
Chromium as Cr				Corrosivity			
Lead as Pb				Foaming Agents			
Mercury as Hg				Hydrogen Sulfide	0.20	RC	
Selenium as Se				Iron as Fe	0.17	DB	
Silver as Ag				Manganese as Mn	0.01	DB	
Nitrate as N	0.39	RC		Odor, T.O.N.	1	DB	
Fluoride as F	0.23	RC		pH, pH Units	7.40	DB	
Turbidity, NTU	2.4	DB		Sulfate as SO ₄	3.9	RC	
Organics	See Separate Report			TDS	226	RC	
				Zinc as Zn	1.78	DB	

GENERAL

Parameter	Result	Analyst	Parameter	Result	Analyst
Temperature (LAB), °C	22.3	DB	Metals:		
Hardness:			Calcium as Ca	64.4	CB
Total as CaCO ₃	178	RC	Magnesium as Mg	4.0	DB
Calcium as CaCO ₃	161	RC	Sodium as Na	4.6	DB
Magnesium as CaCO ₃	17	CB	pH _s (saturation) (c)	7.60	CB
Carbonate as CaCO ₃	117	CB	Stability Index, 2 pH _s -pH	7.80	CB
Non-Carbonate as CaCO ₃	61	CB	Saturation Index, pH-pH _s	-0.20	CB
Alkalinity:		CB			
Total as CaCO ₃	117	DB			
Bicarbonate as CaCO ₃	117	DB			
Hydroxyl as CaCO ₃	0	DB			
Free CO ₂ as CO ₂	8.5	CB			

BACTERIOLOGY

Total Coliform, MF, #/100ml	
Standard Plate Count, #/ml	

Date/Time

Sample Received

3/17/82, 3:00 PM

HRS Laboratory Certification
Identification Number

84181

REMARKS:

Analysis Certified by: Catherine Bolze Date: 3/22/82

EN.

.. ASSOCIATES, INC.

ARCHITECTS • ENGINEERS • PLANNERS • ENVIRONMENTAL SCIENTISTS

11602 51st STREET • TAMPA, FLORIDA 33617 • PHONE (813) 985-8565

CERTIFIED DRINKING WATER ANALYSIS

SAMPLING IDENTIFICATION

System name: Racetrack Petroleum

ADDRESS: I-4 & 301

Sample Site: I-4 & 301

Phone: 971-4512

EAI REPORT NUMBER: 81.3045

Date/Time Collected: 11/3/81, 12:30 PM Collector: Tampa Well Drilling-Randy Bard

Raw or Treated: Raw Temperature (Field): F/C Field Chlorine, mg/l:

CHECK ONE: 1. ☐ Community Public Water System 2. ☒ Non-community Public Water System
3. ☐ Other Public Water System 4. ☐ Private Water SystemCHECK ONE: 1. ☒ HRS Compliance 2. ☐ HRS Recheck 3. ☐ VA Loan 4. ☐ FHA Loan
5. ☐ Other

Special Instructions/Notes:

ANALYSIS RESULTS (all results in mg/l, unless otherwise indicated)

PRIMARY STANDARDS

SECONDARY STANDARDS

Parameter	Result	Analyst	Method	Parameter	Result	Analyst	Method
Arsenic as As				Chloride as Cl	14.8	RC	
Barium as Ba				Color, Pt-Co Units	2	DH	
Cadmium as Cd				Copper as Cu	<0.01	DH	
Chromium as Cr				Corrosivity			
Lead as Pb				Foaming Agents			
Mercury as Hg				Hydrogen Sulfide	0.80	DH	
Selenium as Se				Iron as Fe	<0.02	DH	
Silver as Ag				Manganese as Mn	<0.01	DH	
Nitrate as N	8.7	RC		Odor, T.O.N.	4	DH	
Fluoride as F	0.14	RC		pH, pH Units	7.36	DH	
Turbidity, NTU	0.37	DH		Sulfate as SO ₄	34.0	RC	
Organics	See Separate Report			TDS	260	RC	
				Zinc as Zn	0.21	DH	

GENERAL

Parameter	Result	Analyst	Parameter	Result	Analyst
Temperature (LAB), °C	21.3	DH	Metals:		
Hardness:			Calcium as Ca	73.2	CB
Total as CaCO ₃	199	RC	Magnesium as Mg	3.8	CB
Calcium as CaCO ₃	183	RC	Sodium as Na	8.7	DH
Magnesium as CaCO ₃	16	CB	pH _s (saturation) (c)	7.42	CB
Carbonate as CaCO ₃	170	CB	Stability Index, 2 pH _s -pH	7.48	CB
Non-Carbonate as CaCO ₃	29	CB	Saturation Index, pH-pH _s	-0.06	CB
Alkalinity:					
Total as CaCO ₃	170	DH			
Bicarbonate as CaCO ₃	170	DH			
Hydroxyl as CaCO ₃	0	DH			
Free CO ₂ as CO ₂	16	CB			

BACTERIOLOGY

Total Coliform, MF, #/100ml	
Standard Plate Count, #/ml	

Date/Time Sample Received 11/3/81, 4:00 PM

HRS Laboratory Certification Identification Number

84181

REMARKS:

Analysis Certified by: Catherine Balle Date: 11/9/81

TAMPA BRANCH LABORATORY
P. O. Box 2380
1115 E. KENNEDY BLVD.
TAMPA, FLORIDA 33602

State of Florida
Department of Health and Rehabilitative Services
Office of Laboratory Services
P. O. Box 210
Jacksonville, Florida 32231

HILLSBOROUGH COUNTY HEALTH DEPT
ENVIRONMENTAL ENGINEERING DIV.
1105 E. KENNEDY BLVD.
TAMPA, FLORIDA 33602

DRINKING WATER CHEMICAL ANALYSIS

System Name: MANGO County: HILLS Collector: J.E. ROSEN
Address: RT 2, Box 738, MANGO System I.D. No.: 6291135 DER District: 06
Sample Site: W4 Raw or Treated: RAW Temperature: 69°
Date and Time Collected: 4-22-80 Field Chlorine, mg/l: 0.0 Field pH: 7.2

Circle one: ☒ Community public water system 41. Non-community public water system 42. Other public water system 43. Private water system
Circle one: ☒ Compliance 2. Recheck 3. Other (indicate below parameters to be tested for items 2 or 3).

PRIMARY STANDARDS			SECONDARY STANDARDS			GENERAL	
PARAMETER	METHOD	RESULT ^o	PARAMETER	METHOD	RESULT ^o	PARAMETER	RESULT ^o
Arsenic as As		BDL	Chloride as Cl		16	Total Hardness as CaCO ₃ (c)	163
Barium as Ba		BDL	Color ^o		0	Total Alkalinity as CaCO ₃	141
Cadmium as Cd		BDL	Copper as Cu		BDL	N.C.H. as CaCO ₃ (c)	22
Chromium as Cr		BDL	Corrosivity ^o			Bicarbonate as HCO ₃ (c)	172
Lead as Pb		BDL	Foaming Agents		BDL	Calcium as Ca	59.0
Mercury as Hg		BDL	H ₂ S			Magnesium as Mg	3.86
Selenium as Se		BDL	Iron as Fe		.02	Carbon Dioxide as CO ₂ (c)	7
Silver as Ag		BDL	Manganese as Mn		0.019	Bicarbonate as CaCO ₃ (c)	130
Nitrate as N		.3	Odor ^o			Carbonate as CaCO ₃ (c)	.5
Fluoride as F		.19	pH ^o		7.6	Hydroxide as CaCO ₃ (c)	0
Turbidity, NTU		.29	Sulfate as SO ₄		22.1	Sodium as Na	6.2
			TDS		230		
Endrin		BDL	Zinc as Zn		.28	pH ^o (c)	7.9
Lindane		BDL				Stability Index ^o 2pHs-pH (c)	8.2
Methoxychlor		BDL				Saturation Index ^o pH-pHs (c)	-1.3
Toxaphene		BDL				INTERPRETATION: Stable	
2,4-D		BDL				Corrosive	
2,4,5 TP Silvex		BDL				Scale Forming	
Trihalomethanes			DER reviewer:				
			Action required:				

Note: *All results in mg/liter except those denoted

†List of methods available on request

Date and Time Received: 02300 APR 22 80 1330

Date Reported: APR 30 1980

Analyst: Jack L. Periman

(c) = Calculated value

BDL = Below detection limit, see reverse side

Laboratory I.D. No.: 14005

Remarks:

ANALYTICAL AND CONSULTING CHEMISTS

DRINKING WATER CHEMICAL ANALYSIS
Laboratory I.D. #84147

System Name: Hillsboro Welding & Construction Company

Address: _____

Sample Site: _____

Date and Time Collected 7/22/81 @ 2:00 PM Collector Henry Morrill

For: Morrill Well & Pump Laboratory Mark 561308
P.O. Box 717
Brandon, Florida 33511

- Check One: 1. ☐ Community Public Water System 2. ☒ Non-Community Public Water System
3. ☐ Other Public Water System 4. ☐ Private Water System
Check One: 1. ☒ Ground water 2. ☐ Surface Water
Check One: 1. ☒ Raw 2. ☐ Treated _____
Check One: 1. ☒ Compliance 2. ☐ Recheck 3. ☐ Other

Check Analysis Desired

☐ PRIMARY STANDARDS ☒ SECONDARY STANDARDS ☒ GENERAL

PARAMETER	RESULT	PARAMETER	RESULT	PARAMETER	RESULT
Arsenic as As		Chloride as Cl	60	Total Hardness as CaCO ₃	273
Barium as Ba		Color*	(25)	Total Alkalinity as CaCO ₃	101
Cadmium as Cd		Copper as Cu	0.005**	N.C.H. as CaCO ₃ (C)	172
Chromium as Cr		Corrosivity		Bicarbonate as HCO ₃ (C)	123
Lead as Pb		Foaming Agents	0.01**	Calcium as Ca	94
Mercury as Hg		H ₂ S	0.04**	Magnesium as Mg	9.5
Selenium as Se		Iron as Fe	0.84	Carbon Dioxide as CO ₂ (C)	8.5
Silver as Ag		Manganese as Mn	0.040	Bicarbonate as CaCO ₃ (C)	101
Nitrate as N	0.05	Odor*	1	Carbonate as CaCO ₃ (C)	0
Fluoride as F	0.36	pH*	7.3	Hydroxide as CaCO ₃ (C)	0
Turbidity, *NTU	(13.3)	Sulfate as SO ₄	17	Sodium as Na	12
		TDS	464		
Endrin		Zinc as Zn	1.7	pHs* (C)	7.5
Endane				Stability Index* 2pHs-pH (C)	7.7
Dethoxychlor				Saturation Index* pH-pHs (C)	-0.2
Dioxaphene				INTERPRETATION:	Stable
4-D					Corrosive
4-5 TP Silvex					Scale Forming

NOTE: *All results in mg/l except those denoted
(C) Calculated value
Analysis according to approved methods listed in Federal Register Vol. 41, No. 132 (Dec. 1, 1976).
Specific analytical information on request.

**Less than

Date and Time Received 7/22/81 @ 2:10 PM Date Reported August 24, 1981

THORNTON LABORATORIES, INC.

10.9.2 WELL COMPLETION REPORTS

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

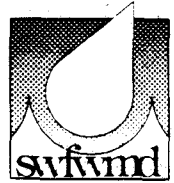


2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 SUNCOM 684-1011

BRUCE A. SAMSON, Chairman, Tampa
Wm. O. STUBBS, JR., Vice Chairman, Dade City
JIM KIMBROUGH, Secretary, Brooksville
RONALD B. LAMBERT, Treasurer, Wauchula
DON CRANE, Assistant Secretary, St. Petersburg
ARCH UPDIKE, JR., Assistant Treasurer, Lake Wales

WALTER H. HARKALA, Plant City
MARY A. KUMPE, Sarasota
MICHAEL ZAGORAC, JR., Belleair

GARY W. KUHL, Executive Director



August 24, 1983

Mr. Tom Tetreault
Camp, Dressler & McKee
1 Center Plaza
Boston, MA 02108

Re: Well Completion Report #75-5171

Dear Mr. Tetreault:

Enclosed you will find the above referenced report.

If I can be of any further assistance, feel free to contact this office.

Sincerely,

SANDY SEMEGEN
Permits Coordinator
Well Construction Permitting & Enforcement

SS:cm
Enclosure: as stated

**SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (REGULATORY)
APPLICATION FOR A PERMIT TO CONSTRUCT A WELL**

To: Chief, Permits Department
Post Office Box 457
Brooksville, Florida 33512

Phone: (904) 796-3511

Date March 5, 1975

TYPE OR FEE (CALLPOINT FEE AND FEE NAME)

In compliance with the Rules and Regulations of the Southwest Florida Water Management District (Regulatory)

Ziegler Well Drilling Co. 1232 11505 N. Gandy Ave. Tampa, Fla. 33618
DRILLING CONTRACTOR NUMBER ADDRESS

requests authorization to construct a well for L. B. Foster Co.
NAME OF WELL OWNER

3781 Northeast Expressway, Suite 2142 Atlanta, Ga.
ADDRESS (MAILING) STREET OR BOX NO. CITY ZIP CODE

Well will be 4 inches in diameter. Proposed yield to be 60 GPM.

Well will be constructed with ☐ cable tool ☒ rotary ☐ jotted ☐ other (specify) _____

Well will be approximately 200 feet deep. Well will have about 100 feet of casing

☐ black pipe ☒ galvanized ☐ other _____

Casing will be joined by ☒ coupling ☐ weld ☐ both. Space between casing and hole will be sealed with

☒ natural materials ☐ neat cement grout ☐ other _____

Well will be located at 18-27-20 310 Fairhaven Rd. Tampa McLennan
SECTION, TOWNSHIP, RANGE AND STREET ADDRESS CITY COUNTY

Well will be used for: ☐ private supply ☒ public water supply ☐ irrigation ☐ industrial

☐ test well ☐ other _____

If this permit is for repair, modification or alteration of a well constructed under a previous permit give number _____ and indicate work to be done _____

I agree to furnish a log within 30 days after drilling operations cease and to comply with all provisions of the Rules and Regulations of the SWFWMD(R) and with local health regulations relative to well construction.

Signature of Drilling Contractor W. C. Ziegler

I hereby consent to be regulated by Southwest Florida Water Management District and by Southwest Florida Water Management District (Regulatory) regarding consumptive use of water and allocation thereof, and if this permit is granted I agree to comply with the conditions set forth on the reverse side of this form. Access to proposed well site for inspection at any reasonable time is hereby granted personnel of SWFWMD and SWFWMD(R).

Signature of Owner or his authorized Agent [Signature]

DO NOT WRITE BELOW THIS LINE -- FOR SWFWMD(R) USE ONLY

PERMIT TO CONSTRUCT A WELL

Review of the above application and related hydrologic data has been made by a duly authorized official of the Southwest Florida Water Management District (Regulatory) and subject to conditions set forth on the reverse side of this form permission for construction of this well is granted in accordance with the Rules and Regulations of SWFWMD(R). 25-5171 18

All drilling shall be performed by, or in the presence of, a certified driller and a copy of the well log will be submitted to this office within 30 days after drilling operations cease. In addition to these provisions, compliance with the special item number(s) _____, as described on the reverse side of this form, shall be required.

This permit does not imply approval of sewage or other waste disposal facilities, or of water supply and other facilities in the area to be supplied by the well.

Granted by: [Signature] Date 3-6-75

Title: _____

**THIS PERMIT NOT VALID UNTIL PROPERLY SIGNED AND SEALED BY AN AUTHORIZED OFFICER OF SWFWMD(R) AND SHALL BE MAINTAINED AT THE WELL SITE DURING ALL DRILLING OPERATIONS
PROMINENTLY DISPLAYED**

STATE OF FLORIDA
WATER WELL CONTRACTOR'S NOTIFICATION
OF CONSTRUCTION OR REPAIR OF A WATER WELL
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF BUREAU OF MINES
 205 LOMA BUCKING, TALLAHASSEE, FLORIDA 32304
 Telephone (904) 492-6275

Contract No. 1232
 Date of Completion 12/1/85

1. OWNER: L. B. Foster Company
201 Hawthorne Parkway, Suite A
Tampa, FL 33607

2. LOCATION OF WELL: 300 Fairbairn Rd.
Tampa, FL 33607
 Section 18 Lot No. 20
 Block 3 Sublot 20

3. PURPOSE OF WELL:
☐ Domestic ☐ Irrigation ☐ White Water
☐ Industrial ☐ Stock ☐ Other

4. TYPE OF WELL:
☐ Drive Well ☐ Drilling ☐ Other

5. QUALITY:
☒ Good ☐ Fair ☐ Poor ☐ Very Poor ☐ Other

CHECK TEST MADE
☐ None ☐ Gravity South Dept.
☐ Potentiometric ☐ Gravity North Dept.
☐ Other ☐ U.S.G.S.
 Check ☐ if test was for
 (check all that apply)
 Temperature ☐ Yes ☐ No

6. EQUIPMENT:
☒ Rotary ☐ Cable Tool ☐ Other
☐ Air ☐ Reverse Rotary

7. LOGOUT:
 Specify and give number of logs (P.S.) From (25) To (25)

8. CASING AND LINER PIPE:
 Diameter (inches) 4 Size 0 To (25)
Open hole 93 25
 Check One: ☒ Stranded & Coupled ☐ Welded Only
☐ T & C Welded ☐ Other

9. WATER LEVEL:
 Water level after well completed 3 feet
☐ Above ☐ Below land surface
 Well Flowing ☐ Yes ☒ No Flow gph

10. SCREENS:
 Size 20 Material 20 Location (25)
 Below Surface From (25) To (25)

11. UPPER END OF WELL:
☒ Pump Installed ☐ Valve ☐ Cap ☐ Other

12. PUMPING TEST:
 Date 12/1/85 ☐ Test Pump ☒ Permanent Pump
 Measure point is top of casing
 which is 2 feet ☒ above ☐ below land surface
 Static water level 3 feet ☐ above ☒ below measure point
 Maximum drawdown 3 feet below measure point
 Drawdown at maximum drawdown gph
 After 3 hours

13. PUMP INSTALLED
 Type Submersible Model No. 50055
 Motor Power 1/2 HP 5
 Capacity 155.5 GPM at total dynamic head
 No. of heads or stages 10
 Pump setting 63 feet

14. WELL LOG:

Depth (ft)	Soil	Remarks
0	10	Black dirt
10	18	White clay
18	3	White soft lim - best circulation
3	20	Gray hard rock
20	28	White clay
28	95	Brown/black hard rock
95	103	White clay
103	130	White clay & rock
130	148	White medium hard rock
148	155	Gravelly
155	180	Ten broken lim
180	195	Ten broken lim with hard streaks
195	220	Ten broken lim
220	238	Brown broken lim

15. CONTRACTOR'S CERTIFICATION:
 This work was done under my supervision and this report is true to the best of my knowledge and belief. The work commenced on 12/1/85 and was completed on 12/1/85
Ziegler Well Drilling Co. 1232
 Contractor W. S. S. S. License Number 11905 N. County Avenue
 Location of Well Tampa, Hillsborough Florida
813/961-1033 Bank Cannon
 Phone Number 1232 License Number 11905 N. County Avenue

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT



2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 SUNCOM 584 1011

BRUCE A. SAMSON, Chairman, Tampa
Wm. O. STUBBS, JR., Vice Chairman, Dade City
JIM KIMBROUGH, Secretary, Brooksville
RONALD B. LAMBERT, Treasurer, Wauchula
DON CRANE, Assistant Secretary, St. Petersburg
ARCH UPDIKE, JR., Assistant Treasurer, Lake Wales

WALTER H. HARKALA, Plant City
MARY A. KUMPE, Sarasota
MICHAEL ZAGORAC, JR., Belleair

GARY W. KUHL, Executive Director



September 6, 1983

Mr. Phillip C. Kennedy
Camp, Dresser & McKee, Inc.
One Center Plaza
Boston, MA 02108

Re: Well Completion Reports #71-7281, 71048 & 716211

Dear Mr. Kennedy:

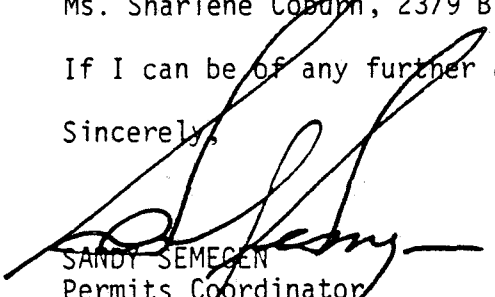
Enclosed you will find copies of the above referenced reports. The cost of these reports are as follows:

4 micro-film copies	@ 1.00	= \$4.00
First class mail		.20
Total		\$4.20

Please send your remittance to Office and Information Service, ATTN Ms. Sharlene Coburn, 2379 Broad St. Brooksville, FL 33512.

If I can be of any further assistance, contact this office.

Sincerely,


SANDY SEMEGEN
Permits Coordinator
Well Construction Permitting & Enforcement

SS:cm

Enclosure: as stated

cc: S. Coburn

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (SWFWMD)

DRILLING COMPLETION REPORT AND LOG

TO: Chief Hydrologist, SWFWMD(R)
Post Office Box 457
Brooksville, Florida 33512

Phone: (804) 796-3511

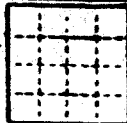
Well started - date 12/1/77
Well completed - date 12/1/77

Well owner: Name and Address May S. Brown, Rt. 3 Box 4

Well location: County Hillsborough

Tests taken by: ☐ District ☐ Volunteer ☐ County Health Department ☐ Other

SECTION TOWNSHIP RANGE
18 29 20



INDICATE WELL LOCATION IN THE SECTION

Purpose of well:

☒ Domestic ☐ public water supply ☐ irrigation ☐ stock
☐ industrial ☐ other

Pump _____ HP. Type _____ ☐ electric ☐ diesel

Yield _____ GPM. ☐ Well not pumped. ☐ Well flows above land surface

Water level above below land surface before pumping _____ feet. Water

level lowered to _____ feet after _____ minutes pumping at _____ GPM.

Method of drilling: ☐ rotary ☒ cable tool ☐ jet ☐ other

Fin sh: ☐ open hole ☐ sand point ☐ well screen placed at _____ feet.
depth packer set _____ feet

Well depth _____ feet
Casing depth _____ feet
Pump depth _____ feet
Well casing material _____
Well casing size _____
Well casing weight _____
Well casing joint _____
Well casing coupling _____
Well casing thread _____
Well casing end _____
Well casing bottom _____

DEPTH - BELOW LAND SURFACE - FEET

CHARACTER OF MATERIAL

NOTE: SHOW TYPE OF MATERIAL AND COARSENESS OF GRAIN

DEPTH - BELOW LAND SURFACE - FEET	CHARACTER OF MATERIAL	WATER	TEMP.
10	sd	0	4
20	sd	4	16
30	sd	16	24
40	sd	20	25
50	sd	24	28
60	sd	32	27
70	sd	43	24
80			
90			
100			
110			
120			
130			
140			
150			
160			
170			
180			
190			
200			
210			
220			
230			
240			
250			
260			
270			
280			
290			
300			

USE CONTINUATION SHEET FOR LOGS DEEPER THAN 300 FEET

SWFWMD

Well Completed By John P. Thompson 12/1/77 Tampa Well Drilling

WATER MANAGEMENT DISTRICT REGULATORY WELLER'S COMPLETION REPORT

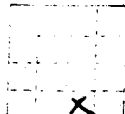
(To be forwarded upon completion of the well)

TO: CHIEF HYDROLOGIST
 SOUTH DAKOTA WATER MANAGEMENT DISTRICT (REGULATORY)
 Box 100, Pierre, S.D. 57501
 BRK 100-1-1000 33512

PERMIT NO. 71048

DATE WELL COMPLETED 7/6/70

1. Well location: County Hells
 Section 17
 Township 29 S
 Range 20 E
 Address Rt 2, Box 741A Langaville



Indicate well location in the section

2. Well owner Victor D. Matt

3. Purpose of well: ☒ Domestic ☐ Irrigation ☐ Public supply ☐ Stock ☐ Other explain _____

4. Have water quality tests been taken? Yes ☐ No ☒

A. At least: Bacterial quality _____ Chemical quality _____

B. Where: County Health Dept _____ Other _____

5. Depth of well 92' Depth cased 72 1/2'

Casings used: 72' ft 6 inch diameter _____ ft 3 inch diameter _____ ft _____ inch diameter _____

_____ ft _____ inch diameter

Casing type and grade 11 D Galv Steel #8 per ft.

6. Bottom of casing set at 72' ft below land surface (from _____) ☒ open hole ☐ screened ☐ sand point ☒ open end

if other describe _____

7. Name of pump and its type, size, etc. Cable

8. Pump set at 63' ft below land surface

9. Name of pump R.A. Tullis

10. Name of pump F16

11. Name of pump Electric

12. Name of pump HP

13. Name of pump 38'

14. Name of pump 120 GPM

15. Water level lowered to 0 ft below land surface after 0 minutes pumping, lowered to 0 ft

below land surface after 0 minutes pumping

11. Site elevation 50' above mean sea level in feet

12. Complete driller's log on form SWFWM-DIRI SF 1640-2 (depths, rock type, color, water quality, etc.) Record special observations below (cavities, water quality, etc.)

Good water

Name of person completing this form _____

Date 7/6/70 Address Rt 2, Box 741A Langaville

RETURN TO CHIEF HYDROLOGIST

71045

[illegible]

July- 6-1970

Recd. 12/1/11

July 6 - 1976 PC Box 50 d.b.f./m.

RETURN TO CDDP MAILING LIST

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (REGULATORY) DRILLER'S COMPLETION REPORT AND WELL LOG

TO: Chief Hydrologist, SWFWMD(R)
Post Office Box 457
Brooksville, Florida 33512
Phone: (904) 796-3511

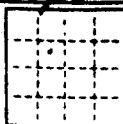
Permit Number 71624-B
Well started - date June 21-71
Well completed - date June 21-71

Well owner: Name and Address Clifford L Smith - Rt 3 Box 438 - Tampa

Well location: County Hillsborough

Tests taken: ☐ bacterial ☐ chemical ☒ none
by: ☐ County Health Department ☐ other

S17-T295-R2CE
SECTION TOWNSHIP RANGE



INDICATE WELL LOCATION IN THE SECTION

Purpose of well:

☒ domestic ☐ public water supply ☐ irrigation ☐ stock
☐ industrial ☐ other

Pump 1 HP. Type jet ☒ electric ☐ diesel

Yield 10 GPM. ☐ Well not pumped. ☐ Well flows above land surface

Water level above below land surface before pumping 31 feet. Water

level lowered to NONE feet after 120 minutes pumping at 10 GPM.

Method of drilling: ☐ rotary ☒ cable tool ☐ jet ☐ other

Finish: ☒ open hole ☐ sand point ☐ well screen placed at _____ feet.
and _____ feet.
depth packer set _____ feet

CASING CONSTRUCTION

Check one:
☐ galvanized
☐ black iron
☐ other

Check one:
☒ threaded, coupled
☐ T&C, welded
☐ well pipe
☐ other

Casing diam. top

3 to 4.5

_____ to _____

_____ to _____

set at 4.5

below land surface

DEPTH BELOW LAND SURFACE - FEET	CHARACTER OF MATERIAL (NOTE EACH TYPE OF MATERIAL AND CAVITIES IF ANY)	FORMATION	
		THICKNESS	PERCENT
10	Sand	0	15
20	Blue Clay	15	20
30	Blue and white clay	20	20
40	White Clay and Rock	30	43
50	White Lime Rock	43	45
60	Blue Rock	45	65
70			
80			
90			
100			
110			
120			
130			
140			
150			
160			
170			
180			
190			
200			
210			
220			
230			
240			
250			
260			
270			
280			
290			
300			

(USE CONTINUATION SHEET FOR LOG OF WELLS DEEPER THAN 300 FEET)

Well Completed By:

DRILLER'S SIGNATURE AND NUMBER

John W. Tullis
5437

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
WELL COMPLETION REPORT

OWNER: BUSSIC NICK
Last Name First Name Initial
7100 BACOTLEGS DRIVE
Number Street
TAMPA City FLA State
Area Code Phone Number Zip Code

WELL LOCATION:
1/4 1/4 1/4 of Section 19
27 (N-S) 20 (E-W)
Township Range
Latitude Longitude
Locate in Section
Number Street/Road
LYNNING AREA
Lot No. Subdivision
TAMPA City HILLS County

OWNER WELL NUMBER OR NAME: _____

DRILL METHOD: ☐ Rotary ☐ Cable Tool ☐ Jet ☐ Auger
☒ Other: TRIPED

SURFACE CASING, CASING, AND LINER MATERIAL:

Steel Dia. (in.)	Steel Wt. (lb./ft.)	Die (in.)	From (Ft.)	To (Ft.)	Schedule No.	Joints*
Black Galv S. Steel		PVC Other				
<u>2</u>				<u>42</u>		<u>200</u>

* Describe Material:
* TC = Threaded and Coupled, TCW = Threaded, Coupled, and Welded.
W = Welded, B = Bonded (PVC), O = Other

GROUT: ☒ None ☐ Neat Cement ☐ Other: _____

Type and Percent of Additives and Grout Volume or Number of 94 lb. Sacks

From (Ft.)	To (Ft.)

NISH: ☒ Open Hole ☐ Perforated or Slotted Casing ☐ Gravel Pack
☐ Sandpoint or Screen Attached to Well Casing ☐ Sandpoint or Screen
Telescoped with Packer Inside Casing (Packer Material: _____)

Sandpoint/Screen Material	Dia. (in.)	Slot Size (in.)	From (Ft.)	To (Ft.)

☐ Other Finish: _____

QUALITY TEST: ☐ None ☐ Bacteria ☐ Chemical

By: ☒ Health Dept ☐ USGS ☐ Other _____

☒ Clear ☐ Colored ☐ Sulphur ☐ Salty ☐ Iron ☐ Other _____

Conductance (Micromhos) _____ Chloride _____ ppm

Hardness _____ pH _____ Temp _____ °F

ppm as calcium carbonate

Well Disinfected: ☒ No ☐ Yes (Date) _____

WELL TEST, by: ☐ Natural Flow ☐ G.P.M. ☐ Airlift

☐ Bailor ☐ Permanent Pump ☒ Test Pump ☐ None

Discharge Measured By: ☐ Bailor ☐ Estimated ☐ Current Meter

☐ Orifice ☐ Trajectory ☐ Venturi ☐ Volumetric ☐ Other _____

Measured Static Water Level ☐ + ☐ - ☐ 8 Ft.

Measured Pumping Water Level ☐ + ☐ - ☐ 12 Ft.

After ☐ 7 Hours At ☐ 60 G.P.M.

Specific Capacity ☐ 8 G.P.M./Ft. of Drawdown

Measuring Pt. (Describe): _____

Which is ☐ 7 Ft. ☒ Above ☐ Below Land Surface

Elevation of Measuring Pt. = ☐ 8 Ft. ☐ Above ☐ Below MSL

WELL EQUIPMENT: ☐ Open ☒ Capped ☐ Valved

☐ Permanent Pump ☐ Temporary Pump

Type Pump: ☐ Centrifugal ☐ Cylinder ☐ Jet ☐ Submersible

☐ Turbine ☐ Other: _____

Power: ☐ Diesel ☐ Electric ☐ Gasoline ☐ Other: _____

Horsepower ☐ 10 Capacity ☐ 87 G.P.M.

Intake/Injection Depth ☐ 8 Ft.

FORM 17-1.122 (38)

TYPE OF WORK: ☐ New Construction ☐ Repair
☐ Deepening ☐ Plugging
☐ Other _____

PERMIT NUMBER:

311569-11

WELL NUMBER

TYPE OF WELL: ☒ Water Well ☐ Test Well ☐ Recharge ☐ Drainage
☐ Waste Disposal ☐ Observation ☐ Other _____

USE: ☐ Domestic ☒ Irrigation ☐ Industrial ☒ Livestock ☐ Public Supply
☐ Other _____

SKETCH LOCATION OF WELL in relation to local landmarks, giving distance and direction from nearest town, road, or other reference point.

PALM-RIVER-ROAD

North

HIGH-WAY-301

LYNN-SECTION

GEOPHYSICAL LOGS: Type: _____ By: _____

WELL LOG			Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.
Bore Hole (in.)	Casing Size (in.)	Depth (Ft.)	
		From To	
<u>2</u>		<u>0</u> <u>10</u>	<u>SAND</u>
		<u>10</u> <u>20</u>	<u>11</u>
		<u>20</u> <u>30</u>	<u>SAND + LIGHT-GREEN CLAY.</u>
		<u>30</u> <u>42</u>	<u>LIGHT-GREEN CLAY</u>
			<u>A SOME SOFT-LINE</u>
			<u>STONE.</u>
		<u>42</u> <u>55</u>	<u>LIMESTONE</u>
		<u>55</u> <u>60</u>	<u>11</u>
		<u>60</u> <u>68</u>	<u>SAKE-AS-ABOVE</u>
		<u>68</u>	<u>BOTTOM OF WELL.</u>

Total Depth ☐ 68 Ft. Producing Zone Material: ☐ Sand ☐ Shell

☐ Broken Shell ☒ Limestone ☐ Other: _____

Top of Producing Zone ☐ 47 Ft., Bottom of Producing Zone ☐ 68 Ft.

☐ Drill Cuttings Sent to Bureau of Geology

1020 Reinaldo Garcia owner

License No. _____ Water Well Contractor's Signature _____ Position _____

10 10 87 _____ Driller Signature _____

Completion Date _____

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

OR
ABANDONMENT REPORT

TRACEL 135

NAME OF DRILLING CONTRACTOR: ANGEL BROWN LICENSE NO.: 2184NAME OF PROPERTY OWNER: FLA. DEPT OF TRANSPORTATION PERMIT NO.: 366847LOCATION: SECTION 17 TOWNSHIP 29 RANGE 20 COUNTY HILLSSTREET ADDRESS: FLA DOT PO BOX 1249 BARTOW 33830SIZE OF CASING: 2" DEPTH OF CASING: - DEPTH OF WELL: 17TYPE OF CASING: BLACK IRON - PVC - GALV. ✓ T&C ✓ WELDED -SAND CASING USED: YES - NO ✓ METHOD: GRAVITY FLOW USING TREMIE -DUMP BAILER - PRESSURE PUMPED THROUGH: CASING - TREMIE -BAGS OF GROUT USED: 1 TYPE OF DRILLING EQUIPMENT USED: ROTARYOBSERVER'S ARRIVAL TIME: 2:45 GROUTING START TIME: 2:50GROUTING FINISHING TIME: 3:00 OBSERVER'S DEPARTURE TIME: 3:15

DESCRIPTION OF GROUTING PROCEDURES: THE PLUGGING OF WELL
WAS ACCOMPLISHED USING ONE BAG OF
CEMENT WITH A BAG OF BENTONITE AND
A MIXTURE OF 5.2 GALLONS OF WATER
BEING PUMPED THROUGH THE CASING
BRINGING GROUT 17-0. HOLE WAS
THEN BACKFILLED WITH DIRT. PLUGGING
AS PER DER SPEC 17-21-22

DATE:

7/9/21

OBSERVER'S SIGNATURE:

PRShed

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

OR

ABANDONMENT REPORT

PARCEL 137

NAME OF DRILLING CONTRACTOR: ANCEL BROWN LICENSE NO.: 2184NAME OF PROPERTY OWNER: FLA DEPT OF TRANSPORTATION PERMIT NO.: 366845LOCATION: SECTION 17 TOWNSHIP 29 RANGE 20 COUNTY HILLSSTREET ADDRESS: FLA DOT PO BOX 1249 BARTON 33830SIZE OF CASING: 3" DEPTH OF CASING: - DEPTH OF WELL: 67'TYPE OF CASING: BLACK IRON - PVC - GALV. / T&C / WELDED -SAND CASING USED: YES - NO / METHOD: GRAVITY FLOW USING TREMIE -DUMP BAILER - PRESSURE PUMPED THROUGH: CASING / TREMIE -BAGS OF GROUT USED: 5 TYPE OF DRILLING EQUIPMENT USED: ROTARYOBSERVER'S ARRIVAL TIME: 9:40 GROUTING START TIME: 10:00GROUTING FINISHING TIME: 10:30 OBSERVER'S DEPARTURE TIME: 11:00

DESCRIPTION OF GROUTING PROCEDURES: PLUGGING OF WELL WAS
ACCOMPLISHED USING 2 BUCKETS OF GRAVEL
BEING POURED THROUGH THE CASING LEAVING
A DEPTH OF 45' FIVE BAGS OF PORTLAND
CEMENT WITH A MIXTURE OF 1 BAG OF
BENTONITE AND 25 GALLONS OF WATER
WAS THEN PRESSURED THROUGH THE DRILL ROD
BRING THE GROUT 45-0. HOLE WAS THEN
BACKFILLED WITH DIRT

DATE: 7/9/81 OBSERVER'S SIGNATURE: PRShap

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
WELL COMPLETION REPORT

OWNER: BEST IRRIGATION
Last Name First Name Initial
0321 KINGSBURY CR
Number Street
TAMPA FLA
City State
Area Code Phone Number Zip Code

WELL LOCATION:
Locate in Section
Latitude Longitude
Township Range Section
North East West
Degree Minute Second

Number Street/Road
FAULKNER AVE AD
Lot No. Subdivision
City County

OWNER WELL NUMBER OR NAME: BEST IRR

DRILL METHOD: ☐ Rotary ☒ Cable Tool ☐ Jet ☐ Auger
☐ Other

SURFACE CASING, CASING, AND LINER MATERIAL:
Steel Dia. (in.) Steel Dia. (in.) From (ft.) To (ft.) Schedule No. Joints*
Black Galv. S Steel Wt. (lb./ft.) PVC Other
4 0 28 40 40

* Describe Material.
* TC = Threaded and Coupled. TCW = Threaded, Coupled, and Welded.
W = Welded. B = Bonded (PVC). O = Other.

GROUT: ☒ None ☐ Neat Cement ☐ Other

Type and Percent of Additives and Grout Volume or Number of 94 lb. Sacks
From (ft.) To (ft.)

FINISH: ☒ Open Hole ☐ Perforated or Slotted Casing ☐ Gravel Pack
☐ Sandpoint or Screen Attached to Well Casing ☐ Sandpoint or Screen
Telescoped with Packer Inside Casing (Packer Material)

Sandpoint/Screen Material Dia. (in.) Slot Size (in.) From (ft.) To (ft.)

☐ Other Finish

QUALITY TEST: ☒ None ☐ Bacteria ☐ Chemical
Date Date

By ☐ Health Dept. ☐ USGS ☐ Other

Clear ☐ Colored ☐ Sulphur ☐ Salty ☐ Iron ☐ Other

Conductance (Micromhos) Chloride ppm

Hardness pH Temp OF

ppm as calcium carbonate

Well Disinfected: ☐ No ☐ Yes (Date)

WELL TEST, by ☐ Natural Flow ☐ G.P.M. ☐ Airlift

☐ Bailer ☒ Permanent Pump ☐ Test Pump ☐ None

Discharge Measured By: ☐ Bailer ☐ Estimated ☐ Current Meter

☐ Orifice ☐ Trajectory ☐ Venturi ☐ Volumetric ☐ Other

Measured Static Water Level ☐ + ☐ - ☐ Ft.

Measured Pumping Water Level ☐ + ☐ - ☐ Ft.

After ☐ Hours At ☐ G.P.M.

Specific Capacity ☐ G.P.M./Ft. of Drawdown

Measuring Pt. (Describe):

Which is ☐ Ft. ☐ Above ☐ Below Land Surface

Elevation of Measuring Pt. = ☐ Ft. ☐ Above ☐ Below MSL

WELL EQUIPMENT: ☐ Open ☐ Capped ☐ Valved

☒ Permanent Pump ☐ Temporary Pump

Type Pump ☐ Centrifugal ☐ Cylinder ☐ Jet ☒ Submersible

☐ Turbine ☐ Other

Power ☐ Diesel ☒ Electric ☐ Gasoline ☐ Other

Horsepower ☐ Capacity ☐ G.P.M.

Intake/Injection Depth ☐ Ft.

DER FORM 17-1 122 (38)

TYPE OF WORK:
☒ New Construction ☐ Repair
☐ Deepening ☐ Plugging
☐ Other

PERMIT NUMBER

376256-13

WELL NUMBER

TYPE OF WELL: ☒ Water Well ☐ Test Well ☐ Recharge ☐ Drainage
☐ Waste Disposal ☐ Observation ☐ Other

USE: ☐ Domestic ☒ Irrigation ☐ Industrial ☐ Livestock ☐ Public Supply
☐ Other

SKETCH LOCATION OF WELL in relation to local landmarks, giving distance and direction from nearest town, road, or other reference point.

North
0.5 mi
Nug 60
Tandemby rd

GEOPHYSICAL LOGS: Type:

By:

WELL LOG				Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.
Bore Hole (in.)	Casing Size (in.)	Depth (ft.)		
		From	To	
		1	10	Sand
		10	20	Clay & Rock
		20	28	White Lime
		28	48	" "
		48	68	Blue Lime
		68	70	Brown Lime

Total Depth 70 Ft. Producing Zone Material: ☐ Sand ☐ Shell

☐ Broken Shell ☒ Limestone ☐ Other

Top of Producing Zone 30 Ft., Bottom of Producing Zone 70 Ft.

☐ Drill Cuttings Sent to Bureau of Geology

License No. 15913 B.O.C. 15913 15913

Completion Date 11/6/87 Driller Signature [Signature]

26

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

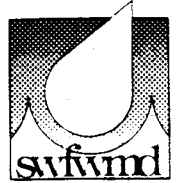


2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 SUNCOM 684-1011

BRUCE A. SAMSON, Chairman, Tampa
Wm. O. STUBBS, JR., Vice Chairman, Dade City
JIM KIMBROUGH, Secretary, Brooksville
RONALD B. LAMBERT, Treasurer, Wauchula
DON CRANE, Assistant Secretary, St. Petersburg
ARCH UPDIKE, JR., Assistant Treasurer, Lake Wales

WALTER H. HARKALA, Plant City
MARY A. KUMPE, Sarasota
MICHAEL ZAGORAC, JR., Belleair

GARY W. KUHL, Executive Director



August 25, 1983

Tom Tetreault
Camp, Dresser and McKeith
4100 W. Kennedy Blvd.
Suite 109
Tampa, FL 33609

Re: Information Request

Dear Mr. Tetreault:

Enclosed is the information you requested. I would like to point out that the water quality information presented in the enclosed report applies to an area upstream of S-162 and should be used with discretion.

I'm looking forward to our meeting on September 1, 1983.

Cordially,

V. J. ATTARDI
Environmental Scientist
Resource Regulation Department

VJA:kk
Enclosure as stated

*Repeat Enclosed: Water Quality and Fish
Populations in the Harnay
Canal.*

Also: TBC blue line

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (REGULATORY)
 5060 U.S. Hwy 41 South, Brooksville, Florida 33512
 904/796-7211

APPLICATION FOR A PERMIT TO CONSTRUCT A WELL

108718

In compliance with the Rules and Regulations of the Southwest Florida Water Management District (Regulatory)

ANCEL O. BROWN		2184	
DRILLING CONTRACTOR		LICENSE NUMBER	
P.O. Box 1249		BARTON 33830	
ADDRESS	STREET OR BOX NO.	CITY	ZIP CODE

PERMIT NO. 366845-366847-11

STIPULATIONS REQUIRED: _____
 (See Reverse)

DATE: _____

(PLEASE TYPE OR PRINT IN ABOVE SPACE)

Requests authorization to construct, repair modify a well for: To Plug
 (Circle One)

FLA. DEPT. OF TRANSPORTATION at

NAME OF WELL OWNER	ADDRESS OF WELL LOCATION	STREET OR BOX NO.	CITY	ZIP CODE
<u>FLA. D.O.T.</u>	<u>P.O. Box 1249</u>	<u>BARTON</u>	<u>33830</u>	
OWNERS MAILING ADDRESS	STREET OR BOX NO.	CITY	ZIP CODE	

TYPE OF EQUIPMENT: ROTARY

LOCATION SKETCH
 (TO CLOSEST MAIN HIGHWAY)

APPROXIMATE DEPTH: _____ DIAMETER: _____

APPROXIMATE CASSED DEPTH: _____ CASING MATERIAL: _____

SEAL: _____ PURPOSE: PLUG

LEGAL DESCRIPTION:

QTR. _____ QTR. _____ SEC. _____ TWP. _____ S. RGE. _____ E.

LOT _____ BLK. _____ UNIT _____ SUBDIVISION _____

COUNTY HILLSBOROUGH

I agree to furnish a Completion Report within 30 days after drilling operations cease and to comply with all the provisions of the Rules and Regulations of the SWFWMD(R) relative to well construction. Driller should supply a copy of the Completion Report to the owner.

I understand if the withdrawal is from a well having an inside diameter of six inches (6") or more or if the withdrawal during any single day is to exceed one-million (1,000,000) gallons or if the average annual daily withdrawal is to exceed one hundred thousand (100,000) gallons average per day on an annual basis, then a Consumptive Use Permit must be approved prior to the Construction Permit being authorized.

Signature of Drilling Contractor Ansel O. Brown

Signature of Owner
 or His Authorized Agent [Signature]

DO NOT WRITE BELOW THIS LINE—FOR OFFICIAL USE ONLY

GRANTED BY: [Signature] DATE: 26 June 81

TITLE: ENFORCEMENT SUPERVISOR

THIS PERMIT NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OF SWFWMD(R). IT SHALL BE KEPT AT THE WELL SITE DURING ALL DRILLING OPERATIONS.

CUP NO. _____

2-1-81 [Signature]

A. O. BROWN, WATER WELL CONTR. # 2184

IMS Update 2.1.81 *Jan*

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT



2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 SUNCOM 684-1011

BRUCE A. SAMSON, Chairman, Tampa
Wm. O. STUBBS, JR., Vice Chairman, Dade City
JIM KIMBROUGH, Secretary, Brooksville
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DON CRANE, Assistant Secretary, St. Petersburg
ARCH UDDIKE, JR., Assistant Treasurer, Lake Wales

WALTER H. HARKALA, Plant City
MARY A. KUMPE, Sarasota
MICHAEL ZAGORAC, JR., Belleair

GARY W. KUHLE, Executive Director



September 6, 1983

Mr. Phillip C. Kennedy
Camp, Dresser & McKee, Inc.
One Center Plaza
Boston, MA 02108

Re: Well Completion Reports #71-7281, 71048 & 716211

Dear Mr. Kennedy:

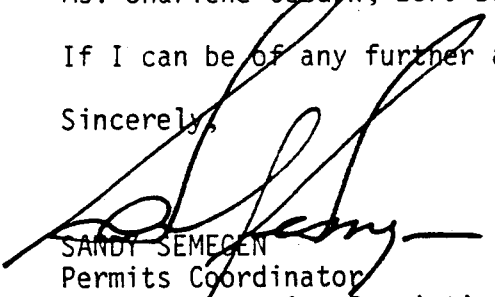
Enclosed you will find copies of the above referenced reports. The cost of these reports are as follows:

4 micro-film copies	@ 1.00	= \$4.00
First class mail		.20
Total		<u>\$4.20</u>

Please send your remittance to Office and Information Service, ATTN Ms. Sharlene Coburn, 2379 Broad St. Brooksville, FL 33512.

If I can be of any further assistance, contact this office.

Sincerely,


SANDY SEMEGEN
Permits Coordinator
Well Construction Permitting & Enforcement

SS:cm

Enclosure: as stated

cc: S. Coburn

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (SWFMD)

DRILLING COMPLETION REPORT AND LOG

TO: Chief Hydrologist, SWFMD(R)
Post Office Box 457
Brooksville, Florida 33512

Phone: (984) 796-3511

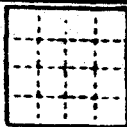
Well started - date 12-1-78
Well completed - date 12-1-78

Well owner: Name and Address May S. Brown, Rt. 3 Box 6

Well location: County Hillabara

Tests taken by: ☐ District ☐ Laboratory ☐ County Health Department ☐ Other

SECTION TOWNSHIP RANGE



INDICATE WELL LOCATION IN THE SECTION

Purpose of well:

☒ Domestic ☐ public water supply ☐ irrigation ☐ stock
☐ industrial ☐ other

Pump _____ HP. Type _____ ☐ electric ☐ diesel

Yield _____ GPM. ☐ Well not pumped. ☐ Well flows above land surface

Water level above below land surface before pumping _____ feet. Water

level lowered to _____ feet after _____ minutes pumping at _____ GPM.

Method of drilling: ☐ rotary ☒ cable tool ☐ jet ☐ other

Fin sh: ☐ open hole ☐ sand point ☐ well screen placed at _____ feet.

depth packer set _____ feet

DEPTH BELOW LAND SURFACE FEET

CHARACTER OF MATERIAL

TYPE OF MATERIAL AND CHARACTER OF MATERIAL

DEPTH	CHARACTER OF MATERIAL	DEPTH	CHARACTER OF MATERIAL
10	sd	4	sd
20	sd	16	sd
30	sd	20	sd
40	sd	25	sd
50	sd	30	sd
60	sd	32	sd
70	sd	47	sd
80			
90			
100			
110			
120			
130			
140			
150			
160			
170			
180			
190			
200			
210			
220			
230			
240			
250			
260			
270			
280			
290			
300			

(USE CONTINUATION SHEET FOR LOGS OF WELLS DEEPER THAN 300 FEET)

SWFMD P

Well Completed By J. L. P. Tamm, Jr. Tamm Well Drilling

DRILLER'S COMPLETION REPORT
To be forwarded upon completion of the well

CHIEF HYDROLOGIST
SOUTH FLORIDA WATER MANAGEMENT DISTRICT (REGULATORY)
P.O. Box 1000, Fort Lauderdale, Florida 33314

PERMIT NO 71048

DATE WELL COMPLETED 7/6/70

1. Well location: County Hells
Section 17
Township 29 S
Range 20 E

2. Well owner Victor D. Matt Address Rt 2, Box 741A Langford, Fla

3. Purpose of well: ☒ Domestic ☐ Irrigation ☐ Public supply ☐ Stock ☐ Other explain _____

4. Have water quality tests been taken? Yes ☐ No ☒
If so, when? Bacterial quality _____ Chemical quality _____
By whom? County Health Dept _____ Other _____

5. Depth of well 92' Depth cased 72 1/2'
Casing used 72' 6" inch diameter 3" inch diameter _____

6. Casing type and grade W.D. Galv Steel #8 per ft.
Bottom of casing set at 72' ft. below land surface. ☒ open hole, ☐ screened, ☐ sand point, ☒ open end.
If other, describe _____

7. Pumping and flow rate Cable
Pump motor size 63' ft. below land surface
Pump motor R.A. Tullis
Pump motor F16
Pump motor Electric

8. Level of water in well before pumping 38' ft. below land surface. Yield by pumping 120 GPM
Water level lowered to 0 ft. below land surface after 0 minutes pumping. Lowered to 0 ft. below land surface after 0 minutes pumping.

9. Site elevation 50' above mean sea level in feet.

10. Complete driller's log on form SWFWMD(R) SF 1640-2 (depths, rock type, color, water quality, etc.). Record special observations below:
Good water

Name of person completing this form R. A. Tullis
Date 7/6/70 Address P.O. Box 51, Gibson, Tex, FIA

RETURN TO CHIEF HYDROLOGIST

DRILLER'S LOG

71045

U.S. 1111

July - 6-1970

CHARACTER OF MATERIAL (Note each material found)	FROM feet below land surface	TO feet below land surface
SAND	0	50
CLAY-Red	50	67
Rock- Red	67	70
Rock- WHITE	70	80
Rock- WHITE SOFT	80	92
POREUSE WATER		

Received of _____ Rs 500/-

July 6 - 1950. No Box 51 L.B.F./M.

RETURNS TO CHIEF HYDROLOGIST

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (REGULATORY) DRILLER'S COMPLETION REPORT AND WELL LOG

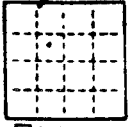
TO: Chief Hydrologist, SWFWMD(R)
Post Office Box 457
Brooksville, Florida 33512
Phone: (904) 796-3511

Permit Number 716245-B
Well started - date June 21-71
Well completed - date August 1-71

Well owner: Name and Address Clifford L Smith Rt 43 Box 495 - Zephyrus

Well location: County Dade Tests taken: ☐ bacterial ☐ chemical ☒ bacteriological
by: ☐ County Health Department ☐ other

S17-T29S-R20E
SECTION TOWNSHIP RANGE



INDICATE WELL LOCATION IN THE SECTION

Purpose of well:
☒ domestic ☐ public water supply ☐ irrigation ☐ stock
☐ industrial ☐ other

Pump 1 HP. Type jet ☒ electric ☐ diesel
Yield 10 GPM. ☐ Well not pumped. ☐ Well flows above land surface

Water level above below land surface before pumping 31 feet. Water level lowered to NONE feet after 120 minutes pumping at 10 GPM.

Method of drilling: ☐ rotary ☒ cable tool ☐ jet ☐ other
Finish: ☒ open hole ☐ sand point ☐ well screen placed at _____ feet.
depth packer set _____ feet

CASING CONSTRUCTION

CHECK ONE
☒ galvanized
☐ black iron
☐ other

CHECK ONE
☒ threaded, coupled
☐ T&C, welded
☐ weld only
☐ other

Casing diameter
to _____ ft.
to _____ ft.
to _____ ft.
coupled or _____ ft.
below land surface

DEPTH BELOW LAND SURFACE FEET	CHARACTER OF MATERIAL (NOTE EACH TYPE OF MATERIAL AND CAVITIES IF ANY)	FORMATION		
		CHANGE	FOOTAGE	FEET
10	Sand	0	15	
20	Blue Clay	15	20	
30	Blue and white clay	30	20	
40	White Clay and Rock	30	43	
50	White Limestone Rock	43	45	
60	Blue Rock	45	60	
70				
80				
90				
100				
110				
120				
130				
140				
150				
160				
170				
180				
190				
200				
210				
220				
230				
240				
250				
260				
270				
280				
290				
300				

(USE CONTINUATION SHEET FOR LOG OF WELLS DEEPER THAN 300 FEET)

Well Completed John W. Tullis T-89
DRILLER'S SIGNATURE AND NUMBER
John W. Tullis 5437

10.9.3 WELL CONSTRUCTION INVENTORY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT



2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 SUNCOM 684-1011

BRUCE A. SAMSON, Chairman, Tampa
Wm. O. STUBBS, JR., Vice Chairman, Dade City
JIM KIMBROUGH, Secretary, Brooksville
RONALD B. LAMBERT, Treasurer, Wauchula
DON CRANE, Assistant Secretary, St. Petersburg
ARCH UPDIKE, JR., Assistant Treasurer, Lake Wales

WALTER H. HARKALA, Plant City
MARY A. KUMPE, Sarasota
MICHAEL ZAGORAC, JR., Belleair

GARY W. KUHL, Executive Director



August 9, 1983

Mr. Tom Tetreavli
Comp, Dressler & McKee
1 Center Plaza
Boston, MA 02108

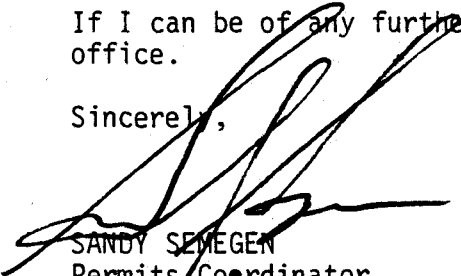
Re: Well Construction Permit Listing

Dear Mr. Tetreavli:

Enclosed you will find copies of the above referenced listing for Sections 17,18,19 & 20 in Township 29S, Range 20E. Also enclosed is a code sheet deciphering codes found under certain categories.

If I can be of any further assistance, feel free to contact this office.

Sincerely,


SANDY SEEGEN
Permits Coordinator
Well Construction Permitting & Enforcement

SS:cm
Enclosure: as stated

WELL CONSTRUCTION LISTUSE CODE

DP USE	- FIRST THREE CHARACTERS
/ PERMIT	- WELL PERMIT NUMBER
2 DRILL	- DRILLER'S NUMBER
3 USE	- USE CODE
4 BASIN	- BASIN NUMBER
5 CNTY	- COUNTY CODE
6 LOCINT	- (SEC/TWP/RGE)
7 DIAM	- DIAMETER
8 D CASE	- DEPTH OF CASING
9 D WELL	- DEPTH OF WELL
10 GROUT	- GROUTING
11 BAGS	- BAGS
12 DRILLM	- DRILLING METHOD
13 ELEV	- ELEVATION
14 SWLLSD	- STATIC WATER LEVEL
15 SP CAP	- SPECIFIC CAPACITY
16 CL	- CLORIDES
17 FE	- IRON
18 SO	- SULPHATE
19 SEDSZE	- SEDIMENT SIZE
20 SEDCLR	- SEDIMENT COLOR
21 DP1CLA	- DEPTH TO 1ST CLAY
22 CL1CLA	- COLOR OF 1ST CLAY
23 TH1CLA	- THICKNESS OF 1ST CLAY
24 DP2CLA	- DEPTH TO 2ND CLAY
25 CL2CLA	- COLOR OF 2ND CLAY
26 TH2CLA	- THICKNESS OF 2ND CLAY
27 1 CARB	- 1ST SHOWING CARBONATE ROCK
28 CL1CRB	- COLOR OF 1ST CARBONATE ROCK
29 DP RCK	- DEPTH TO BEDROCK
30 CL RCK	- COLOR OF BEDROCK
31 UN FEA	- UNUSUAL FEATURES
32 OWNER	- OWNER

D - DOMESTIC
E - ESSENTIAL SERVICES
I - INDUSTRIAL
A - IRRIGATION
L - LIVESTOCK
M - MINING
P - POWER
R - RECREATIONAL
A - SPRINKLING SAME AS IRRIGATION
B - PUBLIC SUPPLY
J - INJECTION WELL
G - RECHARGE WELL
T - TEST WELL
O - OBSERVATION/MONITOR
F - FOUNDATION TEST
Z - OTHER
H - REPAIR OR DEEPEN
C - DEWATERING
N - RETURN A/HEAT
K - CONNECTOR WELL
Q - DRAINAGE WELL
V - INVENTORY
Y - PLUGGED/ABANDONED
Z - SEALING WELL
PIEZOMETERS-T/WELL
SATELLITE-RECHARGE
W - AIR CONDITIONING
SUPPLIES-OTHER RETURN

COUNTY CODE

08 - CHARLOTTE
09 - CITRUS
14 - DESOTO
21 - GILCHRIST
25 - HARDEE
27 - HERNANDO
28 - HIGHLANDS
29 - HILLSBOROUGH
35 - LAKE
38 - LEVY
41 - MANATEE
42 - MARION
48 - ORANGE
51 - PASCO
52 - PINELLAS
53 - POLK
58 - SARASOTA
60 - SUMTER

Field #	CC	
32	80-81	<u>Color of Bedrock</u> -- Recording is the same as for <u>Sediment Color</u> .
33	82-84	<u>Unusual Features</u> -- These are obtained from the completion report and are reported by using the following codes: Features are recorded in block 82.

- J - Boulders
- C - Cavities
- B - Chert (flint)
- D - Dolomite
- F - Fossil shell fragments
- E - Lignite (carbonaceous deposits)
- L - Limonite (iron oxide)
- G - Loss of water
- M - Muck
- O - Oolitic deposits
- P - Pebbles
- A - Phosphate
- K - Pisolithic deposits
- Q - Quicksand
- S - Sinkhole developed
- I - Water gained
- X - More than two unusual features.

The depth (block 83) and the thickness (block 84) are recorded using the following codes:

WELL CONSTRUCTION LIST

DATE 6/02/83

D P	P E R	D R	B A C	L O C	D C	D C	G R B	D R I E	S S M P	S S E E	D P L	T H P L	T H P L	1 C L	D C P L	U N	D M
U S E	H I T	I L E	U S I E N Y	Y N S E T N R R	I A S E	A S E	E O L T	A L S M V	L C S D	C F S P L E O	C C L A	C C L A	C C L A	A C R B	R R C K	F C K A	E R
WPE315726	0064	D	13	29	162920	4	82	115		51				50	50		CROSSON
WPE319188	0067	D	13	29	162920	4	69	150		35				54	54		H HICKMAN
WPE326394	1099	D	13	29	162920	3	63	104		34					45		R GRECULA
WPE330925	1160	D	13	29	162920	4	115	252		54							R HOGAN
WPE329669	1233	A	13	29	162920	6	64	250		56				30	MA	111	WH
WPE333017	1358	D	13	29	NWSW162920	4	94	175		47				58	WH	58	WH
WPE334256	1271	D	13	29	162920	4	86	147		44				45	CR	80	WH
WPE337119	1043	D	13	29	162920	4	138	210		48				75		86	MA
WPH342205	1358	A	13	29	162920	6	76	280		60				29	77	LA	14
WPE309754	0072	D	13	29	172920	4	51	150		27				73	TA	136	WH
WPE308628	0056	D	13	29	172920	5	106	150		55				51			
WPE308791	0198	D	13	29	SENE172920	3	45	65		31				40			
WPC348388	1043	D	13	29	172920	4	95	161		39				43	43		
WPC346927	1094	D	13	29	WE172920	2	130	182		28							
WPC348034	1043	D	13	29	172920	4	42	100		16							
WPC350291	1094	D	13	29	172920	2	147	252		33							
WPC351913	1232	D	13	29	172920	4	95	200		47							
WPC351718	1043	D	13	29	172920	4	52	106		15							
WPC351305	1043	D	13	29	172920	4	53	90		15							
WPC356359	1043	D	11	29	00000172920	4	86	165		50							
WPN356561	1104	D	11	29	172920	4	***	CANCELLED	***								
WPC356431	1056	D	13	29	NWNW172920	4	57	195		35							
WPC358326	1183	D	13	29	NWSE172920	4	60	90		35							
WPC357735	1204	D	13	29	172920	4	42	215									
WPC357179	1204	D	11	29	172920	4	42	196									
WPC364072	1094	D	11	29	172920	2	147	310		30							
WPC364848	1043	D	13	29	172920	4	105	195		34							
WPC366845	2184	Y	11	29	NESW172920	3		68									
WPC366622	1160	D	11	29	172920	4	46	140		33							
WPN366513	1094	D	13	29	172920	2	***	CANCELLED	***								
WPC366846	2184	Y	11	29	SWSW172920	3		195									
WPC366847	2184	Y	11	29	SWSW172920	2		17									
WPC366884	1204	D	13	29	172920	4	42	217									
WPE304833	0056	D	13	29	172920	4	113	145		35				85			
WPE304807	0119	L	13	29	NWNW172920	4	42	228		33				38			
WPE304948	0006	D	13	29	SWSW172920	3	87	220		29				42	58		
WPC367725	1160	D	11	29	172920	4	63	140		47							
WPE369134	1392	D	13	29	LT28172920	4											
WPC372159	1252	A	13	29	00000172920	4	180	260		20							
WPC371540	1043	B	13	29	172920	4	67	165	12	24							
WPC373939	1817	I	13	29	172920	6	214	520									
		</															

WELL CONSTRUCTION LIST

DATE 6/02/93

[illegible]

WELL CONSTRUCTION LIST

DATE 6/02/83

D	P	D	B	L	D	D	G	R	B	I	E	L	S	S	S	S	D	C	T	D	C	T	1	C	D	C	U			
P	E	R	A	O	C	D	C	R	B	I	E	L	S	S	S	S	P	L	H	P	L	H	C	L	P	L	N	O		
U	M	I	U	S	N	I	A	E	O	A	L	L	C	A	C	F	S	Z	L	C	C	C	C	A	C	R	R	F	N	
S	I	L	S	I	T	N	A	S	L	U	G	L	S	A	C	F	S	Z	L	C	C	L	L	R	R	C	C	E	E	
E	T	L	E	N	Y	SETNR6	M	E	L	T	S	M	V	D	P	L	E	O	E	R	A	A	A	A	A	B	B	K	A	R
WPE330028	1043	D	13	29	192920	4	69	120		R	18			MS	MA	18	MA	42						60	MA	60	MA	CLB	ATLANTIC CO	
WPH334992	1024	B	13	29	192920	4	73	140		2	C	22		MS		30	WH	10	50	OR	10		70		70		BEJ	JENGINS C N		
WPH334690	1233	B	13	29	192920	6	60	120			C	18		MS		12	MF	10					22	WH	58	WH		C WD CONST		
WPC345975	1855	D	13	29	192920	4	66	120			C	72																RICHBURG		
WPE310136	0165	D	13	29	202920	4	84	210			C												65		65			W HEATH		
WPC348356	1056	B	13	29	202920	4	55	260		7	C	25																FL PRE FAB		
WPC366422	1233	I	13	29	202920	4	63	125			C	24		F														HILLSBOROUGH		
WPH311502	0119	B	13	29	SESE	202920	4	84	227		C	37											48					C COOPER		
WPE310248	0264	T	13	29	202920	6	89	189			C	18											65					CUSTH STRUC		
WPC371502	1160	D	13	29	SWSE	202920	4	66	215		C	1 34																KINNEY, JAC		
WPC375478	2258	L	13	29	202920	4	67	142			C	21																CAREY CATT		
WPC375548	1160	B	11	29	202920	4	41	205		6	C	21																ZANOTTI CON		
WPN376680	2245	Y	11	29	SWNW	202920			***	CANCELLED	***																			
WPE312323	0198	D	13	29	NWNW	202920	3	72	166		C	27											25		68			H D VILDBI		
WPE318931	0165	A	13	29	202920	4	70	195			C	23											26		26			PRIDE SLS		
WPE318932	0165	A	13	29	202920	4	72	165			C	26											64		120			PRIDE SLS		
WPE317786	0119	D	13	29	202920	4	100	205			C	29											47		89			C COOPER		
WPE322712	1388	D	13	29	202920	3	51	100			C	21											51		75			SELF		
WPE323859	1043	D	13	29	202920	4	74	199			C	45											65		72			P ZIMMERMAN		
WPE322452	1185	D	11	27	202920	4	63	210			C	38											55		77			H CHURCHWEL		
WPE325125	1160	D	13	29	202920	4	62	191			C													60				J LOWE		
WPE331113	1183	D	11	29	202920	3	42	73			C	36		MS		8	MY	30					38	WH	38	WH		E HILL		
WPE334203	1043	A	13	29	202920	4	83	147			C	30		MS		7	MB	7	14	MA	21		61		79			PRIDE G		
WPE333591	1358	D	13	29	202920	4	92	205			C	50		MS		20	DA	10	30	MA	20		50	MA	90	WH	CUE	WALLACE C		
WPE335888	1043	D	11	29	202920	4	115	155			C	80		MS		45	LA	26	71	MA	34	105	WH	112	WH			LANIER E A		
WPE337419	1056	D	13	29	202920	4	90	155			C	35		MS	MB	14	MR	35	72	WH	16		49	WH	88	WH		CHANNELL, V		
WPE337604	1056	D	13	29	202920	4	62	220			C	38		MS	MB	22	MA	38					60	WH	60	WH		GIRARD L BL		
WPE308949	0067	D	11	29	212920	4	71	130			C	26																M CARRIER		
WPC350121	1043	D	11	29	212920	4	63	216			T	45																BYRNES, C M		
WPC350646	1043	D	13	29	212920	4	63	195			T	40																SMITH, HARR		
WPC352678	1160	D	13	29	212920	4		225			C	39																BENSON, ED		
WPC355083	1809	D	13	29	212920	4	50	110			C	30																PHILLIPS, C		
WPC354849	1958	Y	13	29	NWSE	212920	6	60	60		C																	HILLSBOROUGH		
WPC358330	1043	D	13	29	212920	4	105	225			T	30																SIVERLING,		
WPC359637	1160	D	13	29	212920	4	84	212			C	44																MURRAY, MA		
WPC365196	1160	D	13	29	212920	4	78	176			C	34																ALVAREZ, A		
WPC365569	1043	D	13	29	212920	4	84	135			T	32																SMITH, E.		
WPC366361	1056	A	13	29	NWNW	212920	4	85	240		C	40																DICK JOYCE		
WPC366075	2147	D	13	29	NESW	212920	4	63	170		C	28																MCDONALD, R		
WPE311765	0003	D	13	29	212920	3	62	160				38											70		70			PUNGEMACH		
WPE310980	0139	D	13	29	212920	4	99	136			C												94					E M WARD		

10.9.4 CONSUMPTIVE USE PERMITS (CUPS) INVENTORY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

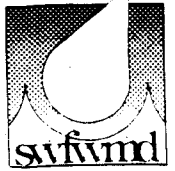


2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 SUNCOM 684-1011

BRUCE A. SAMSON, Chairman, Tampa
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MARY A. KUMPE, Sarasota
MICHAEL ZAGORAC, JR., Belleair

GARY W. KUHL, Executive Director



August 25, 1983

Camp, Dresser, and McKee, Inc.
Attn: Mr. Tetreault
4100 W. Kennedy Blvd.
Suite 109
Tampa, FL 33609

Re: Computer Print-Out

Dear Mr. Tetreault:

Enclosed is a print-out listing the consumptive use permits within the latitude/longitude boundaries delineated (27 59 45, 27 55 00, 82 22 30, 82 18 45) as an area of concern in your attempt to help Hillsborough County complete its application.

Please feel free to contact me at Extension 1322 if you have any questions or require additional assistance.

Sincerely,

SUSAN E. AMES
Supervisor
Processing & Records

SEA:aa
Enclosure: as stated

cc: L.M. Blain
J.E. Curren

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 3

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM	STAT	NAME	ADDRESS	CITY	ST	ZIP
01340 GC	P	CAMPOAMCR MODERN DAIRY INC.	501 US HWY 301 SOUTH	TAMPA	FL	33619

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
143,400	205,100	2	6	0	180.0	00 00 00	83/02/01

WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	E	275648	822134	0	140,000	200,000	MISSING USE CODE
WD#002	E	275654	822135	0	0	0	MISSING USE CODE
WD#003	G	275646	822130	0	0	0	MISSING USE CODE
WD#004	G	275638	822138	0	3,400	5,100	MISSING USE CODE
WD#005	E	275654	822132	0	0	0	MISSING USE CODE
WD#006	G	275656	822133	0	0	0	MISSING USE CODE

USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES
USE#01	532 DAIRY FARMING	140,532	180.0
USE#02	010 DOMESTIC	2,868	0.0

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	071	06	77/05	00/00	NO RUNOFF

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 4

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

01416 00 P BROWNLEE, J. C.

716 S EVERS ST

PLANT CITY

FL 33566

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
---------------	---------------	----------	-------------	-------------	-----------	----------------	-------------

17,100	480,000	1	1	0	17.0	05 29 20	83/02/01
--------	---------	---	---	---	------	----------	----------

WD#001	WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
	6	275924	821925		0	17,100	480,000	MISSING USE CODE

USE#01	USE CODE	USE DESCRIPTION	USE PLMPAGE	USE ACRES
	125	CITRUS	17,100	17.0

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	071	06	77/05	00/00	NO RUNOFF

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 5

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

02024 DC F C.C.C. CC

PO BOX 1118

PLANT CITY

FL 33566

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE	
23,671	288,CCD	1	1	0	85.0	05 29 20	83/04/06	
WD#001	WD TYPE G	W/LAT 275909	W/LONG 821933	SOURCE NAME GROUNDWATER	DIAMETER 0	WD PER AVG 23,671	WD PER MAX 288,CCD	W/D DESCRIPTION MISSING USE CODE
USE#01	USE CODE 125	USE DESCRIPTION CITRUS			USE PLMPAGE 23,671	USE ACRES 40.8		

46

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
COC	C71	06	77/CS	00/CO	NO RUNOFF

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 6

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

02285 01 P SPRINGER, CHARLES E.

7001 INTERBAY BLVD

TAMPA

FL 33616

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SMD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
127,000	254,000	1	2	0	71.2	04 29 20	89/03/02

WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001 G	275907	821907		6	63,500	127,000	PUBLIC SUPPLY
WD#002 G	275856	821904		12	63,500	127,000	PUBLIC SUPPLY

USE CODE	USE DESCRIPTION
USE#01 026	ON-SITE PERCOLATION & FONDING

USE PUMPAGE	USE ACRES
127,000	100.0

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	073	06	83/05	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
000	082	72	89/05	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
000	095	06	83/05	00/00	DISTRICT RESERVES RIGHT TO REQUIRE PUMPAGE RECORDS
000	097	06	83/05	00/00	WATER CONSERVATION METHODS

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

PAGE 6

REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

02285 01 P SPRINGER, CHARLES E.

7001 INTERBAY BLVD

TAMPA

FL 33616

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM CWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
127,000	254,000	1	2	0	71.2	04 29 20	89/03/02

WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001 G	275907	821907		6	63,500	127,000	PUBLIC SUPPLY
WD#002 G	275856	821904		12	63,500	127,000	PUBLIC SUPPLY

USE CODE	USE DESCRIPTION
USE#01 026	ON-SITE PERCOLATION & FONDING

USE PUMPAGE	USE ACRES
127,000	100.0

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	073	06	83/05	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
000	082	72	89/05	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
000	095	06	83/05	00/00	DISTRICT RESERVES RIGHT TO REQUIRE PUMPAGE RECORDS
000	097	06	83/05	00/00	WATER CONSERVATION METHODS

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM	STAT	NAME	ADDRESS	CITY	ST	ZIP
02840 01	P	SEABORD UTILITIES CORP	3250 SW 3RD AVE	MIAMI	FL	33129

BASIN	COUNTY
HILLSBOROUGH	HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SFC/TWNSHP/RGE	EXPIRE DATE
720,000	2,260,000	1	9	0	1,895.4	25 29 19	83/12/07

WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	G	275610	822138	4	68,000	172,000	PUBLIC SUPPLY
WD#002	G	275610	822133	8	68,000	172,000	PUBLIC SUPPLY
WD#003	G	275610	822127	8	0	0	PUBLIC SUPPLY
WD#004	G	275610	822122	8	172,000	605,000	PUBLIC SUPPLY
WD#005	G	275610	822113	6	63,000	156,000	PUBLIC SUPPLY
WD#006	G	275610	822117	6	63,000	156,000	PUBLIC SUPPLY
WD#007	G	275608	822116	6	0	0	PUBLIC SUPPLY
WD#008	G	275610	822146	8	143,000	500,000	PUBLIC SUPPLY
WD#009	G	275613	822133	8	143,000	500,000	PUBLIC SUPPLY

USE CODE	USE DESCRIPTION	USE PLMPAGE	USE ACRES
USE#01	034 ON-SITE SPRAY IRRIGATION	720,000	0.0

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
C00	073	06	81/05	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
C00	082	72	84/05	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
C00	112	72	82/12	88/12	REPORT ANALYSIS OF EFFECTS UPON HYDROLOGIC SYSTEM
C01	005	01	81/02	83/10	METER PUMPAGE-READ AND SUBMIT MONTHLY
C01	038	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C02	005	01	81/02	83/10	METER PLMPAGE-READ AND SUBMIT MONTHLY
C02	038	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C04	005	01	81/02	83/10	METER PLMPAGE-READ AND SUBMIT MONTHLY
C04	038	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C05	005	01	81/02	83/10	METER PUMPAGE-READ AND SUBMIT MONTHLY
C05	038	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C06	005	01	81/02	83/10	METER PUMPAGE-READ AND SUBMIT MONTHLY
C06	038	01	81/02	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C08	005	01	81/06	83/10	METER PLMPAGE-READ AND SUBMIT MONTHLY
C08	038	01	81/06	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY
C09	005	01	82/01	83/10	METER PUMPAGE-READ AND SUBMIT MONTHLY
C09	038	01	82/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT MONTHLY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM	STAT	NAME	ADDRESS	CITY	ST	ZIP
02916	00	P	FEATHERCCK MOBILE HOME PARK	2200 HWY 60 E	VALRICO	FL 33594

BASIN	COUNTY
HILLSBOROUGH	HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
45,000	432,000	1	1	0	73.0	29 29 20	83/06/01

WD#001	WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
	G	275619	822035		0	45,000	432,000	MISSING USE CODE

USE#01	USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES
	034	ON-SITE SPRAY IRRIGATION	45,000	0.0

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REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM	STAT	NAME	ADDRESS	CITY	ST	ZIP
02969 00	P	L.C. CASSIDY & SONS OF FLA., INC	1990 STANKEY PD.	LARGO	FL	33541

BASIN	COUNTY
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HILLSBOROUGH	HILLSBOROUGH
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PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
1,000	2,300	1	1	0	1.0	17 29 20	83/05/04

WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
G	275725	822005		0	1,000	2,300	MISSING USE CODE

USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES
009	INDIVIDUAL SEPTIC TANKS	1,000	0.0

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SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

03281 00 P ROZIER MACHINERY CO, JOSEPH L.

1219 HWY 301 N

TAMPA

FL 33609

BASIN

CCCLNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
55,200	360,000	1	1	0	21.3	00 00 00	83/05/04
WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	G	275724	822117	0	55,200	360,000	MISSING USE CODE
USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES				
USE#01	900	MISCELLANEOUS (100% CONSUMPTIVE)	55,200	0.0			

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DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

03406 00 P FLA STATE FAIR AUTHORITY

PO BOX 11766

TAMPA

FL 33680

BASIN

CCLNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
235,000	604,000	2	2	0	278.6	00 00 00	83/08/03

WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	G	275928	822149	0	168,000	504,000	MISSING USE CODE
WD#002	G	275912	822216	0	67,000	100,000	MISSING USE CODE

USE CODE	USE DESCRIPTION
USE#01	102 LAWS/SHRUBS FOR RECREATION/ATTRACTIONS
USE#02	082 LAKE AUGMENTATION

USE PLMPAGE	USE ACRES
150,400	222.9
84,600	2.8

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
C00	C71	06	77/11	00/00	NO RUNOFF
C01	C03	03	78/04	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C02	C03	03	78/04	83/10	METER PLMPAGE-READ MONTHLY, SUBMIT QUARTERLY

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DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

04352 GC P HILLSBOROUGH CO UTILITIES DEPT

PO DRAWER 3292

TAMPA

FL 33601

BASIN

COUNTY

ALAFIA

HILLSBOROUGH

PERMITTED AVE	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
13,678,000	27,440,000	5	55	0	1.1	00 00 00	83/08/03

WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	E	274252	822317	0	300,000	600,000	MISSING USE CODE
WD#002	E	274252	822324	0	300,000	600,000	MISSING USE CODE
WD#003	E	274318	822028	0	300,000	600,000	MISSING USE CODE
WD#004	E	274318	822030	0	300,000	600,000	MISSING USE CODE
WD#005	E	274309	822033	0	350,000	500,000	MISSING USE CODE
WD#006	E	274301	822035	0	250,000	500,000	MISSING USE CODE
WD#007	E	274322	822026	0	350,000	600,000	MISSING USE CODE
WD#008	E	274315	822017	0	370,000	600,000	MISSING USE CODE
WD#009	E	274256	822016	0	0	0	MISSING USE CODE
WD#010	E	274303	822009	0	250,000	500,000	MISSING USE CODE
WD#011	E	274443	822009	0	250,000	500,000	MISSING USE CODE
WD#012	E	274907	821953	0	550,000	800,000	MISSING USE CODE
WD#013	E	274903	821953	0	300,000	500,000	MISSING USE CODE
WD#014	E	274857	821953	0	0	0	MISSING USE CODE
WD#015	E	274857	821947	0	250,000	300,000	MISSING USE CODE
WD#016	E	274901	821941	0	550,000	700,000	MISSING USE CODE
WD#017	E	274904	821947	0	300,000	400,000	MISSING USE CODE
WD#018	E	274909	821947	0	400,000	400,000	MISSING USE CODE
WD#019	E	274914	821947	0	250,000	400,000	MISSING USE CODE
WD#020	E	275323	821608	0	500,000	1,000,000	MISSING USE CODE
WD#021	E	275337	821713	0	500,000	1,000,000	MISSING USE CODE
WD#022	E	275414	821707	0	100,000	500,000	MISSING USE CODE
WD#023	E	275427	821534	0	850,000	2,000,000	MISSING USE CODE
WD#024	E	275428	821750	0	50,000	150,000	MISSING USE CODE
WD#025	E	275429	821732	0	100,000	150,000	MISSING USE CODE
WD#026	E	275507	821754	0	150,000	350,000	MISSING USE CODE
WD#027	E	275508	821644	0	150,000	500,000	MISSING USE CODE
WD#028	E	275530	821712	0	150,000	340,000	MISSING USE CODE
WD#029	E	275556	821611	0	350,000	750,000	MISSING USE CODE
WD#030	E	275623	821519	0	750,000	1,750,000	MISSING USE CODE
WD#031	E	275634	821838	0	0	0	MISSING USE CODE
WD#032	E	275634	821839	0	0	0	MISSING USE CODE
WD#033	E	275639	821634	0	850,000	2,000,000	MISSING USE CODE
WD#034	E	275638	821631	0	0	0	MISSING USE CODE
WD#035	E	275707	821807	0	250,000	450,000	MISSING USE CODE
WD#036	E	275718	821649	0	200,000	900,000	MISSING USE CODE
WD#037	E	275722	821612	0	450,000	550,000	MISSING USE CODE
WD#038	E	275747	821839	0	200,000	350,000	MISSING USE CODE

WDH039

G

275759

821711

0

50,000

400,000

MISSING USE CODE

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REPORT NUMBER	USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES	DATE
WD#040	G	275833 821655	0 100,000	200,000	MISSING USE CODE
WD#041	G	275854 822008	0 58,000	100,000	MISSING USE CODE
WD#042	G	275953 821833	0 150,000	550,000	MISSING USE CODE
WD#043	G	280009 821651	0 100,000	150,000	MISSING USE CODE
WD#044	G	280007 821811	0 500,000	1,750,000	MISSING USE CODE
WD#045	G	280017 821636	0 100,000	450,000	MISSING USE CODE
WD#046	G	275529 821506	0 400,000	1,000,000	MISSING USE CODE
WD#047	G	275446 821428	0 400,000	1,000,000	MISSING USE CODE
WD#048	G	274256 822016	10 0	0	OBSERVATION/MONITER
WD#049	G	274318 822028	4 0	0	OBSERVATION/MONITER
WD#050	G	274318 822028	6 0	0	OBSERVATION/MONITER
WD#051	G	274857 821953	10 0	0	OBSERVATION/MONITER
WD#052	G	274857 821954	4 0	0	OBSERVATION/MONITER
WD#053	G	274857 821954	6 0	0	OBSERVATION/MONITER
WD#054	G	275432 821613	12 0	0	OBSERVATION/MONITER
WD#057	G	275751 821614	12 0	0	OBSERVATION/MONITER

USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES
USE#01 009	INDIVIDUAL SEPTIC TANKS	5,492,760	1.1
USE#02 026	ON-SITE PERCOLATION & PONDING	2,354,040	0.0
USE#03 690	BOILER MAKE-UP WATER	1,830,920	0.0
USE#04 665	PERISHABLE FOOD PROCESSING	784,680	0.0
USE#05 900	MISCELLANEOUS (100% CONSUMPTIVE)	2,615,600	0.0

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	107	01	78/04	81/06	SUBMIT CONTIOUS RAINFALL RECORDS
001	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
001	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
001	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
001	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
002	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
002	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
002	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
002	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
003	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
003	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
003	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
003	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
004	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
004	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
004	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
004	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
005	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
005	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
005	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
005	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
006	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
006	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
006	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
006	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
007	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY

007

042

03

79/01

83/10

CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY

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007	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
007	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
008	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
008	042	03	79/01	83/10	CHLORIDE ANALYSTS MONTHLY, SUBMIT QUARTERLY
008	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
008	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
010	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
010	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
010	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
010	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
011	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
011	042	03	80/07	83/10	CHLORIDE ANALYSTS MONTHLY, SUBMIT QUARTERLY
011	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
011	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
012	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
012	042	03	80/07	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
012	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
012	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
013	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
013	042	03	79/01	83/10	CHLORIDE ANALYSTS MONTHLY, SUBMIT QUARTERLY
013	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
013	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
015	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
015	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
015	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
015	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
016	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
016	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
016	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
016	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
017	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
017	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
017	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
017	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
018	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
018	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
018	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
018	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
019	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
019	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
019	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
019	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
020	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
020	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
020	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
020	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
021	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
021	042	03	79/01	83/10	CHLORIDE ANALYSTS MONTHLY, SUBMIT QUARTERLY
021	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
021	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
022	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
022	042	03	79/01	83/10	CHLORIDE ANALYSTS MONTHLY, SUBMIT QUARTERLY

022

280

03

79/01

83/10

SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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[illegible]

09.

035

293

03

79/01

83/10

SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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C36	003	03	79/C1	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C36	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C36	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C36	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C37	003	03	79/C1	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C37	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C37	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C37	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C38	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C38	042	03	79/C1	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C38	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C38	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C39	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C39	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C39	280	03	79/C1	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C39	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C40	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C40	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C40	280	03	79/C1	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C40	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C41	003	03	79/C1	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C41	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C41	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C41	293	03	79/C1	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C42	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C42	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C42	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C42	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C43	003	03	79/C1	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C43	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C43	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C43	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C44	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C44	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C44	280	03	79/C1	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C44	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C45	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C45	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C45	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C45	293	03	79/C1	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C46	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C46	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C46	112	72	78/06	84/06	REPORT ANALYSIS OF EFFECTS UPON HYDROLOGIC SYSTEM
C46	280	03	79/01	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C46	293	03	79/C1	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C47	003	03	79/01	83/10	METER PUMPAGE-READ MONTHLY, SUBMIT QUARTERLY
C47	042	03	79/01	83/10	CHLORIDE ANALYSIS MONTHLY, SUBMIT QUARTERLY
C47	089	72	78/05	00/00	NOTIFY DISTRICT UPON CHANGE OF OPERATION
C47	112	72	78/06	84/06	REPORT ANALYSIS OF EFFECTS UPON HYDROLOGIC SYSTEM
C47	124	72	78/05	84/05	PUMP FACILITIES AT MAX RATE FOR TESTING
C47	280	03	79/C1	83/10	SOLIDS (DISOLVED) - MONTHLY, SUBMIT QUARTERLY
C47	293	03	79/01	83/10	SULFATE ANALYSIS MONTHLY, SUBMIT QUARTERLY

048

063

03

78/07

83/10

MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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DATE 83/08/24

048	139	03	75/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
049	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
049	139	03	75/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
050	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
050	139	03	75/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
051	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
051	139	03	75/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
052	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
052	139	03	75/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
053	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
053	139	03	75/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
054	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
054	139	03	75/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
055	300	72	78/08	84/08	CONSTRUCT 1 MONITOR WELL
056	300	72	78/08	84/08	CONSTRUCT 1 MONITOR WELL
057	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
057	139	03	78/07	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)

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DATE 83/08/24

C48	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C49	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C49	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C50	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C50	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C51	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C51	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C52	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C52	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C53	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C53	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C54	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C54	139	03	79/01	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)
C55	300	72	78/08	84/08	CONSTRUCT 1 MONITOR WELL
C56	300	72	78/08	84/08	CONSTRUCT 1 MONITOR WELL
C57	063	03	78/07	83/10	MEASURE WATER LEVEL DAILY, SUBMIT QUARTERLY
C57	139	03	78/07	83/10	SUBMIT HYDROGRAPHS FROM MONITOR WELL(S)

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

05244 00 P WOODRERY ESTATES, ELIZABETH

124 KNIGHTS AVE

BRANDON

FL 33511

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGE	EXPIRE DATE
14,500	240,000	2	1	0	220.0	20 29 20	85/07/10

WD#001	WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
	G	275702	821902		6	14,500	240,000	MISSING USE CODE

USE#01	USE CODE	USE DESCRIPTION	USE PUMPAGE	USE ACRES
USE#01	250	VEGETABLES	13,775	15.0
USE#02	115	PASTURE-HAY	725	10.0

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
COC	071	06	79/11	00/00	NO RUNOFF
COC	073	06	79/11	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
COC	082	72	85/07	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
000	086	06	79/11	80/11	NOTIFY IF PERMANENT TERMINATION OF WITHDRAWAL

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

06390 CC P PULIDO INC., R. M.

3601 PROVIDENCE RD

RIVERVIEW

FL 33569

BASIN

COUNTY

ALAFIA

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SFC/TWNSHP/RGE	EXPIRE DATE
242,000	1,440,000	3	1	0	240.0	32 29 20	87/07/01

WD#001	WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
	G	275508	821933		12	242,000	1,440,000	IRRIGATION

	USE CODE	USE DESCRIPTION	USE PUMPAFE	USE ACRES
USE#01	355	SMALL GRAINS	77,924	34.8
USE#02	250	VEGETABLES	46,948	34.8
USE#03	250	VEGETABLES	117,128	34.8

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	071	06	81/11	00/00	NO RUNOFF
000	073	06	81/11	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
000	082	72	87/11	00/00	MINIMUM AQUIFER LEVEL MAY BE SET

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

06713 00 P TAMPA WATER DEPT, CITY OF

1 CITY HALL PLAZA, 5TH FLOOR

TAMPA

FL 33602

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVE	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/PGE	EXPIRE DATE
---------------	---------------	----------	-------------	-------------	-----------	----------------	-------------

58,000	100,000	1	1	0	48.0	06 29 20	83/05/05
--------	---------	---	---	---	------	----------	----------

WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PER AVG	WD PER MAX	W/D DESCRIPTION
WD#001	E	275854	822008	6	58,000	100,000	PUBLIC SUPPLY

USE CODE	USE DESCRIPTION
USE#01	009 INDIVIDUAL SEPTIC TANKS

USE PUMPAGE	USE ACRES
58,000	0.0

89

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	070	06	82/11	00/00	METER CONNECTIONS; DATA AVAILABLE ON REQUEST
000	073	06	82/11	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
000	082	06	83/05	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
000	095	06	82/11	00/00	DISTRICT RESERVES RIGHT TO REQUIRE PUMPAGE RECORDS
000	097	06	82/11	00/00	WATER CONSERVATION METHODS

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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REPORT NUMBER 41-099

DATE 83/08/24

PERMIT NUM STAT NAME

ADDRESS

CITY

ST ZIP

06783 00 P DAVIS, ALVIN

63 RANCHETTE RD

ZEPHYRHILLS

FL 33599

BASIN

COUNTY

HILLSBOROUGH

HILLSBOROUGH

PERMITTED AVG	PERMITTED MAX	NUM USES	NUM GWD PTS	NUM SWD PTS	TOT-ACRES	SEC/TWNSHP/RGF	EXPIRE DATE
14,400	32,000	1	1	0	6.2	17 29 20	82/11/30

WD#	WD TYPE	W/LAT	W/LONG	SOURCE NAME	DIAMETER	WD PFR AVG	WD PER MAX	W/D DESCRIPTION
WD#001	E	275732	821940		6	14,400	32,000	INDUSTRIAL

USE#	USE CODE	USE DESCRIPTION
USE#01	890	MISCELLANEOUS (90% CONSUMPTIVE)

USE PLMPAGE	USE ACRES
14,400	0.0

WELL NUM	STIP CODE	FREQ CODE	DUE DATE	NEXT DUE	DESCRIPTION
000	073	06	82/11	00/00	DISTRICT RESERVES RIGHT TO COLLECT SAMPLES
000	082	06	82/11	00/00	MINIMUM AQUIFER LEVEL MAY BE SET
000	097	06	82/11	00/00	WATER CONSERVATION METHODS

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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REPORT NUMBER 41-099

DATE 83/08/24

TOTAL SURFACE WITHDRAWALS	0
TOTAL GROUND WITHDRAWALS	83
NUMBER OF USES	23
TOTAL USE ACRES	694.0
TOTAL USE PUMPAGE	14,774,271
TOTAL PERMIT ACRES	3,137.8
PERMITTED AVERAGE PUMPAGE	14,774,271
PERMITTED MAXIMUM PUMPAGE	34,137,400
TOTAL CONSUMPTIVE USE	8,903,897

APPENDIX 10.9.5

SURFACE WATER QUALITY SAMPLING LAB ANALYSIS

(Sampling locations are presented
in Section 2.3.4 of the Application)



Orlando Laboratories, Inc.

P. O. Box 19127

Orlando, Florida 32814

305/896-6645

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83
Page 1 of 7

IDENTIFICATION: Station #1 @ 0940 hrs, Weather conditions: Sunny/no clouds,
Water condition: Turbid/grey-white suspended. Water temper-
ature: 24°C, pH: 7.35, Open area, grass field with erosion
on culvert.

RESULTS OF ANALYSIS

DETERMINATION

SAMPLE

Turbidity, NTU	196
Total Alkalinity, CaCO ₃	29
Ammonia Nitrogen, N (NH ₃ -N)	0.08
Total Kjeldahl Nitrogen, TKN	1.1
Nitrate Nitrogen, N (NO ₃ -N)	0.10
Nitrite Nitrogen, N (NO ₂ -N)	<0.01
Total Phosphate, P (T-PO ₄ -P)	0.58
Total Suspended Solids, TSS	27
Dissolved Oxygen, DO (Field-Fixed)	10.1
Total Hardness, CaCO ₃	111

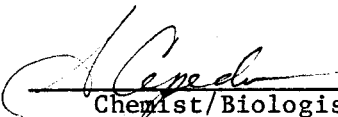
SIEVE SIZING

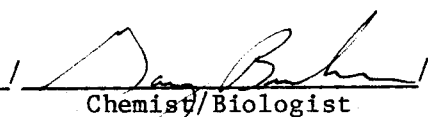
Percentages expressed as dry weight basis. Sample sediments dried at 105°C for 24 hours. Percentage of sample sediment retained at given sieve sizes:

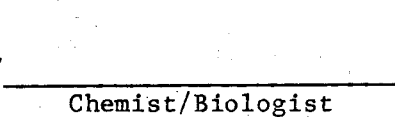
Sieve Size: #20	Percentage retained: 0.364
#40	9.09
#70	62.3
#140	26.0
#200	1.93
Percent passed through #200 sieve	0.176

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist


Chemist/Biologist


Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83

Page 2 of 7

IDENTIFICATION: Station #1 @ 0940 hrs, Weather conditions: Sunny/no clouds,
Water condition: Turbid/grey-white suspended. Water temper-
ature: 24°C, pH: 7.35, Open area, grass field with erosion
on culvert.

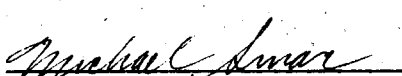
RESULTS OF ANALYSIS

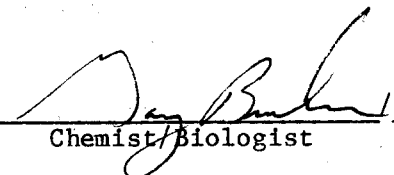
Benthic counts based on a single grab (6" X 6") per sampling site.

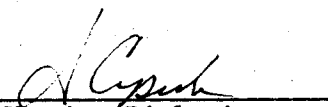
<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
Chironomus	8	
Hyallela azteca	2	
Lumbriculus inconstans	5	
Tubifex	2	
		0.528

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist


Chemist/Biologist


Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83
Page 3 of 7

IDENTIFICATION: Station #2 @ 1040 hrs, Weather conditions: Sunny/no clouds,
Water condition: Clear. Wooded area. Water temperature:
22.5°C, pH: 6.90.

RESULTS OF ANALYSIS

DETERMINATION

SAMPLE

Turbidity, NTU	4.9
Total Alkalinity, CaCO ₃	151
Ammonia Nitrogen, N (NH ₃ -N)	0.31
Total Kjeldahl Nitrogen, TKN	0.77
Nitrate Nitrogen, N (NO ₃ -N)	0.03
Nitrite Nitrogen, N (NO ₂ -N)	<0.01
Total Phosphate, P (T-PO ₄ -P)	0.15
Total Suspended Solids, TSS	9.0
Dissolved Oxygen, DO (Field-Fixed)	2.60
Total Hardness, CaCO ₃	238

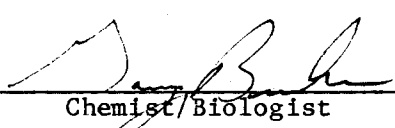
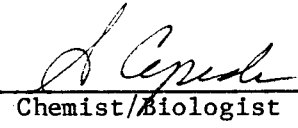
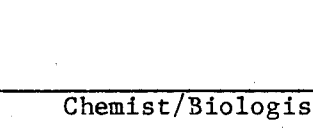
SIEVE SIZING

Percentages expressed as dry weight basis. Sample sediments dried at 105°C for 24 hours. Percentage of sample sediment retained at given sieve sizes:

Sieve Size: #20	Percentage retained: 0.866	<i>Coarse sand</i>
#40	12.9	<i>Coarse sand</i>
#70	57.5	<i>Medium sand</i>
#140	26.6	<i>Fine sand</i>
#200	1.90	<i>Fine sand</i>
Percent passed through #200 sieve	0.186	<i>Fine sand</i>

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

 Chemist/Biologist	 Chemist/Biologist	 Chemist/Biologist
--	--	--

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83

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IDENTIFICATION: Station #2 @ 1040 hrs, Weather conditions: Sunny/no clouds,
Water condition: Clear. Wooded area. Water temperature:
22.5°C, pH: 6.90.

RESULTS OF ANALYSIS

Benthic counts based on a single grab (6" X 6") per sampling site.

<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
Chironomus	2	
Pentaneura monilis	2	
Stenelmis	10	
Caenis diminuta	9	
Lumbriculus inconstans	9	
(Bivalve) too immature to identify	2	

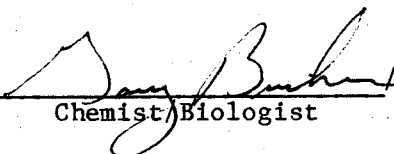
0.762

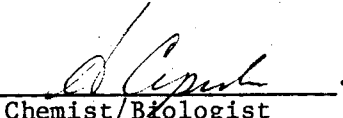
3 Gambusia affinis also collected in sample.

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist


Chemist/Biologist


Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83

Page 5 of 7

IDENTIFICATION: Station #3 @ 1240 hrs, Weather conditions: Sunny/no clouds, Water Temperature: 22°C, pH: 7.2, Cow pasture ditches, soft ground, black muck ditch, turbid water, large amount of leaf matter (detritus), Laurel oaks predominant, scrub forest fauna, cattle feces present.

RESULTS OF ANALYSIS

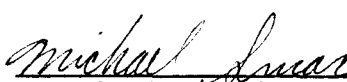
<u>DETERMINATION</u>	<u>SAMPLE</u>
Turbidity, NTU	31
Total Alkalinity, CaCO ₃	92
Ammonia Nitrogen, N (NH ₃ -N)	0.29
Total Kjeldahl Nitrogen, TKN	1.2
Nitrate Nitrogen, N (NO ₃ -N)	0.28
Nitrite Nitrogen, N (NO ₂ -N)	<0.01
Total Phosphate, P (T-PO ₄ -P)	2.0
Total Suspended Solids, TSS	60
Dissolved Oxygen, DO (Field-Fixed)	4.80
Total Hardness, CaCO ₃	182

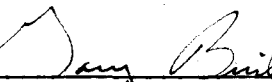
Benthic counts based on a single grab (6" X 6") per sampling site.

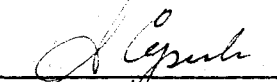
<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
Perithemis domitia	1	0.378
Lumbriculus inconstans	16	
Actinolaimus	23	
Pentaneura monilis	1	

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist


Chemist/Biologist


Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83
Page 6 of 7

IDENTIFICATION: Station #4 @ 1300 hrs, Weather conditions: Sunny/no clouds, Water Temperature: 22°C, pH: 7.9, Cow pasture ditches, soft ground, black muck ditch, white-grey turbid water, large amount of leaf matter (detritus), Laurel oaks predominant, scrub forest fauna, cattle feces present, second feed in ditch.

RESULTS OF ANALYSIS

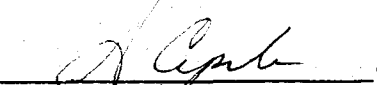
<u>DETERMINATION</u>	<u>SAMPLE</u>
Turbidity, NTU	126
Total Alkalinity, CaCO ₃	33
Ammonia Nitrogen, N (NH ₃ -N)	0.43
Total Kjeldahl Nitrogen, TKN	1.4
Nitrate Nitrogen, N (NO ₃ -N)	0.07
Nitrite Nitrogen, N (NO ₂ -N)	<0.01
Total Phosphate, P (T-PO ₄ -P)	0.38
Total Suspended Solids, TSS	61
Dissolved Oxygen, DO (Field-Fixed)	6.40
Total Hardness, CaCO ₃	85.6

Benthic counts based on a single grab (6" X 6") per sampling site.

<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
Tupifex	2	
Lumbriculus inconstans	6	
		0.244

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

  
Chemist/Biologist Chemist/Biologist Chemist/Biologist

REPORT OF ANALYSIS

Camp Dresser & McKee
Attn: Dana Pedersen
1 Center Plaza
Boston, MA 02108

Report #: 30494 (2732)
Sampled by: OLI-G. Bircher
Date sampled: 10-31-83
Date received: 10-31-83
Date reported: 11-17-83
Page 7 of 7

IDENTIFICATION: Station #5 @ 1430 hrs, Weather conditions: Sunny/no clouds, Water Temperature: 24°C, pH: 7.4, culvert near Tampa By-pass canal, hard bottom, possible lime or clay substrate, sampled with Kemmerer for water sample from roadway, Ekman grab sample taken from side of ditch, white-grey clay sediment, very hard, small amount of sample taken.

RESULTS OF ANALYSIS

<u>DETERMINATION</u>	<u>SAMPLE</u>
Turbidity, NTU	39
Total Alkalinity, CaCO ₃	129
Ammonia Nitrogen, N (NH ₃ -N)	0.16
Total Kjeldahl Nitrogen, TKN	1.2
Nitrate Nitrogen, N (NO ₃ -N)	2.2
Nitrite Nitrogen, N (NO ₂ -N)	0.04
Total Phosphate, P (T-PO ₄ -P)	0.50
Total Suspended Solids, TSS	26
Dissolved Oxygen, DO (Field-Fixed)	8.35
Total Hardness, CaCO ₃	227

Benthic counts based on a single grab (6" X 6") per sampling site.

<u>ORGANISM</u>	<u># INDIVIDUALS</u>	<u>SHANNON SPECIES DIVERSITY INDEX</u>
No macroinvertebrates found.		0

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

Michael Lamar Gay Bircher A. Cepa
Chemist/Biologist Chemist/Biologist Chemist/Biologist

Appendix 10.10

APPENDIX 10.10
SOILS AND RELATED GEOTECHNICAL INFORMATION

APPENDIX 10.10.1

SUMMARY OF IMPORTANT SOIL CHARACTERISTICS

SOURCE: U.S. Department of Agriculture, Soil Conservation Service,
"Soil Survey - Hillsborough County, Florida," September 1958.

SUMMARY OF IMPORTANT CHARACTERISTICS

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SOIL SURVEY SERIES 1950, NO. 3

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Aa	Adamsville fine sand	0-2	Slow	Rapid when freed of the high water table.	Slightly acid to neutral or alkaline.	Dark-gray to gray fine sand, 3 to 8 inches thick.	Light-gray to brownish-yellow fine sand.	Vegetables, truck crops, pasture, and forest.	Pines; saw-palmettos; cabbage palmettos; wiregrass.	IVs-2.
Ab	Alachua loamy fine sand	0-2	Medium	Medium	Medium acid	Very dark grayish-brown to grayish-brown loamy fine sand, 6 to 8 inches thick. Contains a few small pebbles.	Dark-brown or pale-brown to yellowish-brown, brown, or strong-brown loamy fine sand. Contains a few small pebbles.	General crops, a few acres of vegetables, and pasture.	Hardwoods; a few shrubs and grasses.	IIw-1.
Ac	Alluvial land	Nearly level	Very slow	Very slow	Strongly acid to neutral or alkaline.	Variable	Variable	Forest, pasture, and refuges for wildlife.	Hammock vegetation of hardwoods; shrubs; vines; cypress; a few pines.	Vw-1.
Ad	Arredondo fine sand: Level phase	0-2	Medium	Rapid	Medium to slightly acid.	Very dark grayish-brown to grayish-brown fine sand, 6 to 8 inches thick. Contains a few small pebbles.	Dark yellowish-brown to yellowish-brown or brownish-yellow fine sand. Contains a few phosphatic pebbles.	Citrus fruits, general crops, pasture, and forest.	Pines; live and blue-jack oaks; hickory; various grasses.	IIIs-1.
Ae	Gently undulating phase.	2-8	Medium to rapid.	Rapid	Same	Same	Same	Citrus fruits, general crops, vegetables, pasture, and forest.	Same	IIIs-1.
Ba	Blanton fine sand: Level phase	0-2	Slow	Rapid	Medium acid	Dark-gray or gray fine sand, 4 to 8 inches thick.	Grayish-brown or light brownish-gray to very pale brown or light-gray fine sand, lower part spotted with pale yellow or yellow.	Citrus fruits, general crops, vegetables, pasture, and forest.	Oaks; pines; a few saw-palmettos; grasses.	IIIs-1.
Bb	Gently undulating phase.	2-5	Medium to rapid.	Rapid	Medium acid	Same	Same	Same	Same	IIIs-1.
Bc	Undulating phase	5-12	Rapid	Rapid	Medium acid	Same	Same	Forest, pasture, citrus fruits, and general crops.	Same	IIIs-1.
Bd	Brown-layer phase	0-2	Slow	Medium	Medium acid	Same	Gray or light brownish-gray fine sand over dark grayish-brown, organic stained layer; grayish-brown or pale-brown to very pale brown or light-gray fine sand, spotted with yellow at depths between 22 and 42 inches.	Pasture, general crops, and forest.	Oaks; a few pines and saw-palmettos; grasses.	IIIs-1.
Be	Blichton fine sand	0-8	Slow to medium.	Slow to medium.	Medium acid to strongly acid.	Dark-gray fine sand, 6 to 9 inches thick.	Grayish-brown or gray fine sand, containing a few pebbles and rounded stones, to mottled light yellowish-brown and yellow fine sandy clay or fine sandy clay loam con-	General crops, citrus fruits, pasture, and forest.	Hardwoods; pines; a few cabbage palmettos and saw-palmettos; grasses.	IIe-1.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Bf	Bradenton fine sand	0-2	Same	Same	Sand layers strongly acid to medium acid; clayey materials slightly acid to neutral.	Dark-gray fine sand, 4 to 9 inches thick.	taining many pebbles and rounded stones. Light grayish-brown or light-gray to pale-brown or grayish-brown fine sand over grayish-brown fine sandy clay; light-gray marl at depths between 32 and 42 inches.	Vegetables, truck crops, pasture, and forest.	Live oak; cabbage palmettos and saw-palmettos; pines; vines; shrubs; a few grasses.	III-2.
Bg	Thin surface phase	0-2	Same	Slow	Same	Same	Light grayish-brown or light-gray to pale-brown or grayish-brown fine sand over grayish-brown fine sandy clay at depths within 18 inches of the surface; gray marl at depths between 20 and 30 inches.	Pasture and forest.	Live oak, gum, elm, hickory, magnolia, and cabbage palmettos; rank growth of saw-palmettos, shrubs, and vines; a few grasses.	III-2.
Bh	Brighton peat	Nearly level or slightly depressed.	Very slow or ponded.	Slow	Strongly to very strongly acid.	Very dark brown fibrous peat.	Dark grayish-brown or brown fibrous peat, underlain by dark-gray or gray fine sand at depths between 20 and 48 inches.	Pasture and truck crops; used as organic fertilizer or as filler in mixed fertilizer.	Water plants and grasses.	III-4.
Bk	Brighton mucky peat	Same	Same	Slow	Same	Black nonfibrous mucky peat.	Dark-brown or grayish-brown fibrous felty peat underlain at depths between 15 and 40 inches by gray or light-gray fine sand.	Same	Same	III-4.
Bl	Broward fine sand	0-2	Slow	Medium to rapid if freed of high water table.	Sand layers slightly acid to alkaline.	Dark-gray or gray fine sand, 3 to 8 inches thick.	Light-gray to yellowish-brown fine sand. Limestone at 12 to 36 inches.	Pasture and forest.	Second-growth pine; cabbage palmettos, saw-palmettos, and runner oaks; gallberry and other shrubs; wiregrass.	IV-2.
Ca	Charlotte fine sand	Level or slightly depressed.	Very slow or ponded.	Rapid when freed of high water table.	Same	Grayish-brown fine sand, 3 to 8 inches thick.	Yellowish-brown to brownish-yellow fine sand at depths of 12 to 24 inches over light-gray or white fine sand, underlain by limestone or marl.	Pasture and a few acres of vegetables.	Grasses; a few pines; cabbage palmettos.	IV-3.
Da	Delray fine sand	Same	Same	Same	Same	Black fine sand, 7 to 20 inches thick.	Very dark gray or dark-gray to light-gray or gray fine sand, lower part streaked with pale yellow and brown.	Same	Grasses; gallberry and myrtle bushes; a few cabbage palmettos; pines; hardwoods.	III-3.
Db	Shallow phase	Same	Same	Same	Same	Same	Dark-gray to gray or light-gray fine sand underlain, at depths between 30 and 42 inches, by gray to light-gray fine sandy clay loam or fine sandy clay, mottled with pale	Pasture and a few acres of vegetables and truck crops.	Same	III-3.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

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SOIL SURVEY SERIES 1960, NO. 3

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Ea	Eustis fine sand: Level phase	0-2	Slow to medium.	Rapid	Strongly acid	Dark grayish-brown or grayish-brown fine sand, 2 to 6 inches thick.	yellow and grayish brown. Strong-brown to reddish-yellow, or yellowish-red loose fine sand.	Citrus fruits, pasture, and a few acres of water-melons and general crops.	Oaks; sand pines; a few saw-palmettos; rosemary; grasses.	IIIa-1.
Eb	Gently undulating phase.	2-8	Medium to rapid.	Rapid	Strongly acid	Same	Same	Same	Same	IIIa-1.
Fa	Felda fine sand	Level or slightly depressed.	Very slow or ponded.	Medium when freed of high water table.	Sand layers slightly acid; clayey materials slightly acid to alkaline.	Very dark gray or dark-gray fine sand, 3 to 9 inches thick.	Grayish-brown to light-gray fine sand over slightly mottled light brownish-gray or light-gray fine sandy clay loam; mottled light-gray, brownish-yellow, and yellow fine sandy clay loam containing a few lime and iron concretions at depths between 30 and 48 inches.	Pasture, vegetables, truck crops, and forest.	Grasses; a few pines; saw-palmettos, cabbage palmettos; gallberry bushes, myrtle bushes, and other shrubs.	IIIa-3.
Fb	Fellowship loamy fine sand.	0-8	Medium	Slow	Strongly acid	Very dark gray loamy fine sand containing a few pebbles; 4 to 8 inches thick.	Dark-gray loamy fine sand containing many pebbles to mottled gray, yellowish-brown, and yellow fine sandy clay, containing many pebbles and stones.	Pasture, general crops, forest.	Live oaks; pines; shrubs; grasses.	IIe-1.
Fc	Fort Meade loamy fine sand: Level phase	0-2	Slow to medium.	Medium to rapid.	Medium acid	Black loamy fine sand containing a few phosphatic pebbles; 10 to 20 inches thick.	Dark grayish-brown to grayish-brown or brown loamy fine sand containing many pebbles and small rounded stones in lower part.	Citrus fruits, vegetables, general crops, improved pasture, forest.	Oaks; hickory and other hardwoods; pines; grasses.	IIa-2.
Fd	Undulating phase	2-12	Medium to rapid.	Medium to rapid.	Medium acid	Same	Same	Same	Same	IIa-2.
Fe	Fresh water swamp (unclassified soils).	Level or depressions.	Soil covered by water during much of year.	Medium to rapid if freed of high water table.	Variable	Variable	Variable	Forest, refuges for wildlife.	Hardwoods; cypress; vines; shrubs; grasses.	Unclassified.
Ga	Gainesville loamy fine sand: Level phase	0-2	Slow to medium.	Medium to rapid.	Medium acid	Very dark grayish-brown loamy fine sand containing a few small phosphatic pebbles; 6 to 9 inches thick.	Dark-brown to strong-brown loamy fine sand containing a few pebbles and small stones.	Citrus fruits, general crops, improved pasture, forest.	Oaks; hickory; magnolia; pines; shrubs; grasses.	IIa-2.
Gb	Gently undulating phase.	2-5	Rapid	Medium to rapid.	Medium acid	Same	Same	Same	Same	IIa-2.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
la	Immokalee fine sand.....	0-2	Slow.....	Medium to rapid when freed of high water table.	Strongly to very strongly acid.	Dark-gray fine sand, 3 to 8 inches thick.	Gray to light-gray fine sand, between depths of 30 and 42 inches, overlying a very dark brown fine sand, weakly cemented layer grading to lighter color with depth.	Pasture, forest, and a few acres of vegetables.	Second-growth pine; saw-palmettos; runner oak; gallberry bushes; grasses.	IVs-2.
lb	Alkaline variant.....	0-2	Slow.....	Same.....	Upper part of profile strongly to very strongly acid; lower part, immediately below the hardpan, neutral to alkaline.	Same.....	Same.....	Pasture and forest.	Pines; saw-palmettos; shrubs; grasses.	IVs-2.
lc	Istokpoga peat.....	Level or slightly depressed.	Very slow or ponded.	Slow.....	Strongly to very strongly acid.	Black or very dark brown woody peat, 8 to 15 inches thick.	Dark reddish-brown to dark-brown woody peat underlain by gray or light-gray fine sand at depths of 30 to 60 inches.	Pasture, forest, and wildlife.	White and red bays; cypress; maple and other hardwoods; myrtle bushes; briars; vines; ferns; grasses.	IVs-4.
ld	Istokpoga mucky peat.....	Same.....	Same.....	Slow.....	Same.....	Black mucky peat, 6 to 10 inches thick.	Dark grayish-brown or reddish-brown woody peat over gray or light-gray fine sand.	Same.....	Same.....	IVs-4.
Ka	Kanapaha fine sand.....	0-2	Slow to medium.	Slow to medium.	Strongly acid.....	Dark-gray fine sand, 3 to 6 inches thick.	Light-gray or light yellowish-brown to very pale brown fine sand containing a few pebbles. Streaked in lower part with yellowish brown and brownish yellow.	Vegetables, citrus fruits, pasture, and forest.	Gums; hickory; magnolia; oak; cabbage palmettos; saw-palmettos; pines; grasses.	IIIs-1.
Kb	Keri fine sand.....	0-2	Slow.....	Medium.....	Fine sand layers strongly acid to slightly acid. Marl layer strongly alkaline and overlies neutral to mildly alkaline fine sand.	Dark-gray or gray fine sand, 3 to 8 inches thick.	Light-gray or light brownish-gray fine sand over light-gray marl, streaked in places with yellow. Underlying layer mottled light-gray, brownish-yellow, and yellow fine sand.	Pasture, forest, and a few acres of vegetables.	Pines; runner oak; gallberry bushes; saw-palmettos; a few cabbage palmettos; grasses.	IVs-2.
Lb	Lakeland fine sand: Level phase.....	0-2	Slow to medium.	Rapid.....	Strongly to very strongly acid.	Dark-gray fine sand, 3 to 8 inches thick.	Yellowish-brown or brownish-yellow to light yellowish-brown loose fine sand.	Citrus fruits, watermelons, general crops, pasture, and forest.	Pines; a few shrubs and grasses; and bluejack oaks.	IIIs-1.
ld	Gently undulating phase.....	2-5	Medium to rapid.	Rapid.....	Same.....	Same.....	Same.....	Same.....	Same.....	IIIs-1.
le	Undulating phase.....	5-8	Rapid.....	Rapid.....	Same.....	Same.....	Same.....	Same.....	Oaks; a few pines; shrubs; grasses.	IIIs-1.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

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SOIL SURVEY SERIES 1950, NO. 3

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Lc	Shallow phase	0-5	Slow to medium.	Rapid through sandy layer; medium to slow through clayey materials.	Same	Same	Yellowish-brown to brownish-yellow fine sand underlain at depths of 30 to 42 inches by fine sandy clay loam or sandy clay.	Citrus fruits, general crops, and pasture.	Same	III-1.
Lc	Level deep phase	0-5	Slow to rapid.	Rapid	Same	Gray or light-gray fine sand, 4 to 8 inches thick.	Yellowish-brown to pale-yellow fine sand; finer textured materials at depths greater than 72 inches.	Pasture	Scrub live oaks; a few turkey oaks; sand pines; rosemary; grasses.	III-1.
Lf	Undulating deep phase	Undulating	Same	Rapid	Same	Same	Same	Pasture	Scrub live oaks; sand pines; rosemary; saw-palmettos; a few grasses.	III-1.
Lg	Lakewood fine sand	0-2	Very slow because of rapid infiltration.	Medium to rapid.	Strongly acid throughout.	Light-gray or gray fine sand, 2 to 4 inches thick.	White fine sand to depths of 12 to 24 inches over yellow or brownish-yellow fine sand that grades to light gray and white with increasing depth.	Pasture, forest, and building sites.	Sand pine; scrub oak; undergrowth of saw-palmettos, rosemary, runner oak, pricklypear cactus, and wiregrass; few turkey and bluejack oaks.	IV-1.
Lh	Leon fine sand	0-2	Slow	Medium to rapid if freed of high water table.	Very strongly acid.	Dark-gray fine sand, 3 to 8 inches thick.	Light-gray fine sand over the very dark grayish-brown or black pan that begins at depths of 14 to 30 inches; dark-brown to yellowish-brown fine sand below the organic pan.	Pasture, forest, vegetables, and strawberries.	Second-growth pine; saw-palmettos; a few gallberry bushes and runner oaks; wiregrass.	IV-2.
Li	Heavy substratum phase.	0-2	Slow	Same	Strongly acid; lower part of clayey material strongly acid to neutral or alkaline.	Same	Light-gray fine sand over very dark grayish-brown organic pan that begins at depths of 24 to 32 inches; light-gray to yellowish-brown sandy clay loam or sandy clay below organic pan.	Pasture and forest.	Pine; runner oaks, gallberry bushes, a few myrtle bushes; grasses.	IV-2.
Lk	Light-colored surface phase.	0-2	Slow to medium.	Same	Very strongly acid.	Light-gray or gray fine sand, 1 to 3 inches thick.	Light-gray fine sand over the very dark grayish-brown or black organic pan; dark-brown to yellowish-brown fine sand below the pan.	Pasture and forest.	Pines; saw-palmettos; a few gallberry bushes and runner oaks; wiregrass.	V-1.
Ma	Made land	Variable	Variable	Variable	Variable	Variable	Variable	Roadbuilding material, building sites, pasture, and forest.	Pines; grasses	Unclassified.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

HILLSBOROUGH COUNTY, FLORIDA

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Mc	Manatee fine sandy loam	Level or slightly depressed.	Very slow or ponded.	Medium to slow when freed of high water table.	Upper layers slightly acid to neutral; lower layers neutral to alkaline.	Black fine sandy loam, 6 to 15 inches thick.	Black or very dark gray to mottled dark-gray or gray fine sandy clay underlain at depths within 42 inches by light-gray marl, streaked with pale yellow and gray.	Vegetables, pasture, and forest.	Hardwoods; cypress; a few cabbage palmettos; vines; shrubs; grasses; aquatic plants.	IIIs-3.
Md	Manatee loamy fine sand	Same	Same	Same	Same	Black loamy fine sand, 9 to 20 inches thick.	Dark-gray or very dark gray fine sandy clay loam to mottled gray or light-gray fine sandy clay, in places underlain by marl that begins at depths of 30 to 36 inches.	Pasture, vegetables, and forest.	Hammock vegetation of oaks; cabbage palmettos; saw-palmettos; a few pines and cypress trees; aquatic plants.	IIIs-3.
Mb	Manatee fine sandy clay, heavy variant.	Same	Very slow	Very slow	Upper layers slightly acid to neutral; lower layer alkaline.	Very dark gray or dark-gray fine sandy clay, 8 to 14 inches thick.	Gray or grayish-brown fine sandy clay, or streaked or mottled gray or grayish-brown fine sandy clay.	Pasture and forest.	Grasses; shrubs; a few pines and hardwoods.	IIIs-3.
Me	Mines, pits, and dumps	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Pines; saw-palmettos; shrubs; grasses	Unclassified.
Mf	Mixed alluvium, high bottom phase.	0-2	Slow	Slow to medium.	Upper layers slightly acid; lower layers strongly acid to neutral or mildly alkaline.	Dark-gray fine sand, 3 to 8 inches thick.	Grayish-brown to light-gray or very pale brown fine sand overlying mottled gray, light-gray, and yellowish-brown fine sandy clay loam; light brownish-gray fine sand at depths between 20 and 38 inches.	Pasture and forest.	Oaks; pines; saw-palmettos; shrubs; grasses.	IVs-2.
Ona	Ona fine sand	0-2	Slow	Rapid if freed of high water table.	Strongly acid	Dark gray to black fine sand, 6 to 12 inches thick.	Dark-brown fine sand, color grading to light yellowish brown, and light gray with increasing depth.	Vegetables, strawberries, pasture, forest, and citrus fruits.	Pines; saw-palmettos; gallberry and myrtle bushes; grasses.	IIs-1.
Ob	Light-colored surface phase.	0-2	Slow	Same	Strongly acid	Light-gray to gray fine sand, 4 to 10 inches thick.	Same	Pasture, vegetables, strawberries, citrus fruits, and forest.	Pines; oaks; saw-palmettos; grasses.	IIIs-2.
Oc	Orlando fine sand	0-2	Slow	Rapid	Strongly acid	Very dark gray fine sand, 9 to 15 inches thick.	Dark grayish-brown to yellowish-brown or light yellowish-brown fine sand.	Citrus fruits, vegetables, general crops, pasture, and forest.	Oaks; pines; grasses	IIIs-1.
Pa	Pamlico muck	Level or depressed.	Very slow or ponded. Covered by water much of the time.	Medium when freed of the high water table.	Strongly acid	Black muck, 6 to 15 inches thick.	Black muck or mucky fine sand over dark-gray or gray fine sand, color grading to light gray with increasing depth.	Pasture, wildlife	Aquatic plants	IIIs-4.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

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SOIL SURVEY SERIES 1950, NO. 3

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Pb	Parkwood fine sand	0-2	Slow	Medium to slow.	Sand layers slightly acid to mildly alkaline; marl slightly alkaline.	Dark-gray or grayish-brown fine sand, 4 to 8 inches thick.	Gray to light brownish-gray fine sand over light-gray marl.	Vegetables, pasture, and forest.	Cabbage palmettos; oaks and other hardwoods; pines; vines; bamboo briars; a few saw-palmettos.	IIIa-2.
Pc	Peace River soils	0-2	Slow	Slow	Loamy fine sand layers slightly acid to neutral; clayey materials neutral to alkaline.	Black loamy fine sand, 8 to 14 inches thick.	Very dark gray or very dark grayish-brown loamy fine sand over dark-gray fine sandy clay streaked in a few places with yellowish brown; mottled gray, light-gray, and yellowish-brown fine sandy clay at depths between 26 and 40 inches.	Pasture, forest, wildlife.	Hardwoods; cypress; cabbage palmettos; vines; shrubs; grasses.	Unclassified.
Pd	Plummer fine sand	Nearly level or slightly depressed.	Very slow or ponded; sometimes under water.	Rapid when freed of high water table.	Strongly acid.	Dark-gray or gray fine sand, 4 to 8 inches thick.	Light brownish-gray to light-gray or very pale brown fine sand.	Pasture and forest.	Grasses; a few saw-palmettos; shrubs; and pines.	IVa-3.
Pe	Shallow phase	Same	Same	Same	Strongly acid	Same	Same	Pasture and forest.	Same	IVa-3.
Pf	Pomello fine sand	0-2	Slow to medium.	Rapid	Strongly acid	Gray or dark-gray fine sand, 3 to 6 inches thick.	Light-gray through white fine sand to depths of 42 inches.	Pasture, gladioli, and building sites.	Saw-palmettos; oaks; grasses.	Va-1.
Pg	Pompano fine sand	Level or nearly level.	Slow or ponded; sometimes covered by water.	Rapid when freed of high water table.	Upper part slightly acid to neutral; lower part neutral to alkaline.	Dark-gray or dark grayish-brown fine sand, 4 to 8 inches thick.	Grayish-brown to light brownish-gray or light-gray fine sand.	Pasture, vegetables, truck crops.	Grasses; pines; cabbage palmettos; saw-palmettos.	IVa-3.
Ph	Shallow phase	Level areas or slightly depressed.	Same	Rapid to medium when freed of high water table.	Same	Same	Grayish-brown to light brownish-gray or light-gray fine sand underlain, at depths between 30 and 42 inches, by grayish-brown to light-gray fine sandy clay loam or fine sandy clay, mottled yellowish brown and yellow.	Pasture and vegetables.	Same	IVa-3.
Pk	Portsmouth fine sand	Level or slightly depressed.	Very slow or ponded.	Medium to slow when freed of high water table.	Strongly acid	Black to very dark gray fine sand, 10 to 15 inches thick.	Gray to light-gray fine sand over mottled light-gray, yellowish-brown, and yellow fine sandy clay loam.	Pasture, forest, and vegetables.	Grasses; shrubs; pines; a few cypress and hardwood trees.	IVa-3
Pl	Portsmouth mucky fine sand.	Same	Same	Same	Strongly acid	Black to very dark gray mucky fine sand, 8 to 15 inches thick.	Very dark gray or black fine sand, underlain by gray and yellowish-brown fine sandy clay or fine sandy clay loam.	Same	Grasses; shrubs; hardwoods; vines.	IVa-3.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Ra	Rains fine sand.....	Same.....	Very slow.....	Medium when freed of high water table.	Strongly acid.....	Dark-gray or gray fine sand, 4 to 8 inches thick.	Light-gray or light brownish-gray fine sand over gray or grayish-brown fine sandy clay, streaked with strong brown and yellow; mottled light brownish-gray fine sandy clay at depths between 28 and 48 inches.	Same.....	Grasses; shrubs; a few pines.	IVs-3.
Rb	Ruskin fine sand.....	Level or nearly level.	Slow.....	Same.....	Medium acid in upper part to slightly acid or neutral in lower part.	Dark-gray fine sand, 4 to 9 inches thick.	Light-gray fine sand, over mottled brownish-yellow or yellowish-brown fine sandy clay loam; white and pale-yellow shell marl at depths between 24 and 42 inches.	Vegetables, truck crops, pasture, and forests.	Pines; saw-palmettos; runner oaks; grasses.	IIIs-2.
Rc	Rutlege fine sand.....	Nearly level or slightly depressed.	Very slow to ponded.	Rapid when freed of high water table.	Strongly acid.....	Black fine sand, 9 to 15 inches thick.	Very dark gray to dark-gray fine sand over mottled light-gray, pale-yellow, and brownish-yellow fine sand.	Pasture, vegetables, and strawberries.	Grasses; shrubs; pines; hardwoods; cypress trees.	IIIs-3.
Rd	Shallow phase.....	Same.....	Same.....	Moderate when freed of high water table.	Strongly acid.....	Same.....	Very dark gray to light gray or light brownish-gray fine sand over mottled grayish-brown, light olive-brown, and yellowish-brown fine sandy clay at depths between 30 and 42 inches.	Same.....	Same.....	IIIs-3.
Re	Rutlege mucky fine sand.	Same.....	Same.....	Rapid when freed of high water table.	Strongly acid.....	Black mucky fine sand, 6 to 15 inches thick.	Black or very dark gray fine sand, grading to lighter colors with increasing depth.	Same.....	Grasses; shrubs; cypress and hardwood trees.	IIIs-3.
Sd	St. Lucie fine sand.....	Nearly level.	Very slow because of rapid infiltration.	Rapid.....	Strongly acid.....	Light-gray or gray fine sand, 2 to 4 inches thick.	Light-gray to white fine sand.	Pasture and refuges for wildlife.	Live oaks; sand pines; rosemary; saw-palmettos; prickly-pear cactus; grasses.	VIIs-1.
Sa	Sandy local alluvium.....	Small depressions on bases of slopes.	Medium to slow.	Rapid.....	Strongly acid.....	Very dark gray fine sand, 6 to 12 inches thick.	Gray to mottled very pale brown fine sand.	General crops, pasture.	Oaks; pines; shrubs; grasses.	IIw-1.
Ib	Scranton fine sand.....	0-2	Slow.....	Medium if freed of high water table.	Strongly acid.....	Black fine sand, 9 to 15 inches thick.	Dark grayish-brown to pale-yellow, very pale brown, and brownish-yellow fine sand mottled in lower part.	Vegetables, strawberries, citrus fruits, pasture, forest.	Pine; saw-palmettos; shrubs; grasses.	IIIs-1.
Sc	Shallow ponds with grass.	Depressions.....	Covered by water during much of year.	Covered by water during much of year.	Surface layer strongly acid; lower part strongly acid to alkaline.	Variable.....	Light-gray or gray fine sand.	Refuges for wildlife, pasture.	Water-tolerant plants.	Unclassified.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

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Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Se	Sunniland fine sand: Moderately shallow over marl.	Level or nearly level.	Slow.....	Medium to slow through the sandy clay loam layer.	Upper part strongly acid; lower part neutral to alkaline.	Dark-gray fine sand, 3 to 8 inches thick.	Light-gray fine sand over mottled yellowish-brown, strong-brown, and light-gray fine sandy clay or fine sandy clay loam; white marl at depths between 40 and 48 inches.	Pasture, forest, vegetables.	Pines; cabbage palmettos; saw-palmettos; oaks; waxmyrtle bushes; grasses.	IIIa-2.
Sf	Shallow over marl.....	Same.....	Slow.....	Medium to slow.	Same.....	Same.....	Light-gray fine sand over brown, stained layer; brownish-yellow and yellowish-brown fine sandy clay at depths between 14 and 22 inches, underlain by white marl, streaked with yellow.	Pasture, forest, and vegetables.	Pines; oaks; cabbage palmettos; saw-palmettos; shrubs; grasses.	IIIa-2.
Ta	Terra Ceia peaty muck....	Level or slightly depressed.	Very slow or ponded.	Rapid when freed of high water table. Covered by water for long periods.	Slightly acid to neutral in upper part; neutral or mildly alkaline in lower part.	Black peaty muck, 10 to 15 inches thick.	Black or very dark brown muck over dark gray or very dark gray fine sandy clay loam; light gray fine sandy clay at depths between 20 and 36 inches.	Pasture and vegetables.	Water-tolerant plants	IIIa-4.
Tb	Tidal marsh (unclassified soils).	Level or nearly level.	Covered by high tides.	Covered by high tides.	Variable.....	Nearly black mucky fine sand to dark-gray fine sand, 3 to 8 inches thick.	Light-gray or gray fine sand, mixed with shells.	Refuges for wildlife.	Salt-tolerant grasses.	Unclassified.
Tc	Tidal swamp (unclassified soils).	Same.....	Same.....	Same.....	Variable.....	Variable.....	Light-gray or gray fine sand or sandy clay loam.	Same.....	Salt-tolerant grasses.	Unclassified.

APPENDIX 10.10.2
ESTIMATED SOIL PROPERTIES FOR ENGINEERING

SOURCE: U.S. Department of Agriculture, Soil Conservation Service,
"Interim Supplement to the Soil Survey - Hillsborough
County Florida," June 1981.

ESTIMATED SOIL PROPERTIES FOR ENGINEERING

HILLSBOROUGH COUNTY, FLORIDA

TABLE

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Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Aa	Adamsville fine sand	Infrequent Brief	Shallow Brief	45	0-42+	6.3	.05
Ab	Alachua loamy fine sand	Frequent Brief	Mod. deep Long	45	0-42+	6.3	.05-.10
Ac	Alluvial land	Frequent Brief	Variable	Variable	0-60	Variable	Variable
Ad	Arredondo fine sand, level	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Ae	Arredondo fine sand, gently undulating	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Ba	Blanton fine sand, level	None	Shallow V. brief	45	0-42+	6.3	.05
Bb	Blanton fine sand, gently undulating	None	Shallow V. brief	45	0-42+	6.3	.05
Bc	Blanton fine sand, undulating	None	Shallow V. brief	45	0-42+	6.3	.05
Bd	Blanton fine sand, brown layer	None	Shallow	45	0-42+	6.3	.05
Be	Blichton fine sand	Infrequent Brief	Shallow V. brief	75	0-8 8-25 25-42+	6.3 2.0-6.3 .06-.20	.05-.10 .05-.10 .15-.20
Bf	Bradenton fine sand	Infrequent Brief	Shallow Brief	45-75	0-22 22-32 32-42+	6.3 .63-2.0 .20-.63	.05-.10 .10-.15 .10-.15

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2B
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Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHO		
Aa	Adamsville fine sand	0-42+	fs	SP-SM	A-3	Low	C
Ab	Alachua loamy fine sand	0-42+	lfs	SM	A-2-3	Low	
Ac	Alluvial land	0-60	Variable	Variable	Variable	Variable	
Ad	Arredondo fine sand, level	0-42+	fs	SP-SM, SM	A-2-4, A-3	Low	A
Ae	Arredondo fine sand, gently undulating						
Ba	Blanton fine sand, level	0-42+	fs	SP, SP-SM	A-3	Low	A
Bb	Blanton fine sand, gently undulating						
Bc	Blanton fine sand, undulating						
Bd	Blanton fine sand, brown layer						
Be	Blichton fine sand	0-8	fs, lfs	SM	A-2-4	Low	D
		8-25	lfs	SM, SC-SM	A-2-4	Low	
		25-42+	fscl-fsc	SC	A-6	Moderate	
Bf	Bradenton fine sand	0-22	fs	SP-SM	A-2	Low	B/D
		22-32	fscl	SM-SC, SC	A-2, A-6	Moderate	
		32-42+	fscl-fsc	SC	A-6	Moderate	
Bg	Bradenton fine sand, thin surface	0-12	fs	SP-SM	A-2	Low	B/D
		12-28	fscl	SM-SC, SC	A-2, A-6	Moderate	
		28-42+	scl	SC	A-6	Moderate	
Bh	Brighton peat	0-40	pt	pt	Organic	High	A/D
Bk	Brighton mucky peat	40-60	fs	SP	A-3	Low	

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 1
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Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
15	Bg Bradenton fine sand, thin surface	Infrequent Brief	Shallow Brief	45-75	0-12 12-28 28-42+	6.3 .63-2.0 .20-.63	.05-.10 .10-.15 .10-.15
	Bh Brighton peat	V. frequent V. long	V. shallow Continuous	45	0-40 40-60	6.3 6.3	.20 .05
	Bk Brighton mucky peat	V. frequent V. long	V. shallow Continuous	45	0-40 40-60	6.3 6.3	.20 .05
	Bl Broward fine sand	Infrequent Brief	V. shallow Brief	45	0-28 28+	6.3	.05
	Ca Charlotte fine sand	V. frequent Long	V. shallow V. long	45	0-48+	6.3	.05
	Da Delray fine sand	V. frequent V. long	V. shallow V. long	45	0-12 12-48+	6.3 6.3	.20 .05-.10
	Db Delray fine sand, shallow	V. frequent V. long	V. shallow V. long	45	0-12 12-36 36-48+	6.3 6.3 .63-2.0	.20 .05-.10 .10-.15
	Ea Eustis fine sand, level level	None	Deep Continuous	45	0-48+	6.3	.05
	Eb Eustis fine sand, gently undulating	None	Deep	45	0-48+	6.3	.05
	Fa Felda fine sand	V. frequent Long	V. shallow Long	45-75	0-22 22-48+	6.3 .63-2.0	.05-.10 .10-.15

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

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Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHO		
Ca	Charlotte fine sand	0-48+	fs	SP	A-3	Low	A/D
Da	Delray fine sand	0-12	fs	SP-SM	A-2	Low	A/D
		12-48+	fs	SP	A-3	Low	
Db	Delray fine sand, shallow	0-12	fs	SP-SM	A-3	Low	A/D
		12-36	fs	SP	A-3	Low	
		36-48+	fscl, fsc	SM-SC, SC	A-2, A-6	Moderate	
Ea	Eustis fine sand, level	0-48+	fs	SP	A-3	Low	A
Eb	Eustis fine sand, gently undulating						
Fa	Felda fine sand	0-22	fs	SP	A-3	Low	B/D
		22-48+	fscl	SM SC	A-2-4	Mod-Low	
Fb	Fellowship loamy fine sand	0-12	lfs	SM-SC	A-2	Low	D
		12-42+	sc, c	SC, CL, CH	A-7	High	
Fc	Ft. Meade loamy fine sand, level	0-42+	lfs	SM, SM-SC	A-2	Low	A
Fd	Ft. Meade loamy fine sand, undulating						
Fe	Fresh water swamp	---	---	---	---	---	---
Ga	Gainesville loamy fine sand level	0-42+	lfs	SM	A-2	Low	A
Gb	Gainesville loamy fine sand, gently undulating						

ESTIMATED SOIL PROPERTIES FOR ENGINEERING

HILLSBOROUGH COUNTY, FLORIDA

TABLE 2

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Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Fb	Fellowship loamy fine sand	None	V. shallow Brief	75	0-12 12-42+	2.0-6.3 .06	.15-.20 .15-.20
Fc	Ft. Meade loamy fine sand, level	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Fd	Ft. Meade loamy fine sand, undulating	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Fe	Fresh water swamp	--	--	--	--	--	---
Ga	Gainesville loamy fine sand, level	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Gb	Gainesville loamy fine sand, gently undulating	None	Mod. deep Long	45	0-42+	6.3	.05-.10
Ia	Immokalee fine sand	Infrequent Brief	V. shallow Brief	45	0-32 32-38 38-42+	6.3 .63-2.0 6.3	.05 .05-.10 .05
Ib	Immokalee fine sand, alkaline variant	Infrequent Brief	V. shallow Brief	45	0-32 32-38 38-42+	6.3 .63-2.0 6.3	.05 .05-.10 .05
Ic	Istokpoga peat	V. frequent V. long	V. shallow Continuous	45	0-40 40-60+	6.3 6.3	.20 .05
Id	Istokpoga mucky peat	V. frequent V. long	V. Shallow Continuous	45	0-40 40-60+	6.3 6.3	.20 .05
Ka	Kanapaha fine sand	None	Shallow V. brief	45	0-42+	6.3	.05

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2B
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Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHTO		
Ia	Immokalee fine sand	0-32	fs	SP	A-3	Low	B/D
Ib	Immokalee fine sand,	32-38	fs	SP-SM	A-3, A-2	Low	
	alkaline variant	38-42+	fs	SP	A-3	Low	
Ic	Istokpoga peat	0-40	P	Pt	Organic	High	A/D
Id	Istokpoga mucky peat	40-60+	fs	PS	A-3	Low	
Ka	Kanapaha fine sand	0-42+	fs	SP, SP-SM	A-3, A-2	Low	A/D
Kb	Keri fine sand	0-22	fs	SP, SP-SM	A-3	Low	A/D
		22-30	fsl, fsc1	SC	A-2-6	Low	
		30-42+	fs	SP	A-3	Low	
La	Lakeland fine sand, shallow	0-60	fs	SP, SP-SM	A-3, A-2	Low	A
	Lakeland fine sand, level	60+	fsc1	SC	A-4, A-6	Low	
	Lakeland fine sand, gently undulating						
	Lakeland fine sand, undulating						
Lc	Lakeland fine sand, level, deep	0-72+	fs	SP	A-3	Low	A
Lf	Lakeland fine sand, undulating deep						
Lg	Lakewood fine sand	0-48+	fs	SP	A-3	Low	
Lh	Leon fine sand	0-20	fs	SP	A-3	Low	A/D
Lk	Leon fine sand, light colored surface	20-26	fs	SP-SM	A-3, A-2	Low	
		26-42+	fs	SP	A-3	Low	

ESTIMATED SOIL PROPERTIES FOR ENGINEERING

HILLSBOROUGH COUNTY, FLORIDA

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Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Kb	Keri fine sand	Infrequent Brief	V. shallow Brief	45	0-22	6.3	.05
					22-30	.20-.63	.10-.15
					30-42+	6.3	.05
La	Lakeland fine sand, shallow	None	Deep Continuous	45	0-60 60+	6.3 .20-.63	.05 .10-.15
Lb	Lakeland fine sand, level						
Ld	Lakeland fine sand, gently undulating						
Le	Lakeland fine sand, undulating	None	Deep Continuous	45	0-72+	6.3	.05
Lc	Lakeland fine sand, level, deep						
Lf	Lakeland fine sand, undulating deep						
Lg	Lakewood fine sand	None	Deep Continuous	45	0-48+	6.3	.05
Lh	Leon fine sand	Infrequent Brief	V. shallow Brief	45	0-20	6.3	.05
Lk	Leon fine sand, light colored surface				20-26	.63-2.0	.05-.10
					26-42+	6.3	.05
Ll	Leon fine sand heavy substratum	Infrequent Brief	V. shallow Brief	45-75	0-20	6.3	.05
					20-26	.63-2.0	.05-.10
					26-42+	.63-2.0	.10-.15
Ma	Made land	Variable	Variable	Variable	0-60	Variable	Variable
Me	Mines, pits and dumps						
Mb	Manatee fine sandy clay, heavy variant	V. frequent V. long	V. shallow V. long	75 8-42+	0-8 .06-.20	.63-2.0 .15-.20	.20

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

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Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHTO		
L1	Leon fine sand, heavy substratum	0-20	fs	SP	A-3	Low	A/D
		20-26	fs	SP-SM	A-3, A-2	Low	
		26-42+	scl	SC	A-2, A-6	Moderate	
Ma	Made land	0-60	Variable	Variable	Variable	Variable	Variable
Me	Mines, pits and dumps						
Mb	Manatee fine sandy clay, heavy variant	0-8	l, sc	ML, CL	A-2, A-4	High	B/D
		8-42+	c	CH	A-6, A-7	High	
Mc	Manatee fine sandy loam	0-10	lfs, fsl	SM, SP-SM	A-2	Low	B/D
Md	Manatee loamy fine sand	10-24	scl	SC	A-2, A-6	Moderate	
		24-42+	scl	SC	A-2, A-4	Moderate	
20 Me	Mixed alluvium, high bottom	0-60	Variable	Variable	Variable	Variable	Variable
Oa	Ona fine sand	0-14	fs	SM, SP-SM	A-2	Low	A/D
Ob	Ona fine sand, light colored surface	14-42+	fs	SP, SP-SM	A-3	Low	
Oc	Orlando fine sand	0-15	fs	SM, SP-SM	A-2	Low	A
		15-42+	fs	SP, SP-SM	A-3	Low	
Pa	Pamlico muck	0-36	muck	OL	Organic	High	D
		36-48+	fs	SP, SP-SM	A-3, A-2	Low	
Pb	Parkwood fine sand	0-18	fs	SP, SP-SM	A-3, A-2	Low	A/D
		18-42+	marl	---	---	-	
Pc	Peace River soils	0-60	Variable	Variable	Variable	Variable	Variable

ESTIMATED SOIL PROPERTIES FOR ENGINEERING

HILLSBOROUGH COUNTY, FLORIDA

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Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Mc	Manatee fine sandy loam	V. frequent	V. shallow	45-75	0-10	2.0-6.3	.20
Md	Manatee loamy fine sand	V. long	V. long		10-24	.20-.63	.10-.15
					24-42+	.20-.63	.10-.15
Me	Mixed alluvium, high	Frequent Brief	Variable	Variable	0-60	Variable	Variable
Oa	Ona fine sand	Frequent	V. shallow	45	0-14	6.3	.10-.15
Ob	Ona fine sand, light colored surface	Brief	Brief		14-42+	6.3	.05-.10
Oc	Orlando fine sand	None	Deep Continuous	45	0-15	6.3	.10-.15
					14-42+	6.3	.05-.10
Pa	Pamlico muck	V. frequent V. long	V. shallow V. long	45	0-36	6.3	.20
					36-48+	6.3	.05-.10
Pb	Parkwood fine sand	Infrequent Brief	V. shallow Brief	45	0-18	6.3	.05-.10
					18-42+	-	-
Pc	Peace River soils	V. frequent Brief	Variable	Variable	0-60	Variable	Variable
Pd	Plummer fine sand	V. frequent Long	V. shallow Long	45	0-48+	6.3	.05
Pe	Plummer fine sand, shallow	V. frequent Long	V. shallow Long	45	0-36	6.3	.05
					36-48+	.63-2.0	.10-.15
Pf	Pomello fine sand	None	Mod. shallow Brief	45	0-38	6.3	.05
					38-60+	6.3	.05-.10

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

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Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHO		
Pd	Plummer fine sand	0-48+	fs	SP, SP-SM	A-3	Low	B/D
Pe	Plummer fine sand, shallow	0-36	fs	SP, SP-SM	A-3	Low	B/D
		36-48+	fscl	SC	A-2, A-6	Low-Mod.	
Pf	Pomello fine sand	0-38	fs	SP	A-3	Low	C
		38-60+	fs	SP-SM	A-3, A-2	Low	
Pg	Pompano fine sand	0-42+	fs	SP, SP-SM	A-3	Low	A/D
Ph	Pompano fine sand, shallow	0-33	fs	SP, SP-SM	A-3, A-2	Low	A/D
		33-48+	fscl	SC	A-2, A-6	Moderate	
Pk	Portsmouth fine sand	0-24	fs, mfs	SP-SM, SM	A-2	Low	D
Pl	Portsmouth mucky fine sand	24-42+	scl	SC-SM, SC	A-2, A-4	Moderate	
Ra	Rains fine sand	0-18	fs	SP, SP-SM	A-3, A-2	Low	B/D
		18-48+	fscl	SC, SM-SC	A-2, A-4	Moderate	
Rb	Ruskin fine sand	0-24	fs	Sm, SM-SP	A-2	Low	A/D
		24-36	fscl	SC	A-2, A-4	Moderate	
		36-42	marl	marl	--	---	
Rc	Rutledge fine sand	0-20	fs, mfs	SP-SM, SM	A-2	Low	A/D
Re	Rutledge mucky fine sand	20-42+	fs	SP, SP-SM	A-3	Low	
Rd	Rutledge fine sand, shallow	0-14	fs	SP-SM	A-2	Low	A/D
		14-36	fs	SP	A-3	Low	
		36-42+	scl	SM-SC, SC	A-6	Moderate	
Sd	St. Lucie fine sand	0-42+	fs	SP	A-3	Low	A

Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Pg	Pompano fine sand	V. frequent Long	V. shallow Long	45	0-42+	6.3	.05
Ph	Pompano fine sand,	V. frequent Long	V. shallow Long	45	0-33 33-48+	6.3 .20-.63	.05 .10-.15
Pk	Portsmouth fine sand	V. frequent	V. shallow	45-75	0-24	6.3	.15-.20
Pl	Portsmouth mucky fine sand	V. long	V. long		24-42+	.20-.63	.10-.15
Ra	Rains fine sand	V. frequent V. long	V. shallow V. long	45-75	0-18 18-48+	6.3 .20-.63	.05-.10 .10-.15
Rb	Ruskin fine sand	Infrequent Brief	V. shallow Brief	45	0-24 24-36 36-42	6.3 2.0-6.3 -	.05 .10-.15 -
Rc	Rutledge fine sand	V. frequent	V. shallow	45	0-20	6.3	.15-.20
Re	Rutledge mucky fine sand	V. long	V. long		2-42+	6.3	.05
Rd	Rutledge fine sand, shallow	V. frequent	V. shallow	45	0-14 14-36 36-42+	6.3 6.3 .63-2.0	.15-.20 .05 .10-.15
Sd	St. Lucie fine sand	None	Deep Continuous	45	0-42+	6.3	.05
Sa	Sandy local alluvium	Infrequent Brief	Mod shallow Brief	45	0-42+	6.3	.05
Sb	Scranton fine sand	Frequent Brief	V. shallow Long	45	0-14 14-42+	6.3 6.3	.10-.15 .05-.10

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE 2B
Page - 6

Map Symbol	Soil Name	Layer Depth (In.)	CLASSIFICATION			Shrink- Swell Potential	Hydrologic Soils Group
			USDA Texture	Unified	AASHTO		
Sa	Sandy local alluvium	0-42+	fs	SP	A-3	Low	
Sb	Scranton fine sand	0-14	fs	SP-SM	A-2	Low	D
		14-42+	fs	SP	A-3	Low	
Sc	Shallow ponds with grass	0-60	Variable	Variable	Variable	Variable	Variable
Se	Sunniland fine sand, mod. shallow over marl	0-20	fs	SP	A-3	Low	
		20-30	fscl	SC	A-2-6	Moderate	
		30-40+	marl	--	--	--	
Ta	Terra Ceia peaty muck	0-20	muck	Pt, OL	Organic	High	A/D
		20-48+	fscl	SC	A-2-6	Moderate	
24 Tb	Tidal marsh (Unclassified soils)	0-60	Variable	Variable	Variable	Variable	Variable
Tc	Tidal swamp (Unclassified soils)						

Abbreviations:

c - clay
fs - fine sand
fsc - fine sandy clay
fscl - fine sandy clay loam
fsl - fine sandy loam
lfs - loamy fine sand
mfs - mucky fine sand
V. - Very
Mod. - Moderately

ESTIMATED SOIL PROPERTIES FOR ENGINEERING
HILLSBOROUGH COUNTY, FLORIDA

TABLE
Page - 7

Map Symbol	Soil Name	Flood Hazard 1/ (Frequency/ Duration)	Water Table 2/ Seasonally High (Depth and Duration)	Percolation Rate (Min./ In.)	Layer Depth (In.)	Permeability Rate (In./Hr.)	Available Water Holding Capacity (In./In.)
Sc	Shallow ponds with grass	V. frequent V. long	V. shallow V. long	Variable	0-60	Variable	Variable
Se	Sunniland fine sand, mod. shallow over marl	Infrequent Brief	V. shallow Brief	45	0-20 20-30 30-40+	6.3 2.0-6.3 -	.05 .10-.15 -
Ta	Terra Ceia peaty muck	V. frequent V. long	V. shallow V. long	45	0-20 20-48+	6.3 2.0-6.3	.20 .10-.15
Tb	Tidal Marsh (Unclassified soils)	V. frequent V. long	V. shallow V. long	Variable	0-60	Variable	Variable
Tc	Tidal Swamp (Unclassified soils)						

1/ Flood Hazard: Water from stream overflow, runoff, or seepage, standing or flowing above the soil surface.

FREQUENCY		DURATION	
None	Less often than once in 50 years	Extremely brief	Shorter than 2 days
Very infrequent	Once in 20 to 50 years	Very brief	2 to 7 days
Infrequent	Once in 5 to 20 years	Brief	7 days to 1 month
Frequent	Once in 1 to 5 years	Long	1 month to 6 months
Very frequent	More often than once every year	Very long	Longer than 6 months

2/ Water Table: The upper surface of free water in a soil or underlying material. In some places an upper or perched water table is separated from a lower one by a dry zone. If water is above the surface, it is called flooding.

DEPTH		DURATION	
Deep	Deeper than 120 inches	Very brief	Shorter than 1 month per year
Moderately deep	Deeper than 60 to 120 inches	Brief	1 to 2 months per year
Moderately shallow	Deeper than 30 to 60 inches	Long	2 to 6 months per year
Shallow	Deeper than 15 to 30 inches	Very long	6 to 12 months per year
Very shallow	Deeper than 0 to 15 inches	Continuous	More than 12 months

APPENDIX 10.10.3

TEST LAB, INC. REPORT

Report

of

PRELIMINARY GEOTECHNICAL STUDY

RESOURCE RECOVERY FACILITY

FAULKENBURG ROAD SITE

HILLSBOROUGH COUNTY, FLORIDA

for

Hillsborough County - Department of Solid Waste

TEST LAB
INC.



April 20, 1984

Hillsborough County
Department of Solid Waste
P.O. Box 1110
Tampa, Florida 33601

Attention: Mr. Marc J. Rogoff
Resource Recovery Program Administrator

Subject: Preliminary Geotechnical Study
Resource Recovery Facility
Falkenburg Road Site
Hillsborough County, Florida
Project No. 84-1479

Gentlemen:

The purpose of this preliminary geotechnical study was to determine the general nature of the subsurface conditions at the plant site and generally ascertain the types of foundation systems which might be used to support the facilities. An earlier study had been made, but the facility was relocated to the northern portion of the tract. Although it was thought that similar subsurface conditions would exist at the new plant site, a field exploration program was necessary to verify this. Ultimately, this proved to be the case. The following report briefly describes the field and laboratory procedures used in this study and presents a general engineering evaluation of the subsurface and foundation conditions.

FIELD PROCEDURES

Twelve exploratory borings were made at the site at the locations shown on the accompanying plan. These borings were made at locations we recommended, but which were staked in the field by county personnel who also determined the ground surface elevation.

The exploratory borings were made with a truck-mounted CME-55 drilling rig. Conventional rotary drilling procedures were utilized along with a bentonite drilling fluid to stabilize the bore holes. Standard penetration tests were made and split-barrel soil samples obtained at 2.5 foot intervals to a depth of 10 feet and 5 foot intervals thereafter. The following is a brief description of this field test procedure.

The exploratory borings were made in accordance with ASTM's method of standard field penetration tests (D 1586). Standard penetration tests are made with a 2 inch O.D. split-barrel sampler. After drilling to the required depth and cleaning the bore hole, the sampler is driven 18 inches into the undisturbed soil by a 140 pound drop-hammer falling 30 inches. The number of blows required to affect the last foot of penetration is recorded as the penetration resistance (N). The numerals in parenthesis below the 'N' values are the blow count for each of the 6 inch increments which the split-barrel sampler was driven. The soil samples thus obtained were visually classified, and some used for qualitative laboratory tests. Upon completion of the drilling, the bore holes were sealed and grouted in accordance with Southwest Florida Water Management District regulations.

The subsurface data obtained from the field exploration program are presented on the accompanying logs. Also attached is a legend explaining the classification terms and symbols used on these logs.

LABORATORY PROCEDURES

A laboratory test program, limited to determining soil index properties, was undertaken to better ascertain the physical characteristics of the various soil strata found at the site. Grain-size analyses and atterberg limit determinations were conducted on selected disturbed soil samples. The following are brief descriptions of these test procedures.

Grain Size Analyses

Particle size analyses were made in accordance with ASTM procedure 422. The distribution of particle sizes larger than a No. 200 sieve is determined by mechanical sieving; whereas, the distribution of particle sizes smaller than a No. 200 sieve is determined by a sedimentation process. Either or both procedures may be used to more fully evaluate the physical characteristics of the soil. In this study, only the former procedure was used, but the soil samples were mechanically washed over a No. 200 sieve (ASTM D 1140) to more accurately determine the percentage of silt and clay sized particles.

Plasticity Tests (Atterberg Limits)

The liquid limit (LL) and plastic limit (PL) of the soils were determined in accordance with ASTM procedures D 423 and D 424, respectively. The soil plasticity index (PI) is the numerical difference between the liquid limit and plastic limit. The atterberg limits of a soil are particularly useful when identifying and classifying cohesive soils; and also as indexes to other significant properties such as compressibility, plasticity, permeability, and swell-shrink potential.

The data obtained from the laboratory tests are presented on the accompanying grain size distribution sheets.

SUBSURFACE CONDITIONS

The field exploration program revealed generally similar subsurface conditions existing in the various areas investigated. These conditions were similar to those found in

the southern portion of the tract by the earlier Williams study. Basically, four relatively distinct soil/rock strata were revealed by the borings. The following is a generalized description of these strata in the sequence encountered.

Stratum No. 1

This is a moderately thick cohesionless surface stratum which consists of very loose to loose gray and brown medium fine sand and slightly clayey sand containing numerous dark brownish black slightly clayey organic stained zones. This surface stratum varies from 5' to 22' in thickness, but is typically 10' thick.

Stratum No. 2

This a moderately thin semi-cohesive stratum which consists of generally firm brown, grayish brown and light tannish gray clayey medium-fine sand with some slightly clayey lenses. This stratum varies in thickness from 0 to 15 feet, but is typically 5' thick; and extends to depths ranging from 12 to 27 feet.

Stratum No. 3

This is a thick complex stratum of interbedded semi-cohesive and cohesive soils. Typically the upper part of this stratum is a firm light green clay which transgresses with depth to more granular semi-cohesive soils - that is, greenish gray and tan fine sandy clay and clayey fine sand which contain some zones with cemented sand fragments. This stratum is typically about 20' thick, although occasionally much thinner, and extends to depths varying from 24' to 47' .

Stratum No. 4

This stratum, which is the Tampa Formation, is the limestone bedrock. The nature of this stratum is quite variable, typically being more like soil than rock - that is, a hard light tannish white calcareous sandy clay containing rock fragments, hard limestone lenses, some softer weathered zones and occasional green and gray sandy clay lenses. Generally, the upper part of this stratum is poorly indurated and softer, probably the result of weathering; whereas below this, this stratum tends to be somewhat harder and more competent, but frequently contains softer zones. This stratum was encountered at depths of 24 to 47 feet.

Although the stratigraphy in the areas investigated is quite similar, the depth and thickness of the various strata are quite varied. Therefore, the attached soil test boring logs should be reviewed for a detailed description of the materials and conditions encountered at each boring location. The depth to ground water table measured in the borings at the time of the study is shown on the logs. However it should be noted that after heavy rains during the study, standing water existed throughout much of the site.

PRELIMINARY EVALUATION

The object of this preliminary study was to determine the general nature of the subsurface conditions and to generally evaluate these conditions from a foundation standpoint with respect to supporting the type facilities proposed. While this general data and information is to be provided to prospective bidders so that they will be more knowledgeable of the site, subsurface and foundation conditions; it should be noted that this preliminary data is not sufficient to develop final foundation recommendations and design criteria. A more comprehensive final geotechnical study must be undertaken for such purposes.

At the present time, only conceptual plans have been developed, and thus specific structural data and foundation loads are not available. However the proposed facilities will generally be of the size, configuration and located at shown on the accompanying plan. The main building will be a very large heavy steel-frame structure which will house the refuse pit, refuse storage bins, furnace and furnace charging equipment, boilers, air pollution control equipment, and administrative offices. Although the refuse pit will extend approximately 10' below grade, the ground floor level

elsewhere will be at approximately existing grade. Adjacent to the main building will be a 250' high stack. Other more lightly loaded associated facilities are the cooling towers, electric switchyard, and scales & scale houses. An extensive roadway system and associated parking areas are planned. Most of the roadways and parking areas will be constructed at approximately the existing grade. However, high earthen ramps approximately 25' in height will be required for truck access and unloading into the refuse pit. Some large shallow retention ponds are also proposed to store storm water drainage.

The preliminary evaluation of the foundation conditions is based upon analyzing the soil/rock characteristics obtained from this study by comparison with previously made correlations of such data and foundation stabilities that have been developed for subsurface conditions similar to those found at this site. In addition, the data derived from the earlier Williams study, specifically the laboratory consolidation test data, were also used to evaluate the foundation conditions. The general engineering evaluation of the foundation conditions is based upon a site development plan and facilities of the type previously discussed.

The subsurface conditions at the site are considered typical of those generally found in this area. These conditions were quite similar to those revealed by the earlier Williams study. No unusual or significantly different conditions were found. Basically the same potentially poor subsurface conditions exist at the new plant site, that is:

1. The generally loose consistency of the cohesionless surface soils (stratum no. 1).
2. The weak and potentially compressible nature of the soft & loose zones within the deeper underlying semi-cohesive and cohesive soils (stratum no. 3).

3. The less competent, weak, poorly indurated, or highly weathered zones within the limestone bedrock (stratum no. 4).
4. The very shallow ground water table.

The first potentially poor condition poses a foundation problem because loose cohesionless soils may not provide adequate support for even lightly loaded shallow foundations. Shallow foundations supported on loose sands may settle as a result of consolidation due to imposed foundation loads, changes in loading conditions or vibrations. Thus, special site preparation will be necessary to densify the shallow loose sands, thereby providing adequate support for shallow foundations and minimizing potential settlement from this source. Although inexpensive routine proof-rolling techniques may adequately densify the shallow loose sands to a sufficient depth to provide satisfactory foundation support for very light structures, such as the scale facilities; this method may not be adequate for other moderately light structures because of the slightly clayey nature and depth of the loose sands and high ground water table. Therefore, other special in situ densification methods may be required.

The second potentially poor condition is of more serious concern. These potentially compressible cohesive soils cannot be readily improved, except by means of surcharging which does not appear practical. Heavy foundation and embankment loads will induce subsurface stresses of sufficient magnitude to cause appreciable consolidation compression of the weaker zones within this stratum. Thus significant total and differential settlement would occur which could detrimentally affect the structures. Therefore the main building and other associated heavily loaded structures should be supported on deep foundation systems which extend through the compressible soils to adequate bearing on or within the more competent

underlying weathered limestone stratum. Although obviously deep foundations must be used to support the heavy structures, it might also be more practical to similarly support even moderately light structures in view of the relatively shallow depth at which deep foundations will bear and the difficulty and cost of adequately densifying the loose cohesionless soils. Another potential effect caused by the consolidation of this stratum is that of negative friction or pile drag-down. This must be considered in the design of deep foundations in areas where they may be affected - such as adjacent to the roadway embankments.

The third potentially poor condition is only of significance in that the less competent weak weathered zones will limit the capacity of deep foundations. Furthermore, significant variations in the depth at which deep foundations will achieve adequate bearing are anticipated because of the somewhat erratic nature of the limestone bedrock.

The fourth potentially poor condition, i.e. very high ground water table, will necessitate proper dewatering for below grade construction, such as the refuse pit and scales. The dead weight of buried structures must also be sufficient to resist the uplift pressure caused by the ground water. Special consideration must also be given to the high ground water table in the design of pavements, as proper subgrade drainage is essential to achieve satisfactory pavement performance. It would appear that pavements should either be raised to avoid this problem or underdrains installed to alleviate the problem. Also a type of pavement or base should be used which is resistant to deterioration if wetted. The high ground water table will also severely limit the storage capacity of retention basins. This may necessitate raising of the general plant site to facilitate drainage and provide adequate storage capacity, or lowering outfalls may suffice.

It should be noted that during heavy rains and shortly thereafter, and possibly throughout the rainy season, standing water may exist in many portions of the site which can severely hamper construction operations. Thus, site drainage improvements should be one of the first construction activities.

This preliminary study indicates that after proper site preparation and densification of the shallow loose sands light structures may be supported on conventional shallow foundation systems, whereas moderate to heavy structures must be supported on deep foundation systems. Driven piles or drilled piers appear to be the most economical and practical types of deep foundation systems to use; whereas, auger-cast piles do not appear appropriate for the subsurface conditions. The preliminary subsurface data indicate that adequate bearing for deep foundations can be achieved at reasonably shallow depths. Driven piles will typically reach bearing at 35' to 45', although significant variations (30' to 60') are anticipated due to the variable nature of the weathered limestone bedrock. Drilled piers may have to penetrate at somewhat greater depths, depending upon their capacity.

The following page presents some very general deep foundation design parameters which may be used for preliminary planning and cost estimating purposes. However, a more comprehensive geotechnical study should be undertaken to finally select the most appropriate and economical types of deep foundation systems to use for the various structures.

Although various types of piling commonly used in the area have been shown, there are advantages to using certain types. Displacement type piling (timber, concrete, closed-end pipe, or shell) usually derive their support primarily from end-bearing on the underlying weathered limestone bedrock;

DRIVEN PILES

Timber Piling, conforming to ASTM specification D-25.

8 inch	20 tons
10 inch	30 tons

Prestress Concrete Piling, conforming to FDOT specifications (not commercial grade).

10 inch	35 tons
12 inch	50 tons
14 inch	70 tons

Closed-End Steel Pipe Piling (concrete filled), with minimum wall thickness of 0.25 inches, conforming to ASTM specification 252A grade 2.

10 inch	50 tons
12 inch	60 tons

Mandrel-Driven-Shell Piling, with adequate shell gauge to withstand both driving stresses and earth pressures without damage or collapse, minimum 14 gauge is suggested.

10 inch	50 tons
12 inch	60 tons

Open-End Steel Pipe Piling, conforming to ASTM A 252, with a minimum wall thickness of 3/8 inch (soil or concrete filled).

9 inch	60 tons
11 inch	75 tons

Steel H-Piling, conforming to ASTM specification A-36.

HP 8 x 36	40 tons
HP 10 x 42 or 12 x 53	50 tons
HP 10 x 57	70 tons

DRILLED PIERS

Should be installed by the wet-hole method or slurry displacement technique. Capacity is dependent upon diameter and length of rock socket. Load carrying capacity should be based solely upon rock socket side friction at 5 to 6 KSF in competent limestone.

whereas non-displacement type piling (open-end pipe, or H-piles) usually drive their support by a combination of friction and end-bearing in the underlying limestone bedrock. Consequently displacement piling usually take up and reach adequate bearing at somewhat shallower depths than non-displacement piling which tend to penetrate somewhat deeper into the weathered limestone bedrock. A disadvantage of fixed-length type piling (timber or concrete) is the difficulty of predetermining the length to purchase where the depth to bearing is quite variable as at this site. Furthermore, these piles are usually difficult and costly to splice, particularly to sustain uplift loads. Thus, it is usually advisable to purchase sufficiently long piles to eliminate this problem, as it is frequently less costly to waste cutoffs than to splice. To avoid these difficulties, it is usually advantageous to use other types of piling which are more readily adaptable to significant variations in required length - such as pipe, shell, or H-piling which can be more easily cut off and spliced. These various factors and structural loadings and pile cap design requirements must be considered in the selection of the foundation system.

A more comprehensive final foundation study should be undertaken to obtain the additional data needed to establish specific site preparation procedures and foundation design criteria for the various facilities. These additional data are also needed to permit the detailed cost estimates necessary to select the most appropriate and economical types of deep foundation systems to use. Furthermore, additional data are required to establish specific design and construction recommendations for dewatering and foundation installation procedures, load testing, construction monitoring, etc.

LIMITATIONS

This preliminary study was undertaken for planning purposes only. Generally accepted soil mechanics and foundation engineering practices were utilized in the preparation of this report; and no other warranty, either expressed or implied, is made as to the professional advice provided. This report has been prepared solely for the use of our client and may not contain sufficient information for other uses or for the purposes of other parties. We are not responsible for any conclusions or recommendations based upon this data which are made by others, unless we have been given an opportunity to review and concur with them. The following are other applicable limitations.

The lines on the logs designating the interface between the various strata may only be approximate boundaries when the transition is gradational or could not be detected by the drilling operations.

The depth to the ground water table measured in the borings during the investigation is only indicative of the water level at that time. The ground water table may fluctuate significantly due to seasonal changes, variations in rainfall, and other factors not evident at the time of the investigation.

The general engineering evaluation of the subsurface conditions and the preliminary opinions and conclusions presented in this report are based solely upon the data obtained from the exploratory borings made at the locations indicated on the attached plan; and are only valid so long as the site and subsurface conditions remain unchanged. This report does not reflect any variations which may occur between these borings, except as may be discussed in the report.

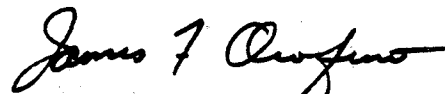
Because of the preliminary nature and limited scope of this study, this report is by necessity rather brief and quite general. However, we would be pleased to answer any specific questions you may have or evaluate these preliminary findings with respect to any other specific development concept you

April 20, 1984

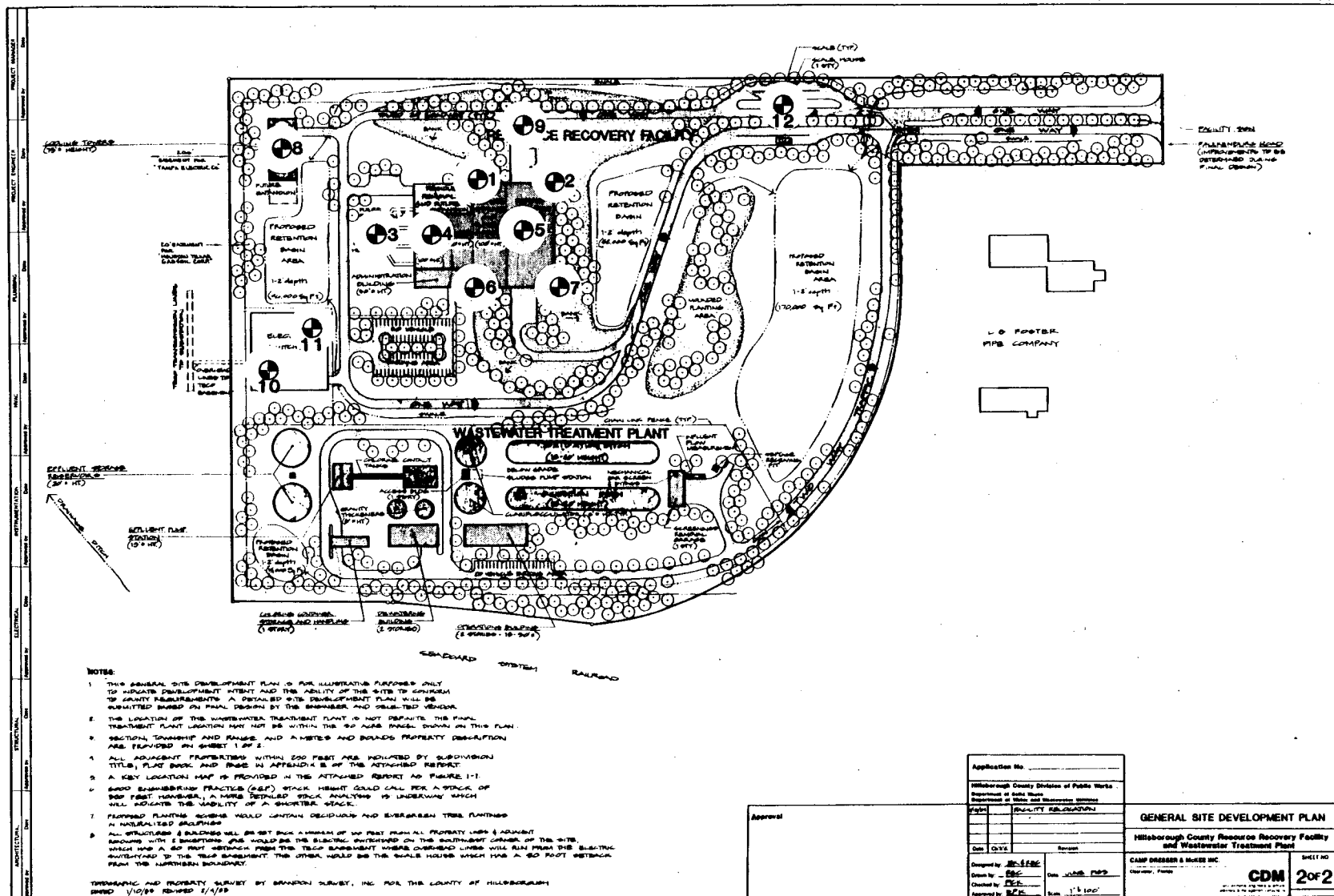
might consider. It should be noted that the exploratory borings were very widely spaced, thus significantly different or more varied conditions are possible at other locations. When the final planning of this facility is complete and more definitive data regarding foundation loads available, a more comprehensive study should be undertaken to establish specific site preparation and foundation criteria for the planned facilities.

If you have any questions concerning this study, or if we may be of further assistance, please do not hesitate to call.

Respectfully submitted,

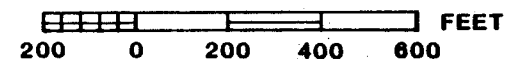


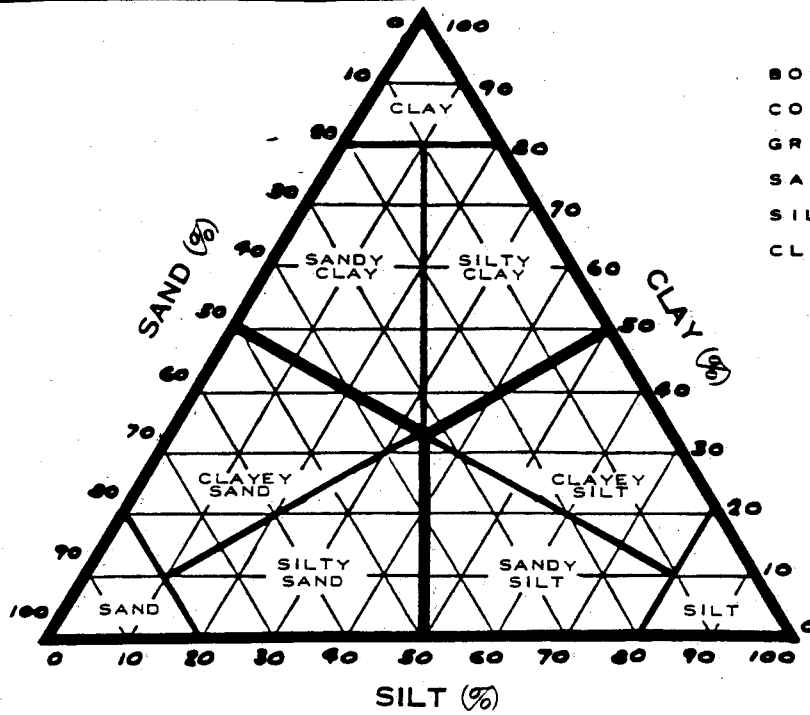
James F. Orofino, PE
President



HILLSBOROUGH COUNTY ENERGY RECOVERY PROJECT

SOIL BORING LOCATIONS





BOULDERS	LARGER THAN 6 INCHES
COBBLES	2 TO 6 INCHES
GRAVEL	2 MM TO 2 INCHES
SAND	0.074 TO 2 MM
SILT	0.002 TO 0.074 MM
CLAY	SMALLER THAN 0.002 MM

SOIL CLASSIFICATION CHART

SOIL SYMBOLS

	SAND		WEATHERED LIMESTONE	
	CLAYEY SAND SILTY SAND		LIMESTONE	
	SANDY CLAY SANDY SILT		PEAT, MUCK, ORGANIC SOILS	
	CLAY, SILT SILTY CLAY CLAYEY SILT		GRAVEL, COBBLES, BOULDERS	
	VOID/CAVITY		MISCELLANEOUS FILL, TOPSOIL, ETC.	

CONSISTENCY

COHESIONLESS SOIL

VERY LOOSE	0 - 4 BLOWS/FT.
LOOSE	4 - 10 BLOWS/FT.
FIRM	10 - 30 BLOWS/FT.
DENSE	30 - 50 BLOWS/FT.
VERY DENSE	50 - UP BLOWS/FT.

COHESIVE SOIL

VERY SOFT	0 - 2 BLOWS/FT.
SOFT	2 - 4 BLOWS/FT.
FIRM	4 - 8 BLOWS/FT.
STIFF	8 - 15 BLOWS/FT.
VERY STIFF	15 - 30 BLOWS/FT.
HARD	30 - UP BLOWS/FT.

LEGEND

MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
	dark grayish brown medium-fine SAND (topsoil)		
	loose light grayish tan medium-fine SAND	1	4 ∇ (2,2,2)
5	loose dark brown medium-fine SAND (slightly organic stained)	2	7 (3,4,3)
	loose light brown medium-fine SAND	3	5 (2,2,3)
10	loose dark brown medium-fine SAND (slightly organic stained)	4	8 (2,3,5)
15	dense dark brown slightly clayey medium-fine SAND	5	52 (17,24,28)
20	dense light brown CLAYEY medium-fine SAND w/sand lenses	6	42 (10,16,26)
25	firm grayish brown CLAYEY medium-fine SAND	7	29 (14,14,15)
30	loose light greenish gray CLAYEY fine SAND w/cemented sand fragments	8	4 (3,2,2)
35	very stiff tan calcareous sandy clay w/some rock fragments & greenish zones (WEATHERED LIMESTONE)	9	16 (4,6,10)

Remarks: ground surface elevation 36.5 feet
complete loss of drilling fluid at 37 feet
bore hole cased (BX) to depth of 40 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: B-1

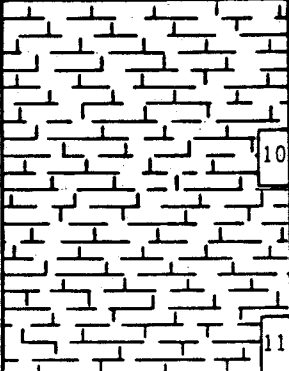
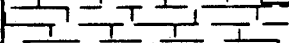
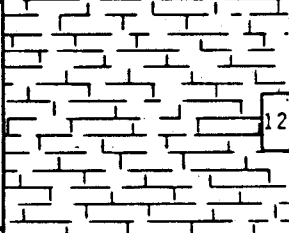
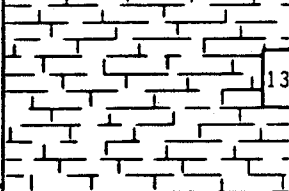
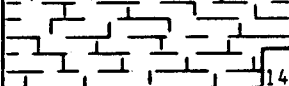
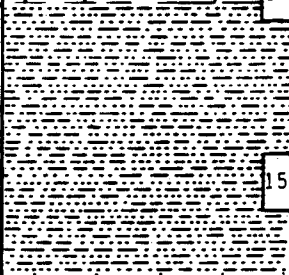
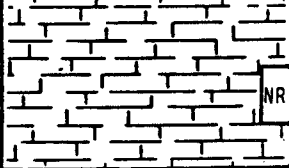
Page 1 of 3

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard light tannish white calcareous sandy clay w/some rock fragments & softer zones (WEATHERED LIMESTONE)		63 (12,30,33)
45			50 = 5"
50	firm grayish tan calcareous clayey sand (WEATHERED LIMESTONE)		.24 (13,11,13)
55	hard light tannish white calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)		34 (11,12,22)
60	dense tan calcareous clayey sand (WEATHERED LIMESTONE)		75 = 10" (15,25,50/4)
65	hard gray & green fine SANDY CLAY w/rock fragments & weathered limestone lenses		100 = 10" (17,50,50/4)
70	hard tan calcareous sandy clay w/rock fragments & limestone lenses (WEATHERED LIMESTONE)		50 = 1"

Remarks:

BORING: B-1

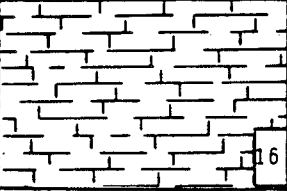
Page 2 of 3

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
75	hard tan calcareous sandy clay w/rock fragments & greenish gray & brown sandy clay lenses (WEATHERED LIMESTONE)		53 (16,20,33)
	boring terminated		

Remarks:

BORING: B-1

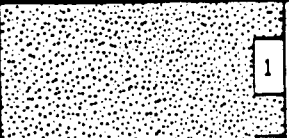
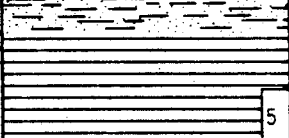
Page 3 of 3

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft
5	* light brown medium-fine SAND		6 ∇ (2,3,3)
	loose dark brown slightly clayey medium-fine SAND		4 (1,2,2)
	loose brown slightly clayey medium-fine SAND		12 (4,6,6)
10	firm light grayish brown CLAYEY medium-fine SAND		18 (7,9,9)
			23 (1,3,20)
20	stiff light tan fine very SANDY CLAY		9 (3,4,5)
			3 (1,1,2)
30	very stiff light tannish white calcareous sandy clay w/some rock fragments & occasional limestone lenses (WEATHERED LIMESTONE)		27 (31,13,14)
			31 (17,14,17)

Remarks: * dark brown & gray medium-fine SAND

ground surface elevation 38.0 feet
partial loss of drilling fluid at 27 & 45 feet
bore hole cased (BX) to depth of 30 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: B-2

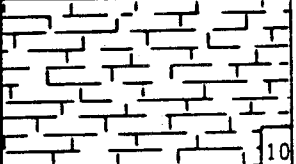
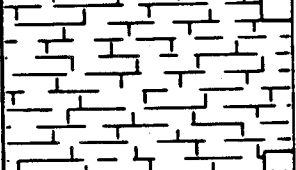
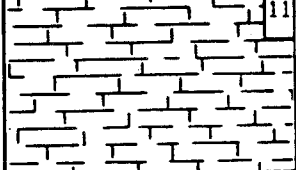
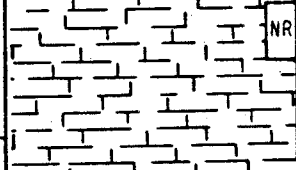
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	very stiff light tannish white calcareous sandy clay w/some rock fragments & occasional limestone lenses (WEATHERED LIMESTONE)		50 = 1½" (17,50/1½)
45	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses, some greenish zones & occasional softer zones (WEATHERED LIMESTONE)		85 (36,40,45)
50			50 = 2"
55	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses & occasional softer zones (WEATHERED LIMESTONE)		50 = 1½"
	boring terminated		

Remarks:

BORING: B-2

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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
5	very loose dark brownish black slightly clayey medium-fine SAND (organic stained)	1	3 (1,1,2)
	very loose brown medium-fine SAND	2	3 (2,1,2)
	very loose dark brownish black slightly clayey medium-fine SAND (organic stained)	4	2 (1,1,1)
		5	15 (4,5,10)
10	firm light tannish gray CLAYEY medium-fine SAND		
15	firm light green CLAY	6	4 (1,2,2)
20	firm light greenish gray fine SANDY CLAY w/some cemented sand fragments	7	6 (7,3,3)
25	very loose green CLAYEY fine SAND	8	1 = 18"
30	very soft light tannish white calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)	9	2 (1,1,1)
35	hard light tan calcareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)	10	50 = 5"

Remarks: * dark grayish peaty medium-fine SAND (topsoil)

ground surface elevation 33.8 feet
partial loss of drilling fluid at 22 feet
complete loss of drilling fluid at 27 feet
bore hole cased (BX) to depth of 35 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: B-3

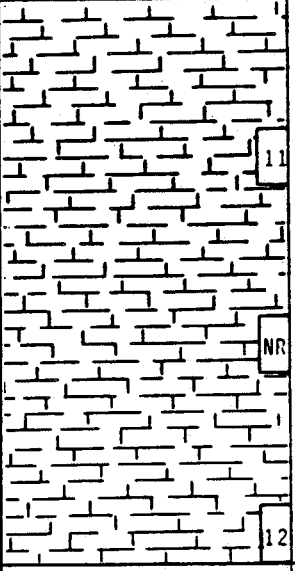
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
40	hard light tan calareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)		50 = 4" (17,50/4)
45			50 = 3"
50			73 (32,36,37)
	boring terminated ---		

Remarks:

BORING: 8-3

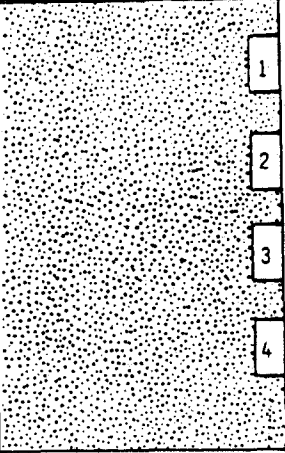
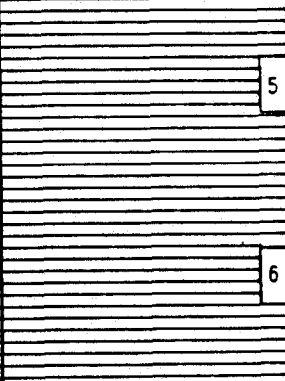
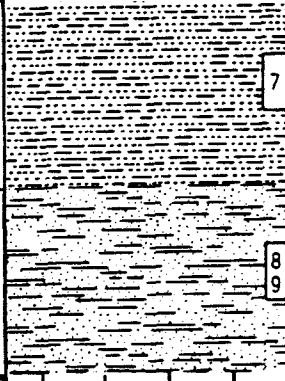
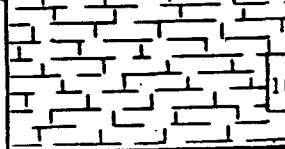
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft
	* **		
5	very loose to firm dark brownish black slightly clayey medium-fine SAND (organic stained)		1 ∇ 2 (1,1,1)
10			2 13 (3,7,6)
			3 6 (2,2,4)
			4 5 (2,2,3)
15	firm light green CLAY		5 7 (2,3,4)
20	firm bluish green CLAY		6 7 (2,2,5)
25	stiff light bluish green fine very SANDY CLAY w/trace of small gravel		7 9 (2,4,5)
30	very loose greenish gray, gray & light brown CLAYEY fine SAND w/some slightly clayey zones		8 2 (2,1,1)
35	very soft tan calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)		9 2 (1,1,1)

Remarks:

- * dark grayish brown medium-fine SAND (topsoil)
- ** light brownish gray medium-fine SAND
- ground surface elevation 35.1 feet
- partial loss of drilling fluid at 35 feet
- bore hole grouted - 1/4 hour and 1/2 bag cement

BORING: B-4

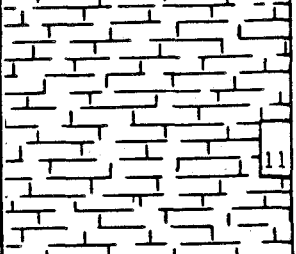
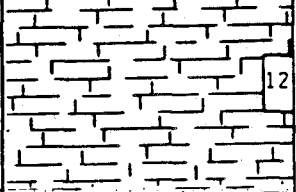
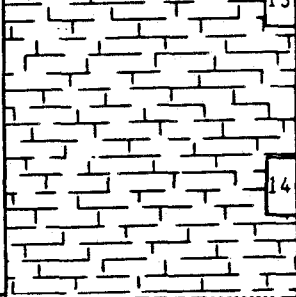
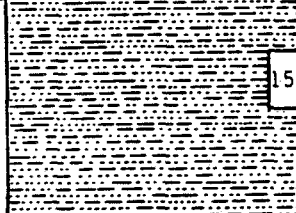
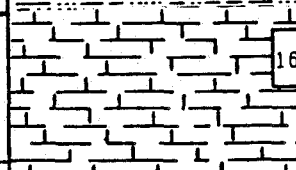
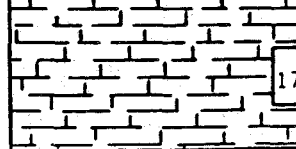
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard tan calcareous sandy clay w/rock fragments, limestone lenses & occasional softer zones (WEATHERED LIMESTONE)		50 = 4" (32,50/4)
45			42 (29,20,22)
50	firm green CLAYEY fine SAND		50 = 4" (13,30,50/4)
55	hard tan calcareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)		50 = 4" (46,50,50/4)
60	firm dark greenish gray fine SANDY CLAY w/tan calcareous lenses		8 (7,4,4)
65	very stiff tannish gray calcareous sandy clay w/rock fragments & some greenish zones (WEATHERED LIMESTONE)		18 (2,5,13)
70	hard tan calcareous sandy clay w/rock fragments & limestone lenses (WEATHERED LIMESTONE)		50 = 4" (16,46,50/4)

Remarks:

BORING: B-4

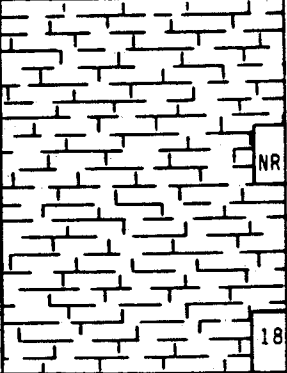
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
75	hard tan calcareous sandy clay w/rock fragments & limestone lenses (WEATHERED LIMESTONE)	 NR	50 = 3"
80	boring terminated	18	50 = 4" (22,46,50/4)

Remarks:

BORING: B-4

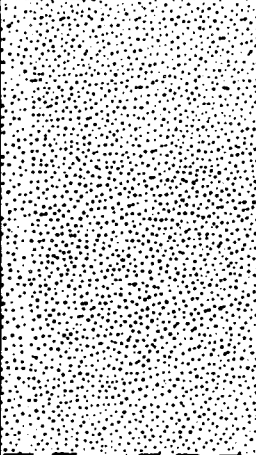
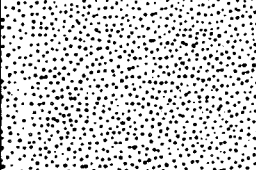
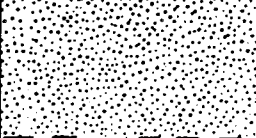
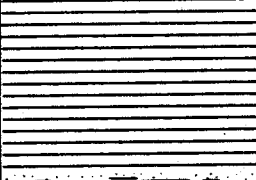
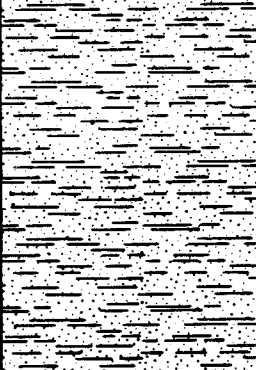
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
	* loose light grayish tan medium-fine SAND		8 1 Σ (3,3,5)
5	firm dark brownish black slightly clayey medium-fine SAND (organic stained)		16 2 (4,6,10)
			12 3 (7,6,6)
10	loose grown medium-fine SAND		8 4 (2,3,5)
15	loose brown CLAYEY medium-fine SAND w/some slightly clayey zones & dark brownish black organic stained zones		9 5 6 (2,3,6)
20	firm light green CLAY		4 7 (2,2,2)
25	very loose light brownish gray, tan & greenish gray CLAYEY fine SAND w/cemented sand fragments, limestone fragments, & some sandy clay lenses		2 8 (2,1,1)
30			3 9 (2,2,1)
35	very loose yellowish tan & gray CLAYEY fine SAND		3 10 (1,1,2)

Remarks: * gray medium-fine SAND

ground surface elevation 37.8 feet
bore hole grouted - 1/4 hour and 1/2 bag cement

BORING: B-5

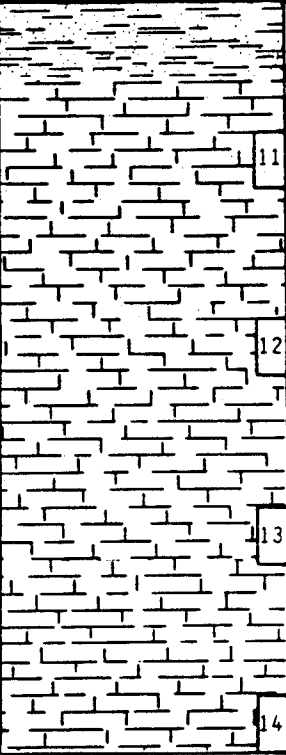
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses, some softer zones & occasional greenish zones (WEATHERED LIMESTONE)		50 = 5½"
45			50 = 4"
50			50 = 2½"
55			50 = 3½" (38,50/3)
	boring terminated		

Remarks:

BORING: B-5

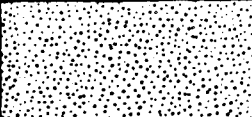
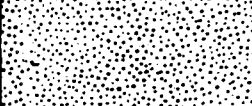
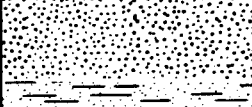
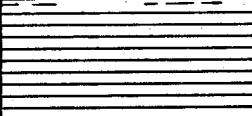
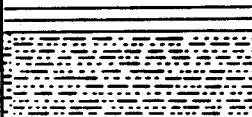
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft
	* loose light grayish tan medium-fine SAND		1 7 (2,3,4)
5	loose brown slightly clayey medium-fine SAND		2 6 (2,2,4)
	very loose dark brownish black slight clayey medium-fine SAND (organic stained)		3 2 (2,1,1)
10	loose light grayish brown CLAYEY medium-fine SAND		4 9 (3,4,5)
15	firm light green CLAY		5 4 (2,2,2)
20	firm light green CLAY		6 5 (1,2,3)
25	firm greenish gray fine very SANDY CLAY w/cemented sand lenses & fragments		7 10 (2,4,6)
30	stiff light tannish white calcareous sandy clay w/rock fragments & greenish zones (WEATHERED LIMESTONE)		8 29 (3,7,22)
35	hard light tannish white calcareous sandy clay w/rock fragments & limestone lenses (WEATHERED LIMESTONE)		9 50 = 3"

Remarks: * gray medium-fine SAND
ground surface elevation 36.8 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: B-6

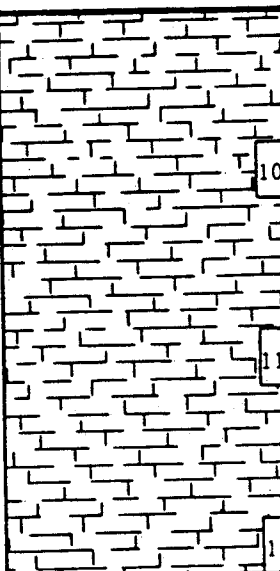
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
40	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses, some softer zones & occasional greenish gray zones (WEATHERED LIMESTONE)		50 = 4" (25,47,50/4)
45			50 = 3"
50			63 (16,27,36)
	boring terminated		

Remarks:

BORING: 8-6

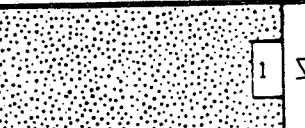
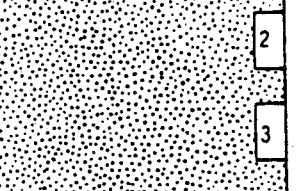
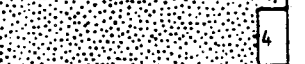
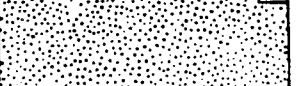
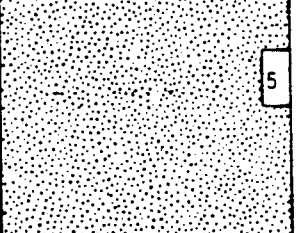
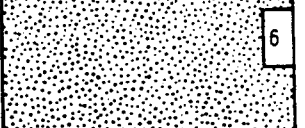
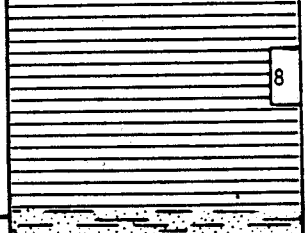
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
	* loose light gray medium-fine SAND		1 ∇ 7 (2,3,4)
5	loose to firm dark brownish black very slightly clayey medium-fine SAND (organic stained)		2 9 (2,3,6)
			3 15 (4,6,9)
10	loose brown medium-fine SAND		4 8 (3,4,4)
15	firm dark brownish black very slightly clayey medium-fine SAND (organic stained)		5 19 (7,10,9)
20			6 13 (5,6,7)
25	firm light brown CLAYEY medium-fine SAND		7 15 (5,6,9)
30	firm dark greenish brown CLAY		8 6 (2,3,3)
35	very loose light brown CLAYEY fine SAND w/cemented sand & shell fragments		9 2 (3,1,1)

Remarks: * gray medium-fine SAND
ground surface elevation 38.4 feet
partial loss of drilling fluid at 60 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: B-7

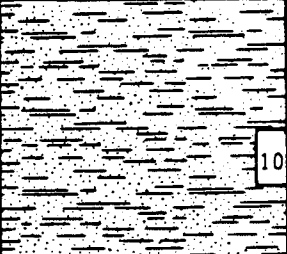
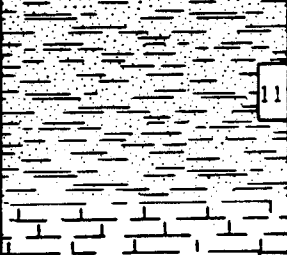
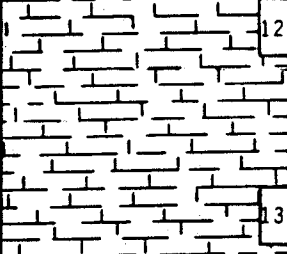
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows / Ft.
40	very loose greenish gray CLAYEY fine SAND		1 = 18"
45			1 = 18"
50	hard light tan calcareous sandy clay w/some rock fragments, occasional limestone lenses, greenish zones & softer zones (WEATHERED LIMESTONE)		50 = 2" (38,50/2)
55			71 = 10" (11,21,50/4)
60	hard light grayish tan calcareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)		50 = 3" (32,50/3)
65			88 (40,40,48)
	boring terminated		

Remarks:

BORING: B-7

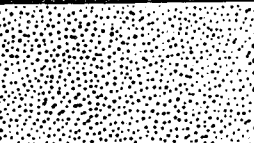
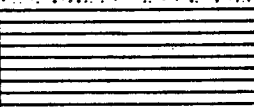
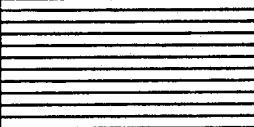
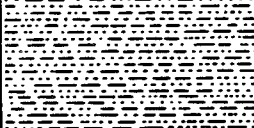
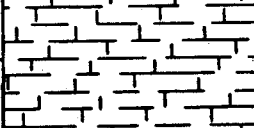
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
5	loose brown medium-fine SAND		1 6 (2,3,3)
	loose dark brownish black slightly clayey medium-fine SAND (organic stained)		2 4 (3,2,2)
10	firm green CLAY w/brown clayey sand & sandy clay lenses		3 6 (2,3,3)
			4 5 (2,2,3)
15	stiff light green fine SANDY CLAY		5 9 (3,4,5)
20	soft light greenish gray & tan fine SANDY CLAY		6 3 (2,1,2)
25	firm light tannish white calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)		7 7 (2,3,4)
30	very stiff to hard light tannish white calcareous sandy clay w/occasional rock fragments & greenish zones (WEATHERED LIMESTONE)		8 33 (10,20,13)
35			9 22 (6,7,15)

Remarks: * dark grayish brown slightly peaty medium-fine SAND (topsoil)

ground surface elevation 30.4 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: B-8

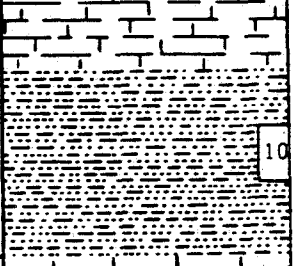
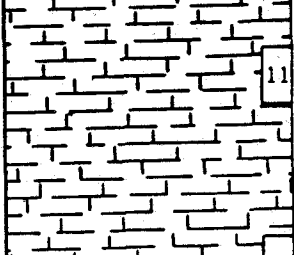
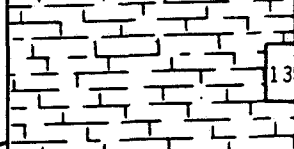
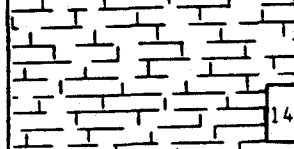
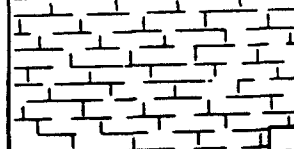
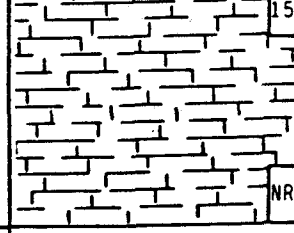
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TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	hard green fine very SANDY CLAY		31 (8,13,18)
45	hard light tannish white calcareous sandy clay w/some rock fragments, limestone lenses, greenish zones & occasional softer zones (WEATHERED LIMESTONE)		50 = 4" (30,50/4)
50	-		80 (14,30,50)
55	hard light tan calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)		40 (9,20,20)
60	hard grayish tan calcareous sandy clay w/rock fragments, limestone lenses, occasional greenish zones & softer zones (WEATHERED LIMESTONE)		83 = 4" (25,33,50/4)
65			50 = 5"
70	boring terminated		50 = 2"

Remarks:

BORING: B-8

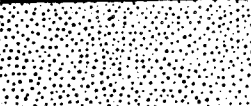
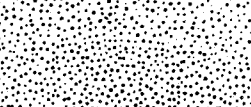
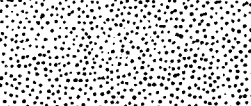
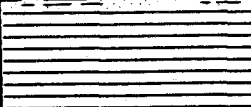
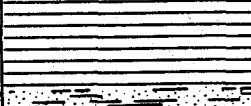
Page 2 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
	* loose light gray medium-fine SAND		8 Σ (2,3,5)
5	loose brown medium-fine SAND		6 (2,2,4)
	very loose dark brownish black very slightly clayey medium-fine SAND (organic stained)		3 (1,2,1)
10			14 (3,6,8)
	firm light grayish tan CLAYEY medium-fine SAND		18 (6,9,9)
15			3 (2,1,2)
20	soft light green CLAY		8 (2,3,5)
25	loose light greenish tan CLAYEY fine SAND		2 (1,1,1)
30	very soft light greenish gray fine very SANDY CLAY w/clayey sand lenses, tan calcareous clay lenses & rock fragments		1 - 18"
35	very soft light tannish white calcareous sandy clay w/green sandy clay lenses (WEATHERED LIMESTONE)		

Remarks: * grayish brown medium-fine SAND (topsoil)
ground surface elevation 37.2 feet
partial loss of drilling fluid at 35 feet
bore hole cased (BX) to depth of 40 feet
bore hole grouted - 1/2 hour and 1/2 bag cement

BORING: B-9

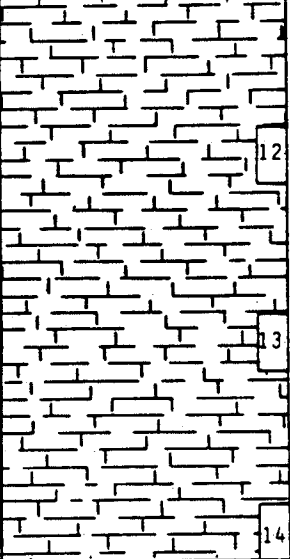
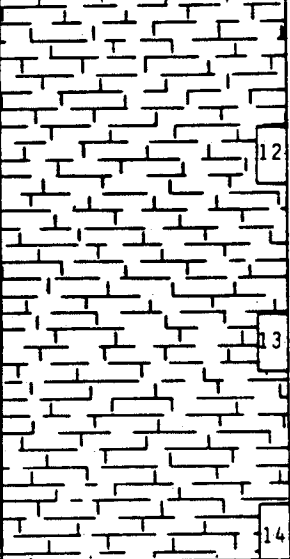
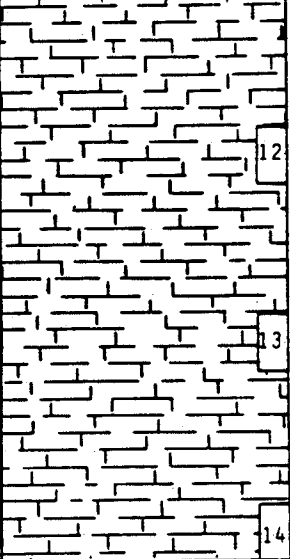
Page 1 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
40	stiff light tan & white calcareous sandy clay w/rock fragments (WEATHERED LIMESTONE)		12 (2,7,5)
45	hard light tannish white calcareous sandy clay w/rock fragments, limestone lenses & some softer zones (WEATHERED LIMESTONE)		50 = 3" (50,50/3)
50	boring terminated		50 = 3"

Remarks:

BORING: B-9

Page 2 of 2

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
	dark grayish brown medium-fine SAND (topsoil)		
	loose light grayish tan medium-fine SAND		1 ∇ 6 (2,2,4)
5	firm brown medium-fine SAND		2 17 (4,7,10)
	firm dark brownish black very slightly clayey medium-fine SAND (organic stained)		3 15 (4,8,7)
10	loose to firm gray & brown medium-fine SAND		4 6 (2,2,4)
15			5 28 (5,11,17)
20	firm gray CLAY		6 4 (3,2,2)
25	firm light grayish tan very CLAYEY fine SAND		7 11 (3,4,7)
	boring terminated		

Remarks: ground surface elevation 32.2 feet

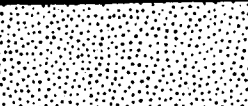
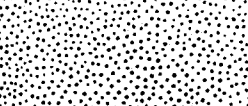
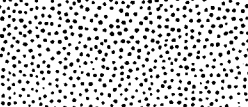
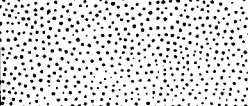
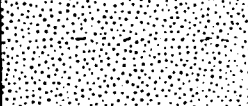
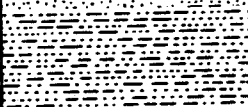
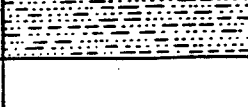
BORING: 8-10

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

Depth	Soil Description	Soil Log	Sampler Blows/Ft.
	* loose light gray & tan medium-fine SAND		1 ▽ 7 (2,3,4)
5	loose dark brown medium-fine SAND		2 8 (2,3,5)
	firm dark brownish black medium-fine SAND (organic stained)		3 13 (4,5,8)
10			4 19 (5,8,11)
	firm to dense brown & gray medium-fine SAND		5 36 (9,14,22)
15			
20	stiff gray fine very SANDY CLAY w/some tan sand lenses		6 11 (2,4,7)
	stiff light bluish gray fine SANDY CLAY w/some tan sand lenses		7 14 (3,6,8)
25	boring terminated		

Remarks: * grayish brown medium-fine SAND (topsoil)

ground surface elevation 32.8 feet

BORING: B-11

TEST LAB

SOIL TEST BORING LOG

Project: Resource Recovery Facility

Job No.: 84-1479

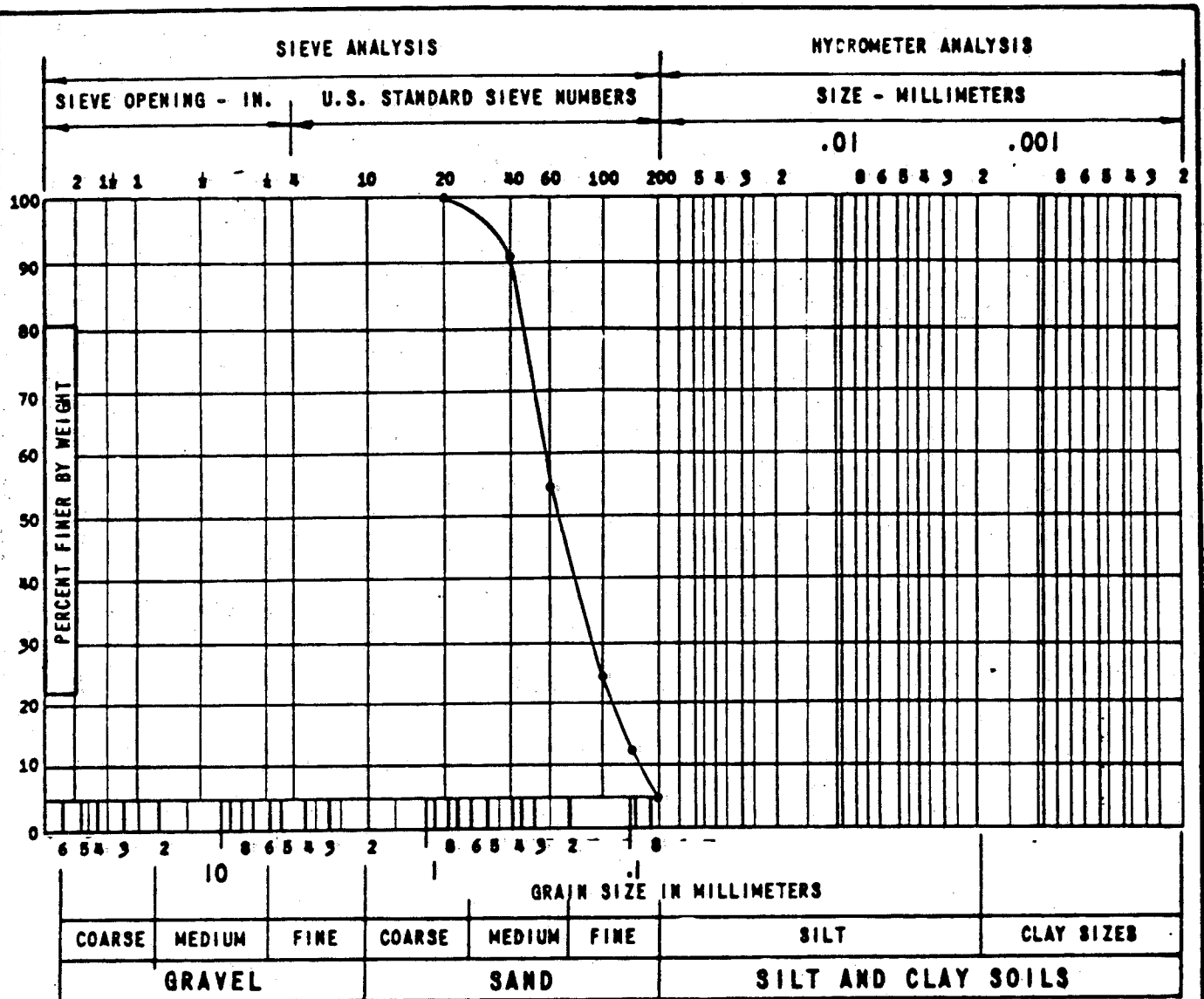
Depth	Soil Description	Soil Log	Sampler Blows/Ft.
	*		▽
		1	2 (1,1,1)
5	very loose dark brownish black slightly clayey medium-fine SAND (organic stained)	2	3 (1,1,2)
		3	9 (5,5,4)
10	loose brown slightly clayey medium-fine SAND	4	3 (1,2,1)
	very loose to loose dark brown medium-fine SAND w/some dark brownish black organic stained zones	5	5 (1,2,3)
15		6	14 (10,8,6)
	firm light gray CLAYEY fine SAND	7	
20		8	8 (3,3,5)
25	stiff light green CLAY		
	boring terminated		

Remarks: * dark brownish black slightly peaty medium-fine SAND (topsoil)

ground surface elevation 33.0 feet

BORING: B-12

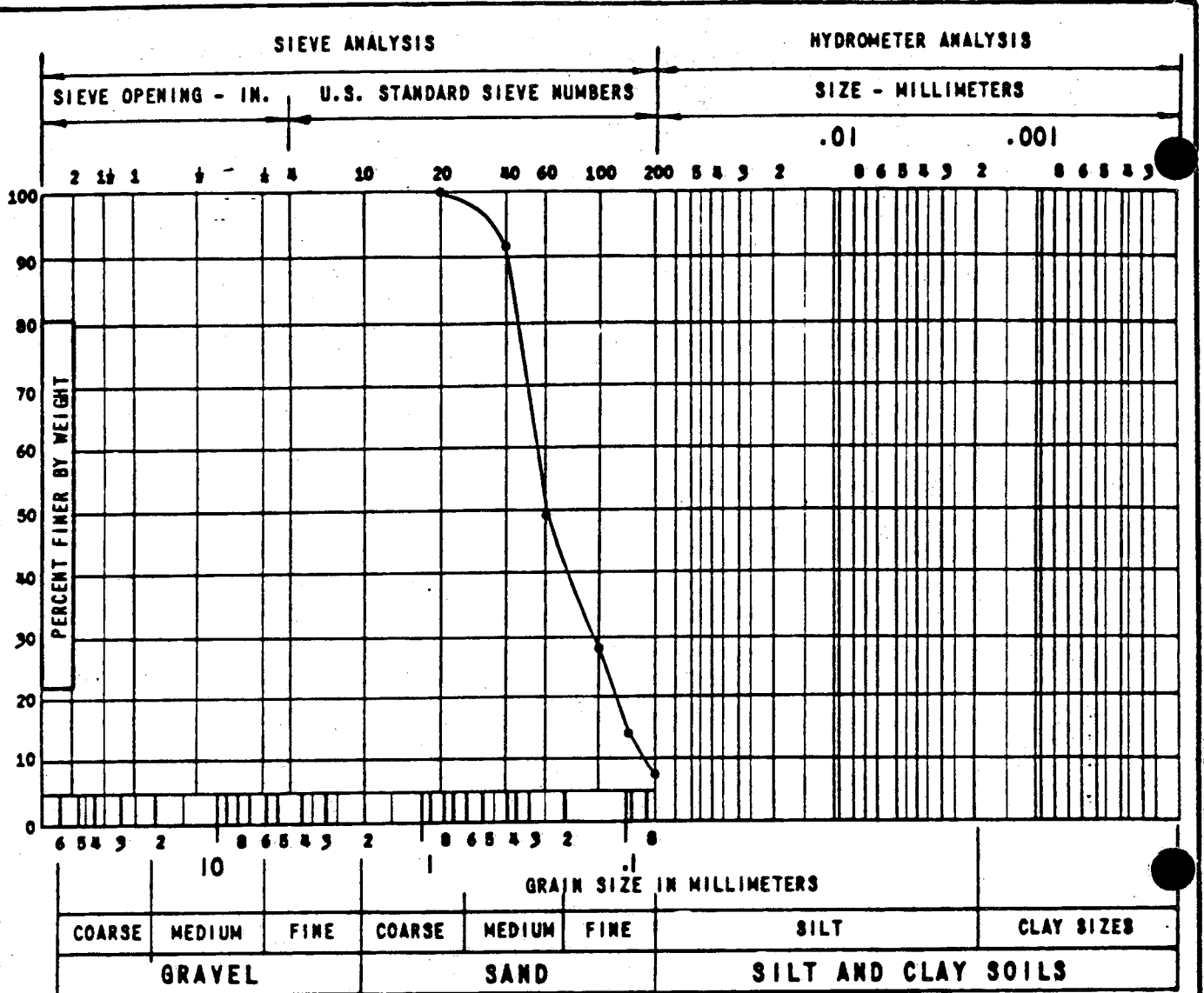
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 1	1' to 2 1/2'				light grayish tan medium-fine sand

GRAIN SIZE DISTRIBUTION

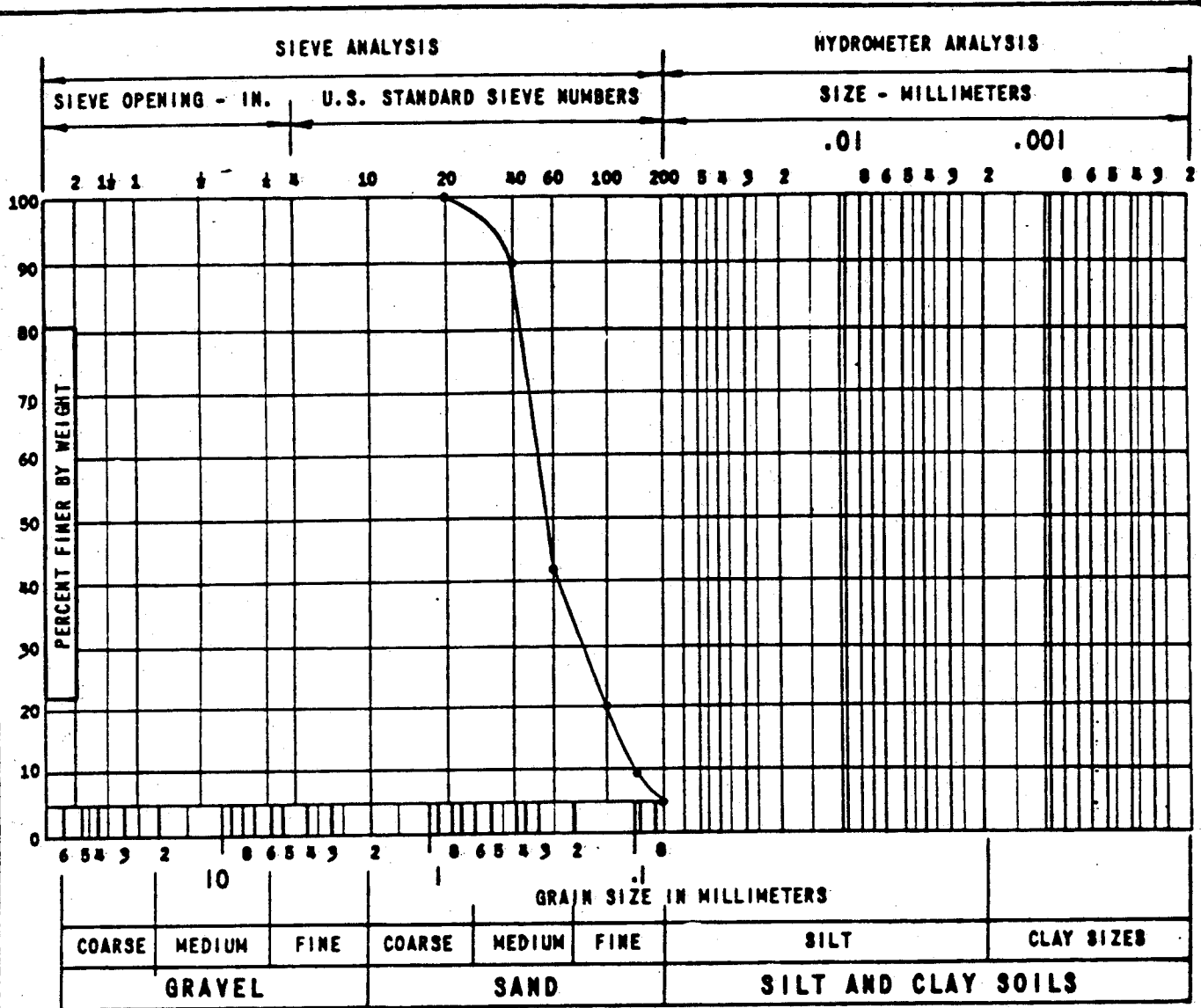
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 2	3 1/2' to 5'				loose dark brown medium-fine sand (slightly organic stained)

GRAIN SIZE DISTRIBUTION

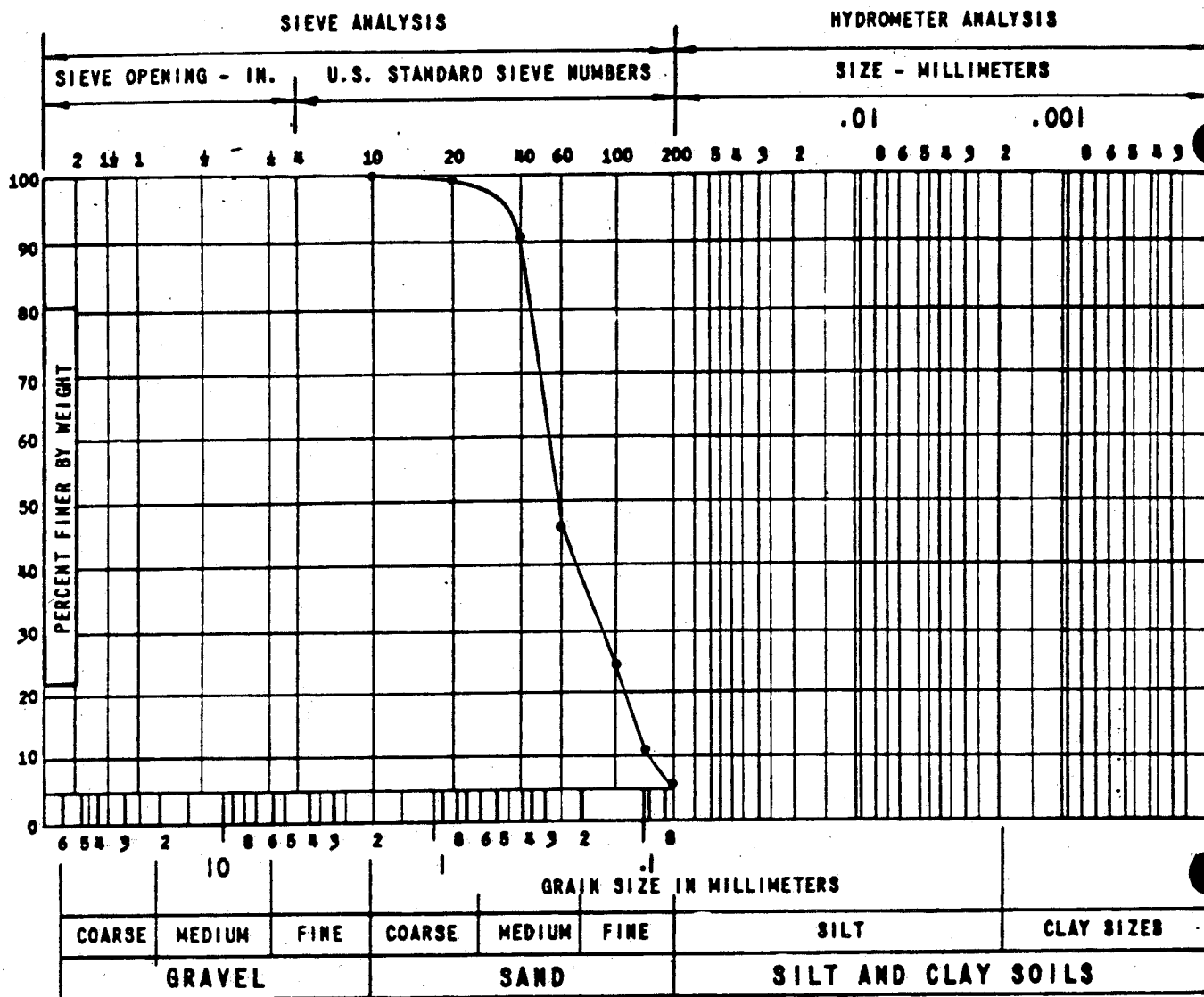
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 3	6' to 7½'				light brown medium-fine sand

GRAIN SIZE DISTRIBUTION

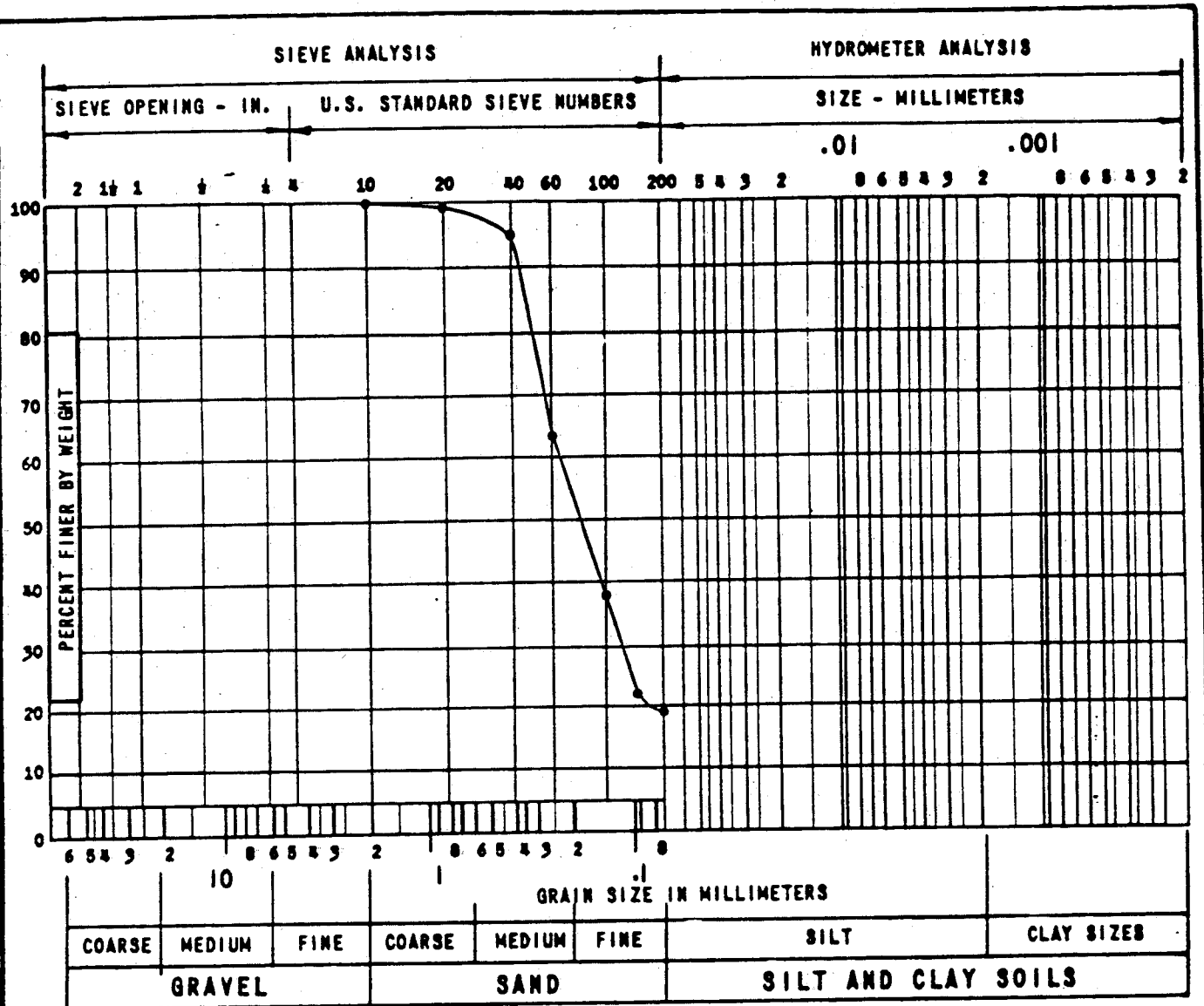
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 4	8 1/2' to 10'				dark brown medium-fine sand (slightly organic stained)

GRAIN SIZE DISTRIBUTION

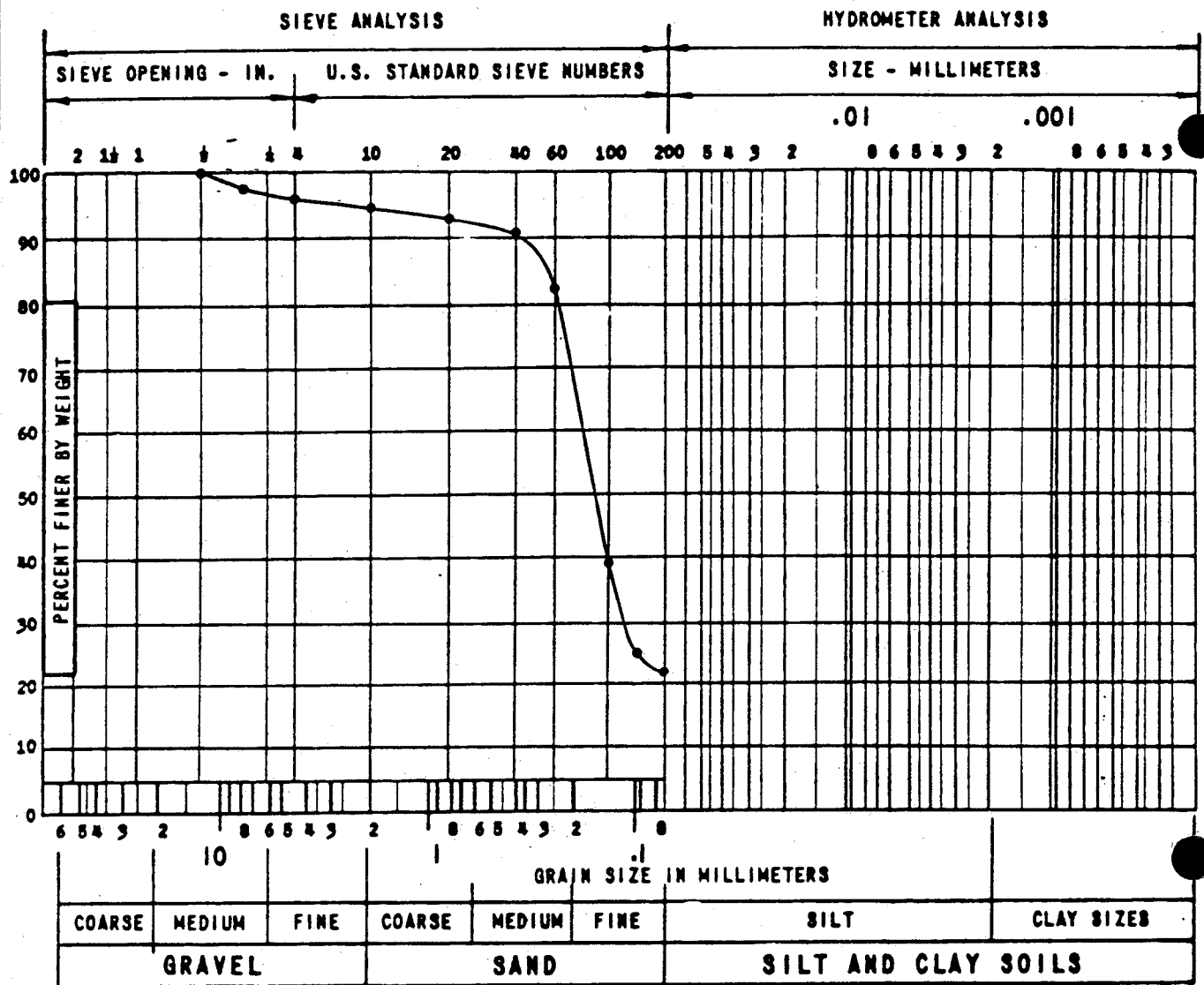
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 7	23½' to 25'		20	7	grayish brown clayey medium-fine sand

GRAIN SIZE DISTRIBUTION

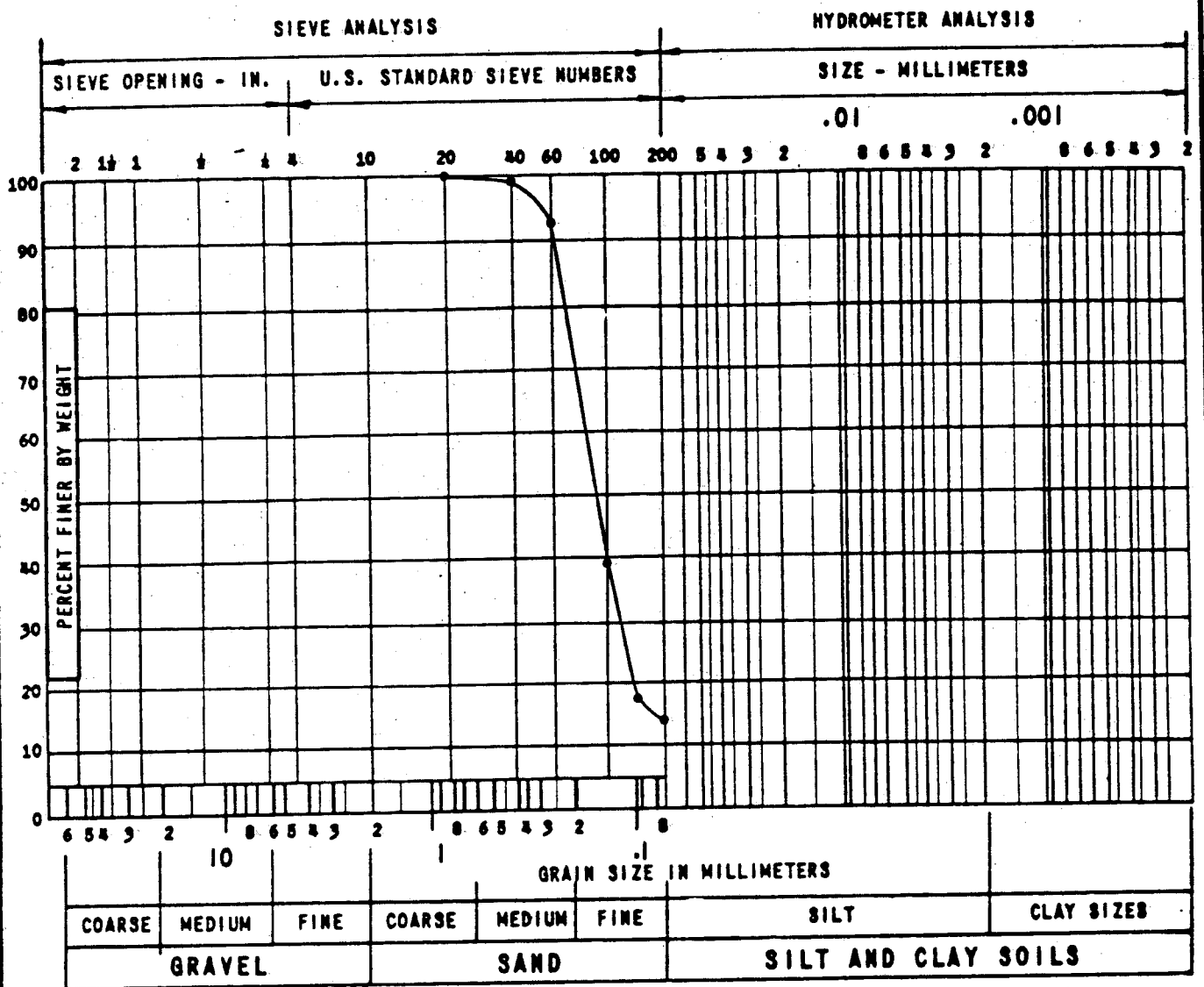
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-1 Sample No. 8	28½' to 30'		28	13	light greenish gray clayey fine sand w/cemented sand fragments

GRAIN SIZE DISTRIBUTION

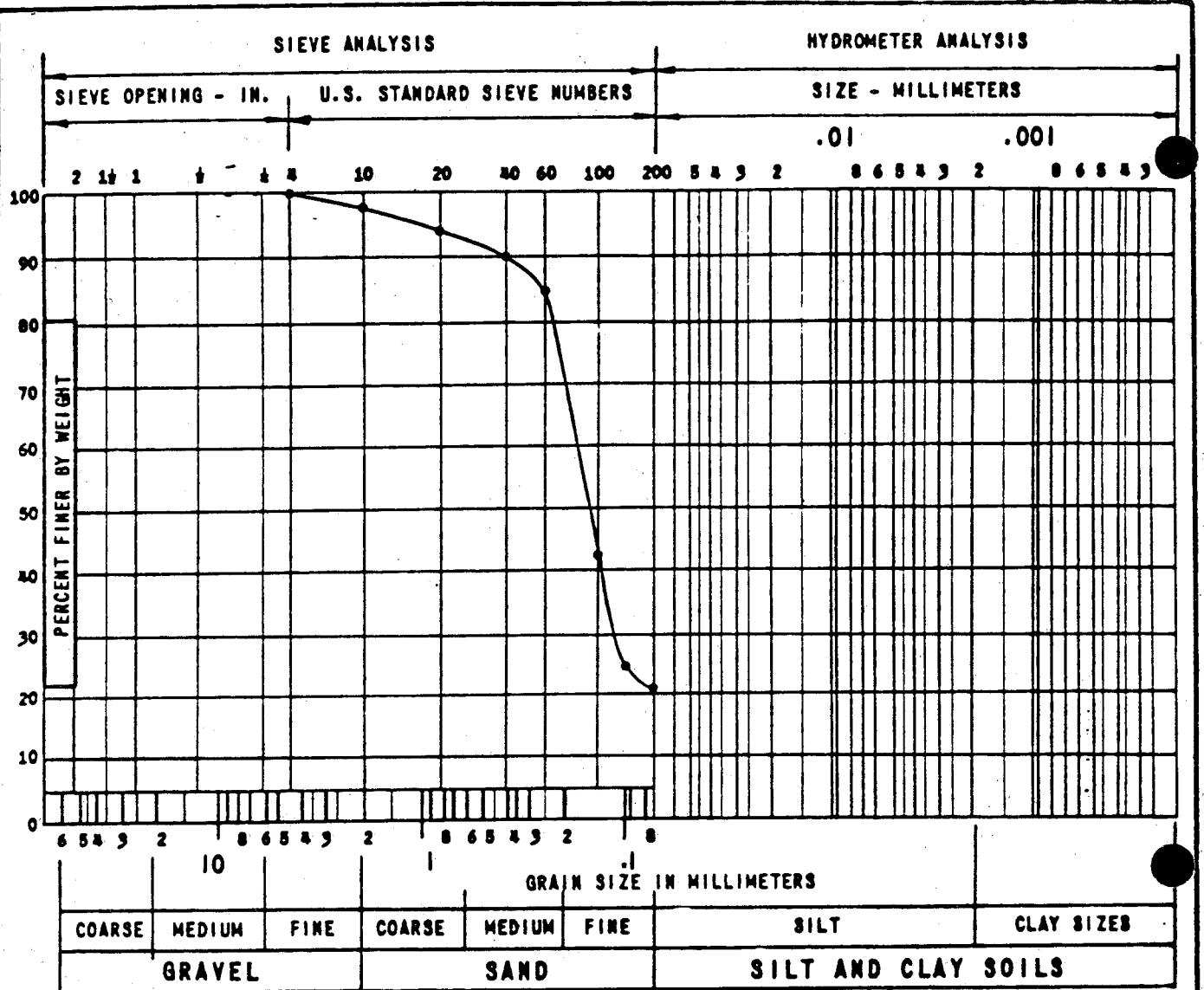
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-3 Sample No. 8	23½' to 25'		22	NP	green clayey fine sand

GRAIN SIZE DISTRIBUTION

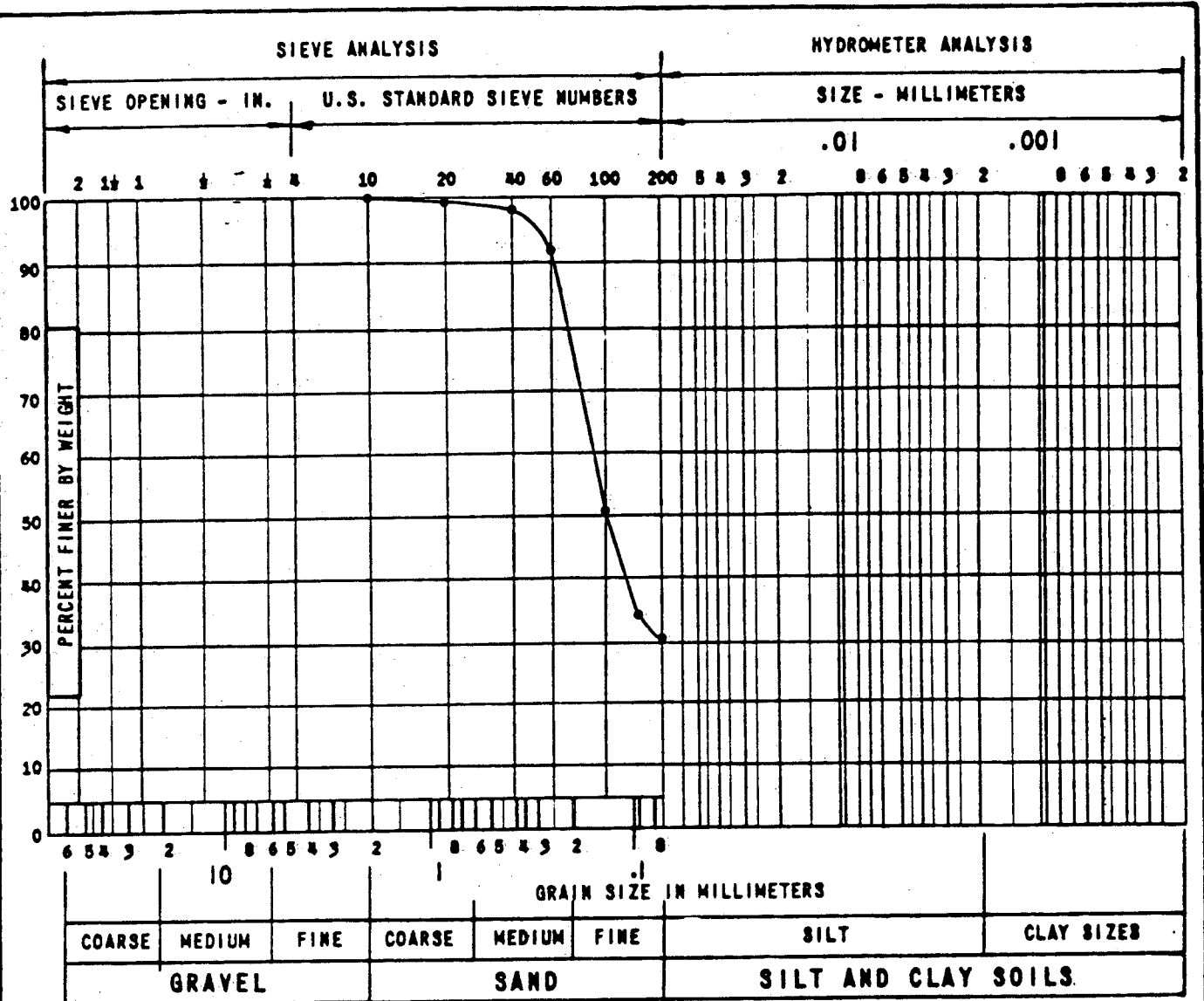
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-5 Sample No. 8	23 1/2' to 25'		35	10	light brownish gray clayey fine sand w/some cemented fragments

GRAIN SIZE DISTRIBUTION

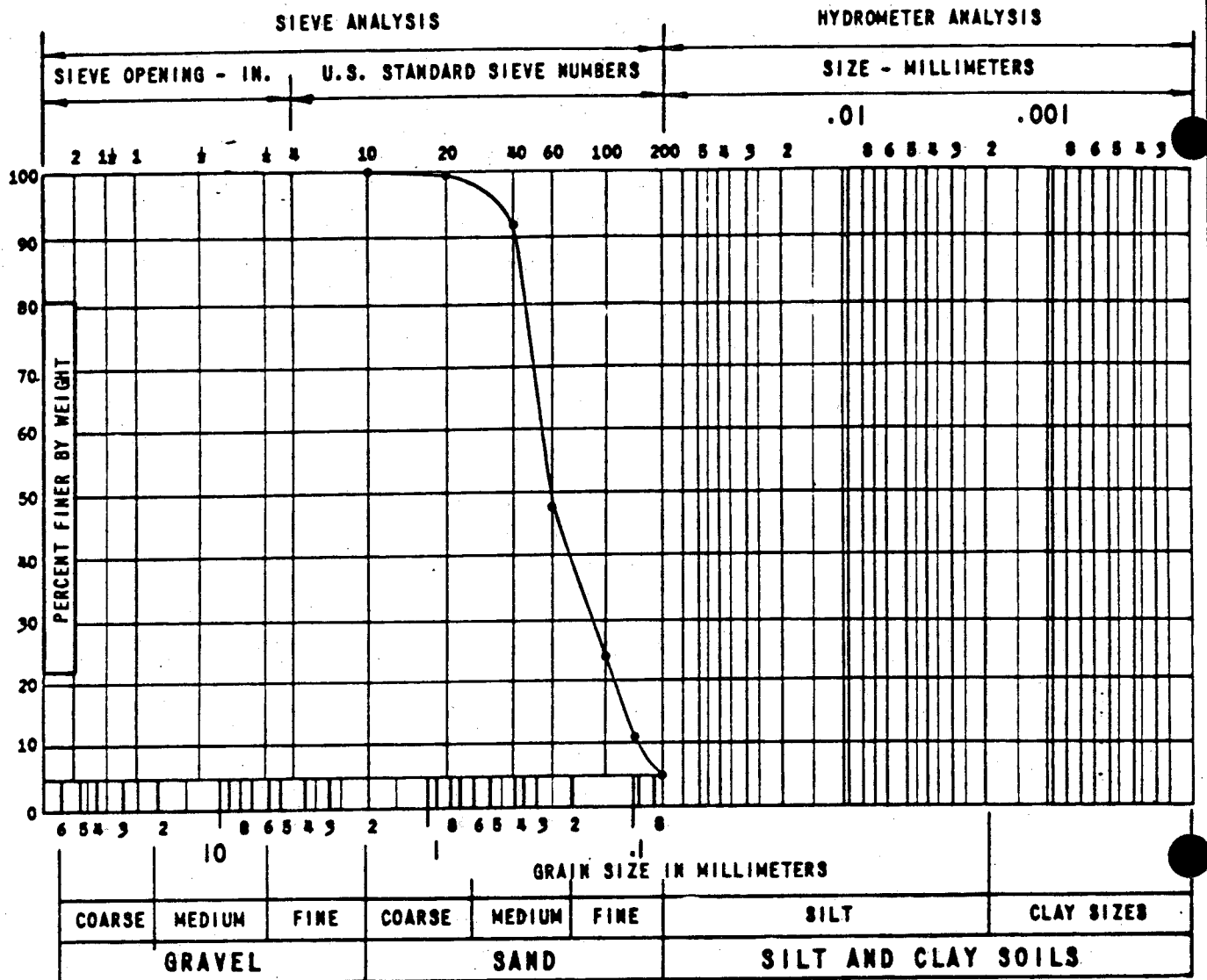
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-5 Sample No. 10	33 1/2' to 35'		61	22	yellowish tan & gray clayey fine sand

GRAIN SIZE DISTRIBUTION

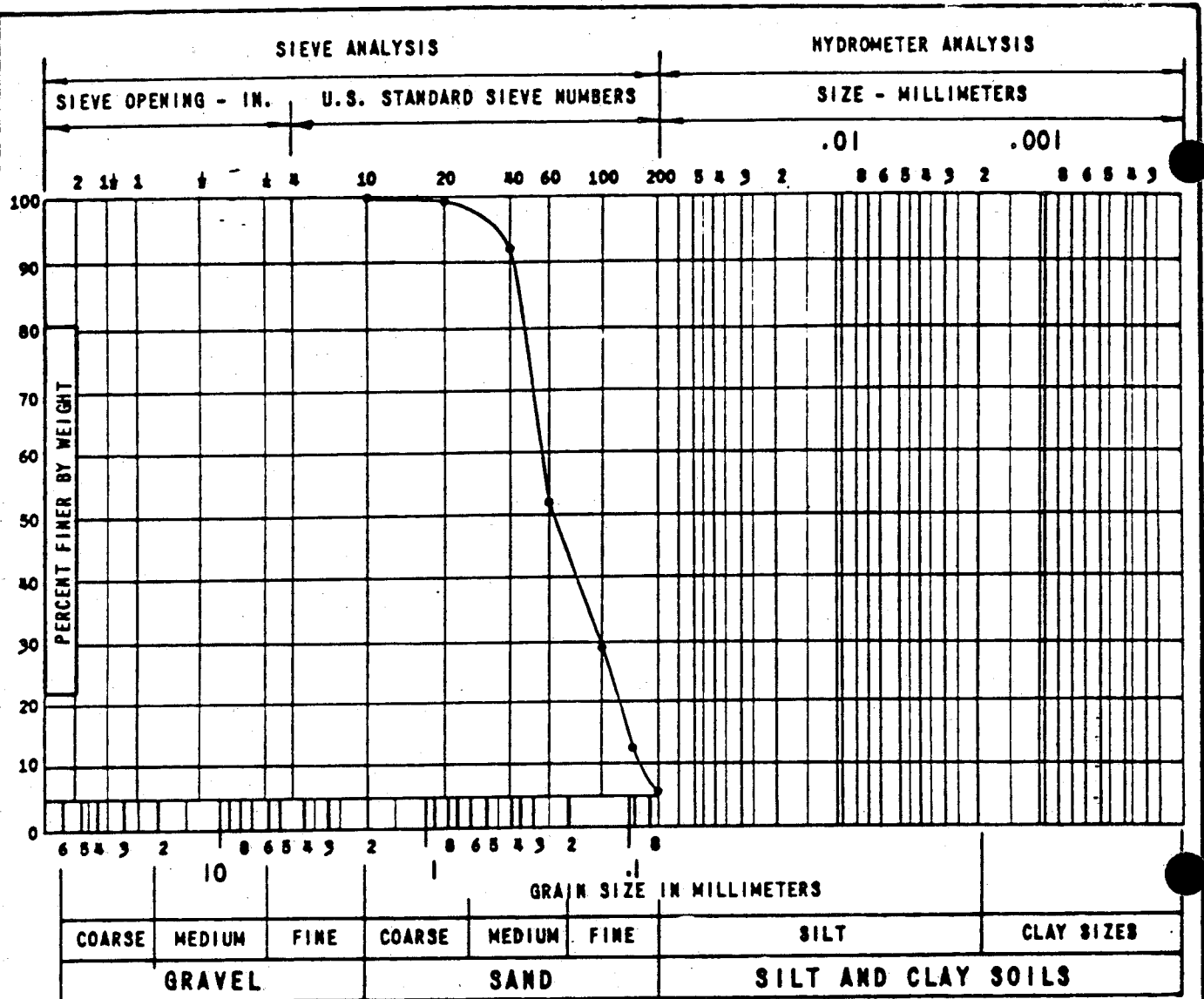
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 1	1' to 2 1/2'				light gray medium-fine sand

GRAIN SIZE DISTRIBUTION

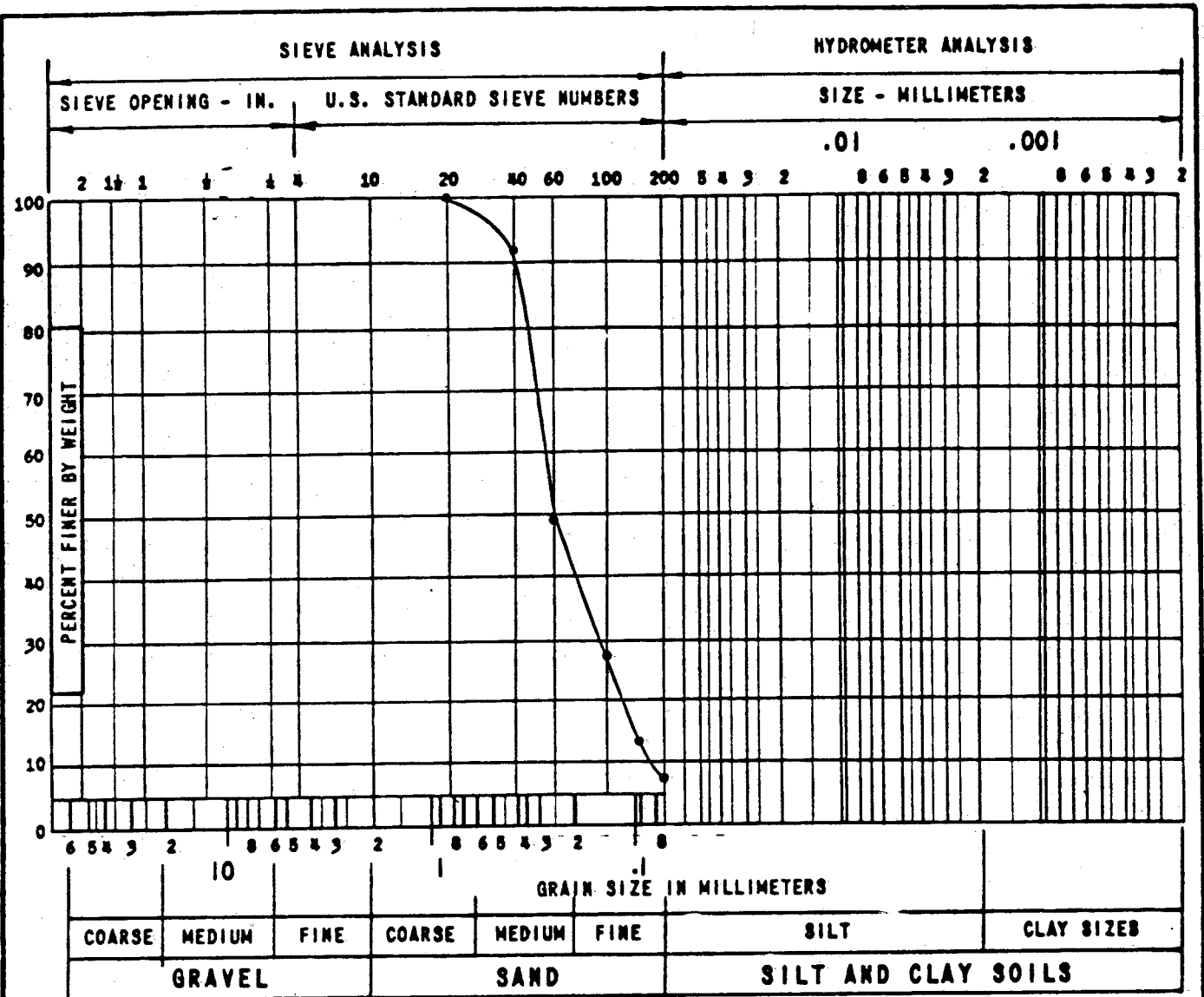
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 4	8 1/2' to 10'				brown medium-fine sand

GRAIN SIZE DISTRIBUTION

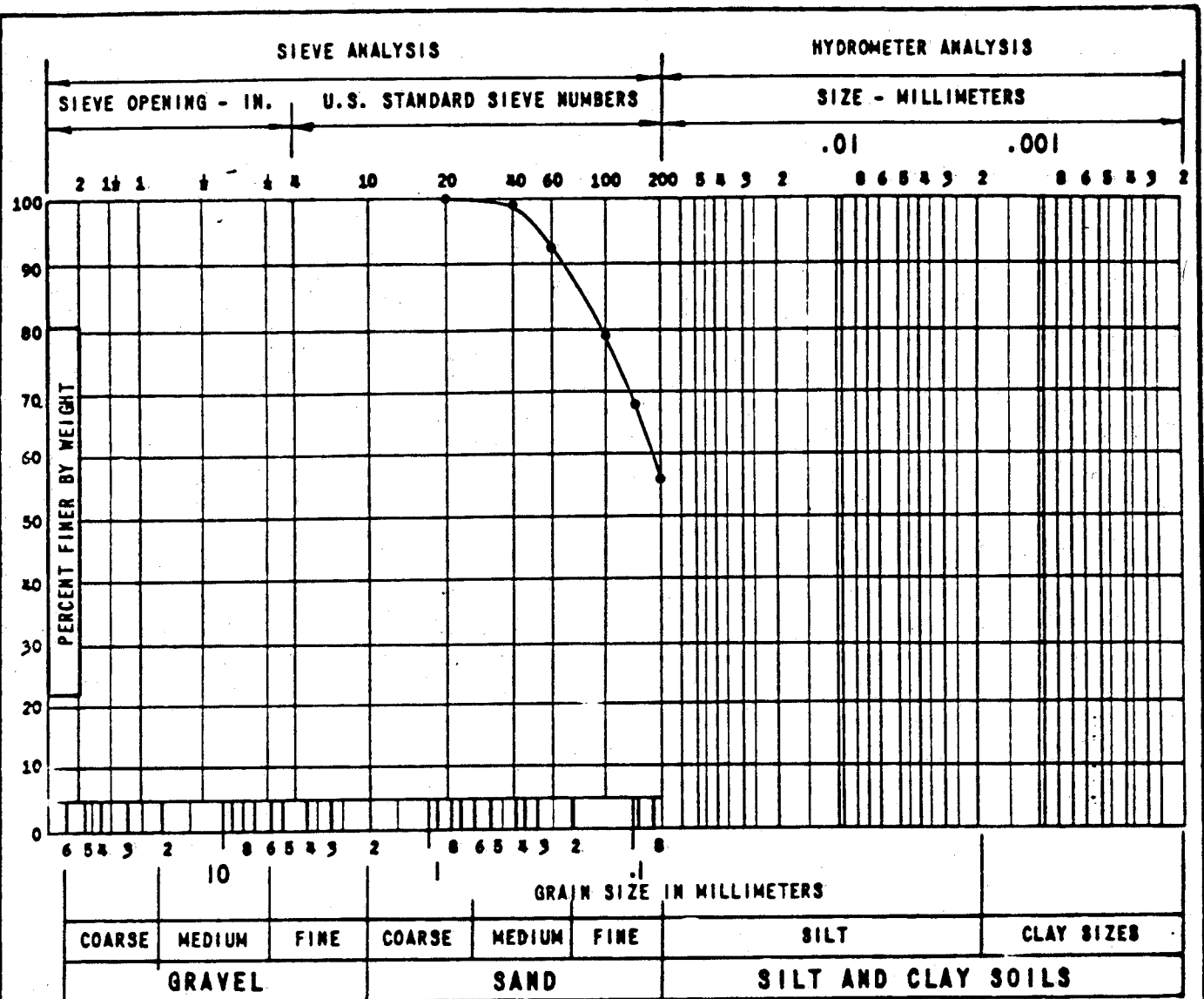
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 5	13½' to 15'				dark brownish black very slightly clayey medium-fine sand (organic stained)

GRAIN SIZE DISTRIBUTION

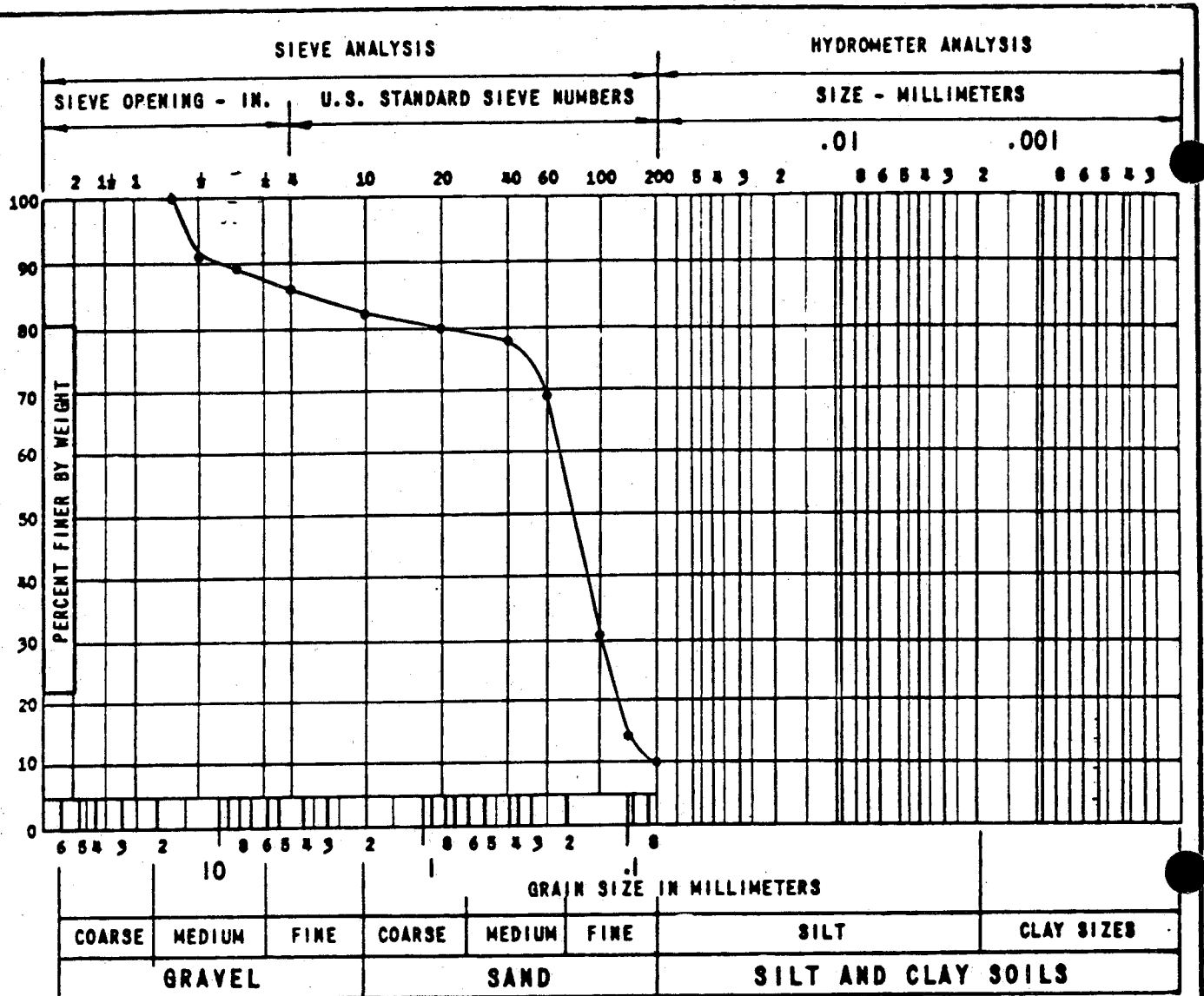
MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 8	28 1/2' to 30'		55	20	dark greenish brown fine sandy clay

GRAIN SIZE DISTRIBUTION

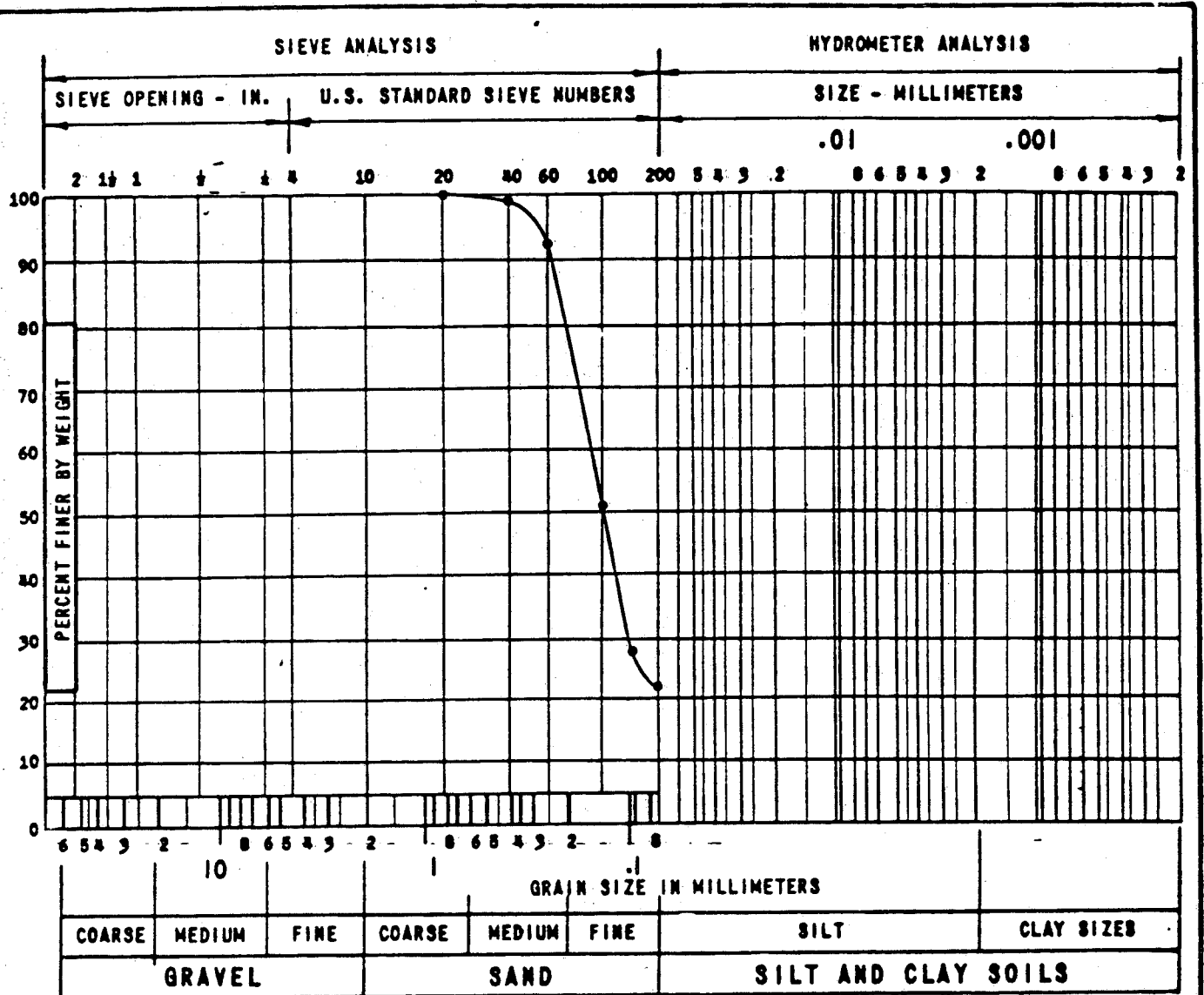
MATERIALS ENGINEERING TESTING AND INSPECTION
TEST LAB

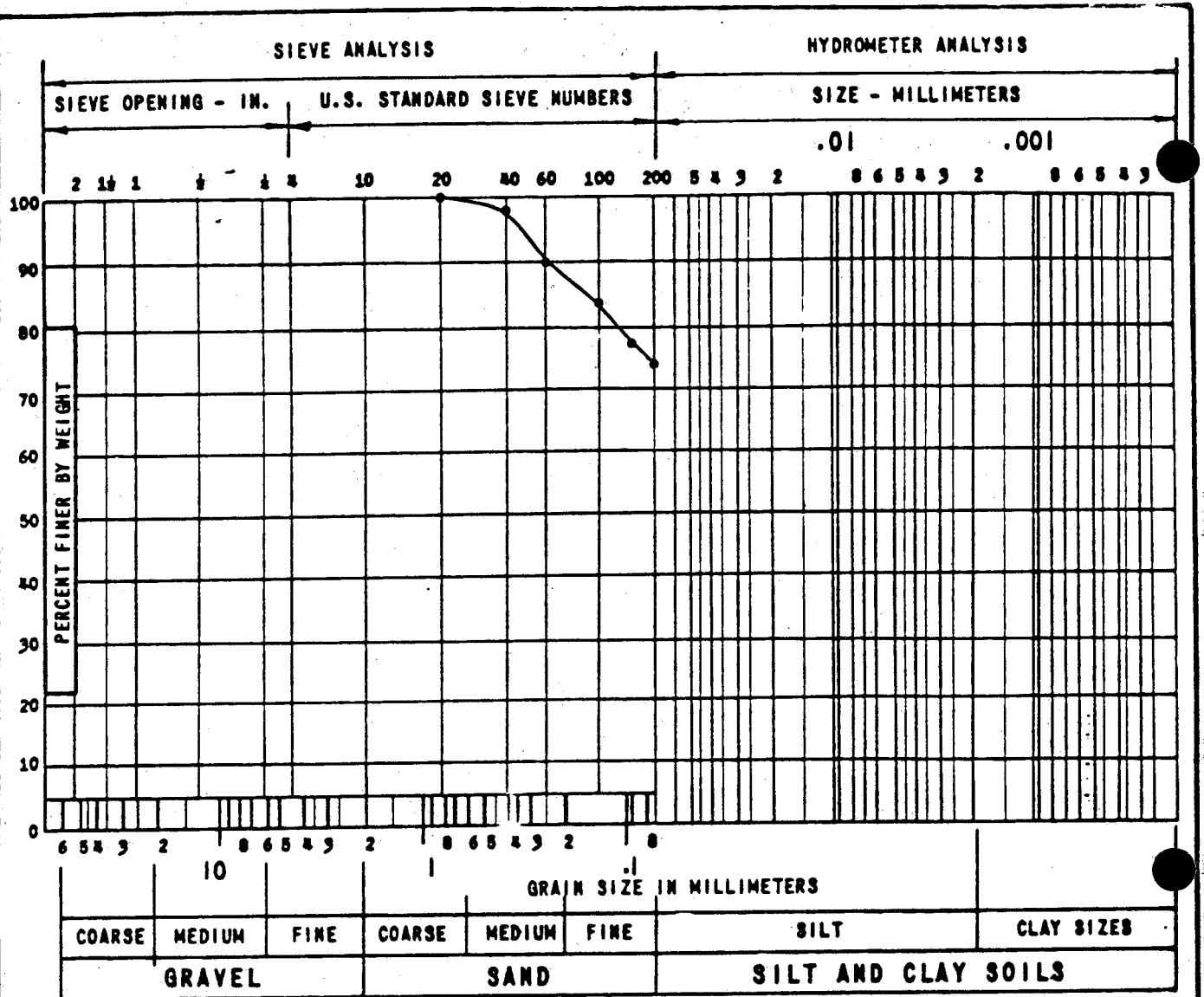


CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-7 Sample No. 9	33½' to 35'		24	NP	light brown clayey fine sand w/cemented sand & shall fragments

GRAIN SIZE DISTRIBUTION

MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB

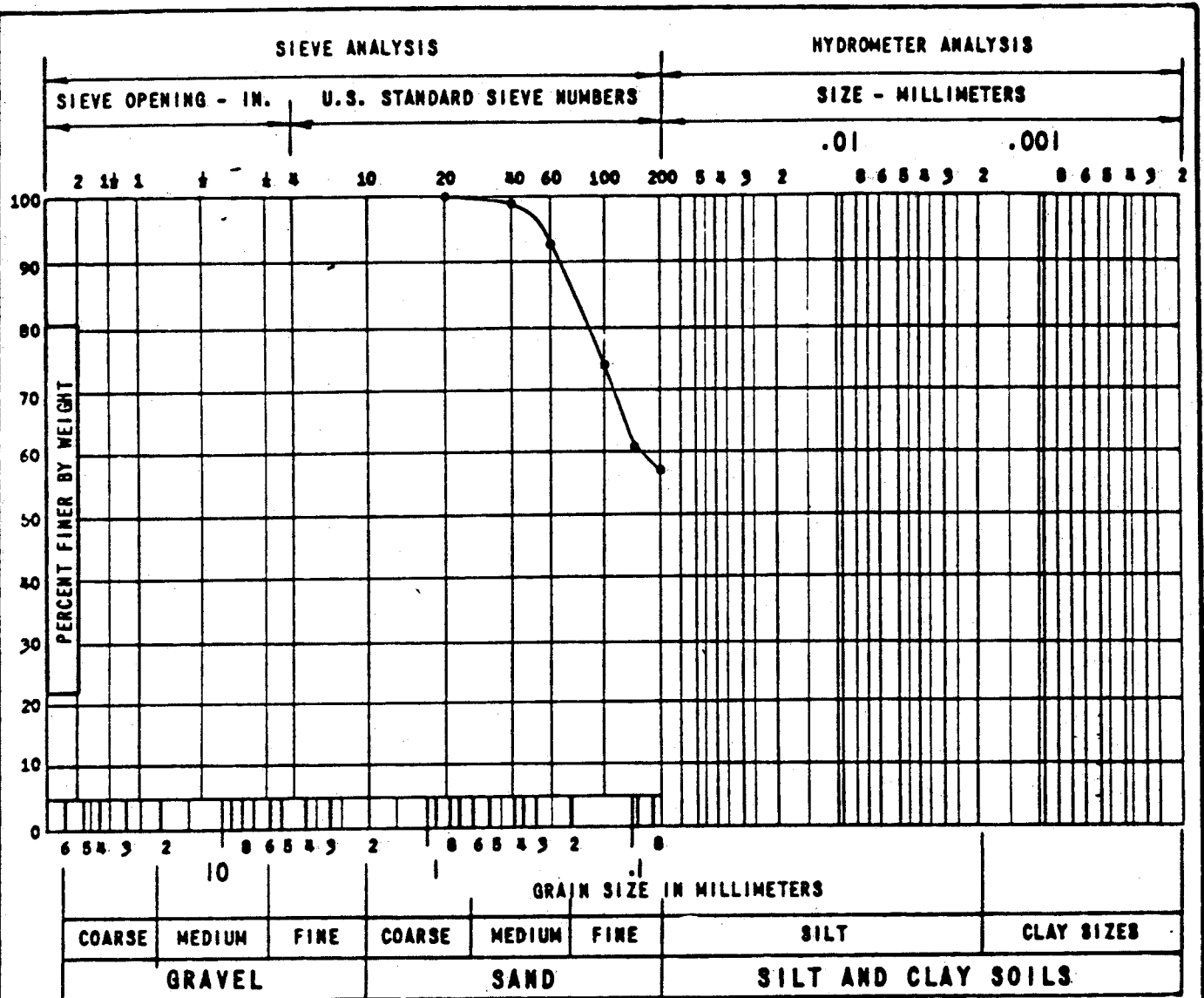




CURVE NO.	SYM.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-8 Sample No. 3	6' to 7½'		93	64	firm green clay w/brown clayey fine sand & fine sandy clay lenses

GRAIN SIZE DISTRIBUTION

MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB



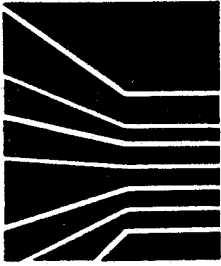
CURVE NO.	SYN.	SAMPLE NUMBER	DEPTH	ELEV.	L.L.	P.I.	DESCRIPTION
		B-8 Sample No. 6	18 1/2' to 20'		86	62	light greenish gray & tan fine sandy clay

GRAIN SIZE DISTRIBUTION

MATERIALS ENGINEERING, TESTING AND INSPECTION
TEST LAB

APPENDIX 10.10.4

WILLIAMS AND ASSOCIATES INC. REPORT



WILLIAMS & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING & MATERIALS TESTING

12290 US HIGHWAY 19 SOUTH, CLEARWATER, FLORIDA 33516

TELEPHONE: CLEARWATER (813) 536-4789 TAMPA (813) 228-7020

29 March 1983

County of Hillsborough
Department of Solid Waste
Post Office Box 1110
Tampa, FL 33601

Attention: Mr. Warren N. Smith

Subject: Report of a Preliminary Subsurface Exploration
Proposed Solid Waste Energy Recovery Facility
Faulkenburg Road Site, Hillsborough County, Florida
Our File Number D820117P

Gentlemen:

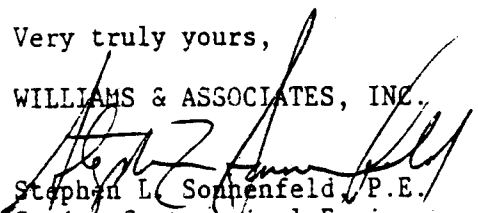
Williams & Associates, Inc., has performed a subsurface exploration for the subject project. The intent of this study was to develop preliminary or conceptual soil-related criteria for foundation design. It is our understanding that these recommendations are to be utilized in the development of preliminary cost estimates. Previous investigative work we have performed at this and other potential recovery facility sites was reported to you on 1 November 1982.

Our engineering and testing services were authorized by your acceptance of our proposal dated 24 January 1983. The scope of data collection indicated in that proposal was altered due to difficult access caused by the high groundwater levels. One change was to perform additional soil test borings rather than electric cone penetrometer soundings. Also, no data could be obtained from several test locations due to the high water. Because of the relatively uniform conditions encountered, it is not anticipated that additional borings will be performed for this preliminary study.

Williams & Associates, Inc., appreciates the opportunity to provide these engineering and testing services. If you have any questions, please contact our office.

Very truly yours,

WILLIAMS & ASSOCIATES, INC.


Stephen L. Sonnenfeld, P.E.
Senior Geotechnical Engineer
Florida Registration Number 19398

SLS/cb/460/H

SUBMITTALS: Addressee (1)
Camp, Dresser & McKee, Inc. (3)

Revised 12 December 1983

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APPENDIX:

Drawings:	No. 820117P-1	Site Location
	No. 820117P-2	Test Locations
	No. 820117P-3	Soil Profiles
	No. 820117P-4	Soil Profiles

Field Testing

Laboratory Testing

I. INVESTIGATIVE PROCEDURES

A. FIELD TESTING

1. Soil Test Borings

On a supplied site plan, we selected the locations for ten soil test borings. These borings were located in the field by our engineering technician using a 100-foot tape and estimated right angles. The approximate boring locations are shown on our Drawing 820117P-2, which we prepared from the furnished site plan.

Soil test borings provide soil samples and Standard Penetration Resistance Values from selected depth intervals. Based on previously developed empirical correlations, various engineering properties of the soils can be inferred from these data. Records of the test borings are attached.

2. Undisturbed Samples

Soft cohesive soils which could adversely affect foundation support were encountered in the test borings. To better quantify these soils' engineering properties, relatively undisturbed samples were obtained for quantitative laboratory testing. These samples were obtained in conjunction with the soil test borings and are shown on the appropriate boring record.

3. NX Coring

NX-size corings were performed in general accordance with ASTM D 2113. The borings were advanced using a double-tube core barrel. Water was pumped through the core barrel to the tip to aid in cutting and flushing the bore hole. Once the desired length of core had been cut, the barrel was returned to the surface and the sample removed.

Coring provides a continuous sample of the more competent material encountered. These samples aid in better stratification of the subsurface conditions and provide samples for laboratory testing. This type procedure is not applicable in the softer material. A record of all coring is presented on the soil test boring logs.

B. LABORATORY TESTING

1. Classification Tests

Grain-size and Atterberg limit tests were performed on selected samples to assist in soils classification and to provide a general indication of the soils' engineering properties. The grain-size tests were performed in general accordance with ASTM D 442-63.

The soils' liquid limit was determined in general accordance with ASTM 423-67. The plastic limit and plasticity index were determined in general accordance with ASTM D 424-59. The test results are shown in the Summary of Laboratory Test Data.

2. Determination of Unit Weight and Moisture Content

In-place unit weights and moisture contents are necessary in evaluating the soils' settlement potential. The test data are presented in the Summary of Laboratory Test Data.

3. Consolidation Tests

In order to determine the soils' settlement characteristics, consolidation tests were performed on selected undisturbed samples. Consolidation tests provide quantitative data for estimating the soils' settlement potential under planned loading conditions. The tests were performed in general accordance with the procedures outlined in ASTM D 2435-78. The test results are presented as plots of void ratio versus the log of the applied vertical pressure.

WILLIAMS & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERS

II. SITE AND SUBSURFACE CONDITIONS

The location of the proposed Faulkenburg Road solid waste treatment facility is shown on our Drawing 820117P-1. At the present time, the site is being utilized for pasture land. Due to heavy rains which have occurred recently, standing water has been observed over portions of the site. This very wet condition has made access to the site extremely difficult for truck-mounted equipment.

The soil test borings drilled during this study indicated overburden soils consisting primarily of fine sands to sandy clays (see Drawings 820117P-3 and 4). The clean, fine sands were typically encountered from the ground surface to depths of 5 to 13 feet. The consistency of this upper layer of sands ranged from very loose to medium dense, as indicated by Standard Penetration Resistance Values ranging from 3 to 19 blows per foot. An exception to this occurred at Boring 105, where dense conditions in the upper sands were indicated by Standard Penetration Resistance Values as high as 60 blows per foot.

Underlying the fine sands, clayey fine sands to sandy clays were encountered. Borings 108 and 109 were terminated in this cohesive stratum at a depth of 21.5 feet. The consistency of these clays varied markedly, as indicated by Standard Penetration Resistance Values ranging from 2 to 20 blows per foot. This wide range in penetration resistance values of the cohesive stratum indicates a significant variation in its settlement potential. This potential was further defined by laboratory consolidation tests.

The soils overlying the limestone formation were encountered to depths ranging from approximately 27 to 38 feet below existing ground surface. The test borings penetrated through these soils into the calcareous clays and silts of the limestone formation. Standard Penetration Resistance Values in the upper portion of the formation varied significantly from 8 to in excess of 100 blows per foot. However, the penetration resistance values within the

formation typically increased in depth, ranging from approximately 26 to in excess of 100 blows per foot. The borings were terminated in the formation at a maximum depth of 60 feet.

The relatively porous nature of the limestone formation was indicated by the loss of drilling fluid. However, no voids or near-void conditions were observed.

Relatively stabilized groundwater was observed in hand auger borings drilled adjacent to the test borings. At the time of our study, groundwater was encountered at ground surface to depths of approximately 1 foot. However, it is known the groundwater levels will fluctuate with rainfall and seasonal conditions.

III. SUPPLIED INFORMATION

At the present time, we have not been provided with specific structural information pertaining to the proposed solid waste facility. The following structural concepts are based on our experience with similar type facilities. We have assumed that the most critical components will be the refuse pit, boilers, steam generators, smoke stack, and heavy steel-frame structures.

The refuse pit will likely have an area load of approximately 3000 pounds per square foot. For traffic to access this pit, a ramp, a minimum of 20 to 30 feet in height, will likely be required. Both the fill and the proposed pit will cover large lateral areas.

Other heavier loading conditions will exist in the boiler, steam generator, and smoke stack areas. We have estimated that column loads could range from as high as 1000 to 1500 kips. At the present time, we have not considered the affects of equipment vibrations on the proposed foundations.

Typically a development of this nature will have a series of relatively small on-site improvements. These improvements could consist of office space, cooling towers and electrical substations, for example. For our preliminary purposes, we have defined lightly loaded structures as those which would have column loads less than 200 kips.

IV. EVALUATIONS

The following evaluations and recommendations are based on the subsurface data collected at this site and the preliminary structural conditions discussed herein. While in our opinion sufficient data have been obtained to evaluate the site in a preliminary fashion, additional subsurface data will be necessary in order to develop final recommendations. Also, it is cautioned that these evaluations are based on assumed structural conditions which could vary markedly. If there are significant variations from these structural conditions, we should be informed so as to review these evaluations for possible changes to our recommendations.

The subsurface data collected at this site indicate two limiting conditions for using conventional shallow foundations under the planned heavy loads. These are the very loose surficial sands and the potential for consolidation-type settlement in the underlying clayey stratum. The upper sands could be improved so as to significantly reduce the potential for post-construction settlement. However, the potential for consolidation-type settlement in the underlying clays would be somewhat more difficult to reduce. One procedure would be to surcharge the area. However, from a preliminary or conceptual point of view, this approach does not appear to be favored due to the required fill and possible construction delays.

For the relatively light loads, column loads less than 200 kips, post-construction settlement due to consolidation will likely be less than 1 inch. Therefore, shallow foundation support for lightly loaded components is quite feasible. It is cautioned that care would have to be taken between shallow-supported and pile-supported elements so as to reduce the potential for detrimental affects of differential types of settlement.

The proposed structures could be supported on a driven pile foundation. Additional information pertaining to the compressive strength of the limestone formation was obtained from both soil test borings and NX core samples. Based on this additional data, it is our opinion that pile compressive capa-

cities at this site should be limited to 60 tons. We estimate typical pile tip depths will range from 30 to 40 feet below existing ground surface for the 12-x 12-inch precast, prestressed concrete pile; or a pipe pile with a minimum diameter of 10 inches, driven to the 60-ton compressive capacity. However, based on a literal interpretation of the boring data, pile tip depths as great as 55 feet could occur at this site. Therefore, cutting and splicing of piles will likely be required. If the concrete section were selected rather than the steel section, then some means of splicing should be agreed upon prior to beginning production pile installation.

Another deep foundation support system would be to utilize a drilled shaft. Due to the relatively high groundwater levels, the drilled shaft would likely be installed using the "wet-hole" technique. Therefore, we recommend for preliminary planning that you consider drilled shafts developing their load-carrying capacity solely by side friction in the limestone formation. The top of the limestone formation was encountered at the test locations varying from approximately 27 to 40 feet below existing ground surface. Based on the additional data obtained during this study, we still recommend a design allowable friction capacity of 6 kips per square foot.

The relatively high groundwater level was observed throughout the entire site. Lowering of the groundwater level will likely be required during foundation construction. Also, depending on final site grading, high groundwater levels could be a factor in the design of pavement sections. We strongly recommend that for proposed paved areas, which will exist near or below existing ground surface, you consider a base course which is resistant to early deterioration due to water intrusion. Such base courses as soil-cement and cement-treated limerock would appear to be appropriate.

Aerial photographs of this site indicate numerous circular depressions in this general area. One of the test borings drilled during our previous study was located in a depression. The porous nature of the formation was indicated by the loss of drilling fluid in some of the test borings. However, this is not considered to be a unique condition. No evidence of advanced solution activity

such as voids and near-void conditions, was observed within either the overburden or limestone formation. Therefore, it is our opinion that this site does not appear to have a higher potential for solution and sink development than that which exists in this general locale.

V. PRELIMINARY RECOMMENDATIONS

We recommend that for your conceptual planning you consider supporting the heavily loaded components by means of a deep foundation system. Preliminary criteria for alternate deep foundation systems are discussed below. For the more lightly loaded components, less than 200-kip column loads, shallow foundation support would seem to be feasible. Preliminary recommendations for these footings are also recommended. However, it is again cautioned that care should be taken to reduce the potential of detrimental affects between the shallow and deep supported elements.

A. Heavily-Loaded Components

1. Driven Piles

Individual pile compressive capacities of up to 60 tons are available for preliminary design. The recommended minimum pile sections are a 12- x 12-inch precast, prestressed concrete pile and a closed-end, concrete-filled pipe pile with a minimum diameter of 10 inches. These piles should be installed with a driving hammer which has a rated energy of at least 19,500 foot-pounds. Estimates of pile lengths are presented in the Evaluation section. It is cautioned that the boring data does not fully bracket the variations in tip depths that production piles might encounter. Also, some cutting and splicing of these piles are likely. Therefore, if the concrete section is selected, appropriate splicing techniques should be agreed upon prior to beginning pile installation. After the final subsurface exploration is performed, criteria for test pile driving and load testing should be developed.

2. Drilled Shafts

We recommend that you consider drilled shafts for support of the heavier-loaded components. The drilled shafts should develop their load-carrying capacity solely by side friction in the underlying limestone formation. Side friction values up to 8 kips per square foot can be used for design.

Estimates of the top of the limestone formation were presented in the Evaluations section. Again, additional field and laboratory test data should be obtained prior to developing specific criteria for testing and observation of production drilled shafts.

B. Lightly-Loaded Components

1. Design Criteria

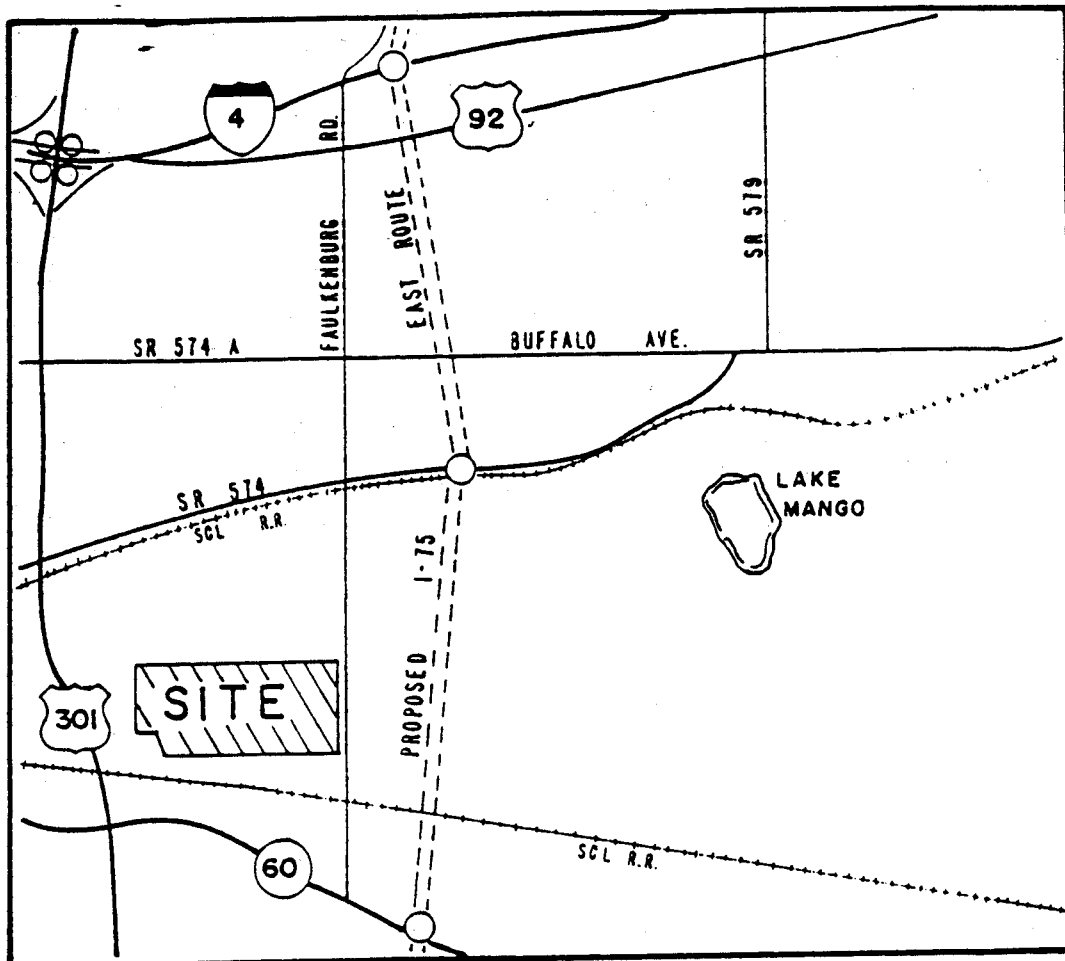
Soil bearing pressures of up to 3000 pounds per square foot (total load) are available for design of the more lightly-loaded components. Minimum footing widths of not less than 18 inches for continuous footings and 24 inches for isolated column footings should be specified even though maximum allowable bearing pressures may not be developed. The minimum dimensions are considered necessary to provide confinement which cohesionless bearing soils require to develop adequate shear strength. All footings should bear a minimum of 18 inches below final adjacent grade.

Specific criteria for installation of these footings should be based on data obtained during a final subsurface exploration and specific structural information. Also, lowering of the groundwater levels during footing construction will likely be required. A system of perimeter ditches may be effective. Pumping directly from footing excavations should be strictly prohibited.

2. Roadways and Parking Areas

The development of specific design criteria for a wearing surface, base, or sub-base is considered beyond the scope of this preliminary study. Due to the relatively high groundwater levels, the need for underdrains, and/or cement-treated base courses may be necessary. The determination of whether to use one or both of these should be based on actual site grading and the anticipated high groundwater conditions.

* * *



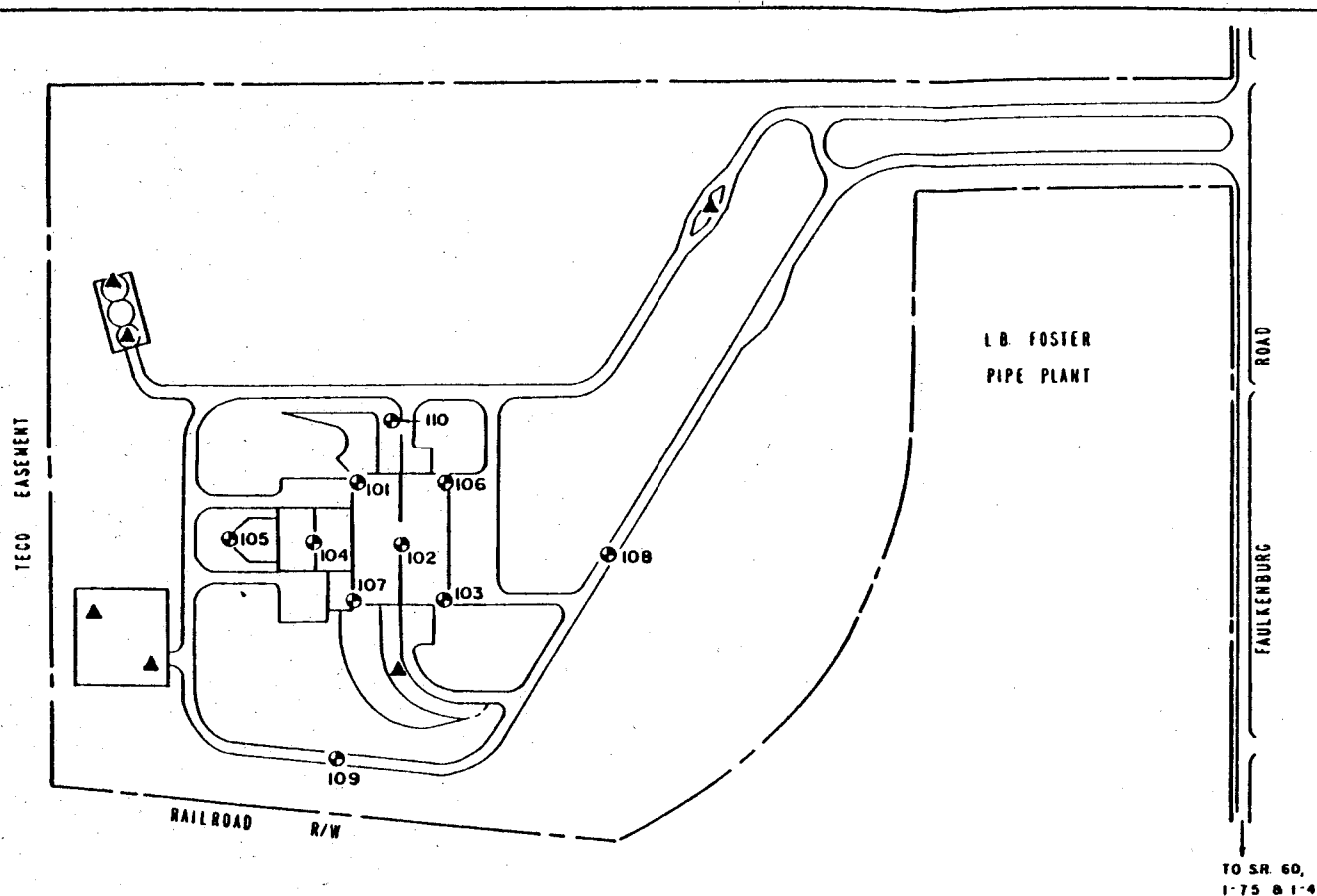
HILLSBOROUGH COUNTY, FLA.

NORTH

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SCALE

WILLIAMS & ASSOCIATES INC. GEOTECHNICAL ENGINEERING & MATERIALS TESTING 12260 US HIGHWAY 19 SOUTH, CLEARWATER, FLORIDA 33546 TELEPHONE: CLEARWATER (813) 825-8802 TAMPA (813) 825-7080		
TITLE SITE LOCATION SOLID WASTE ENERGY RECOVERY PROJECT		
SCALE AS NOTED	DR. BY DEG	DRAWING NO. 0820117P-1
DATE 3-29-83	CK'D. BY SLS	

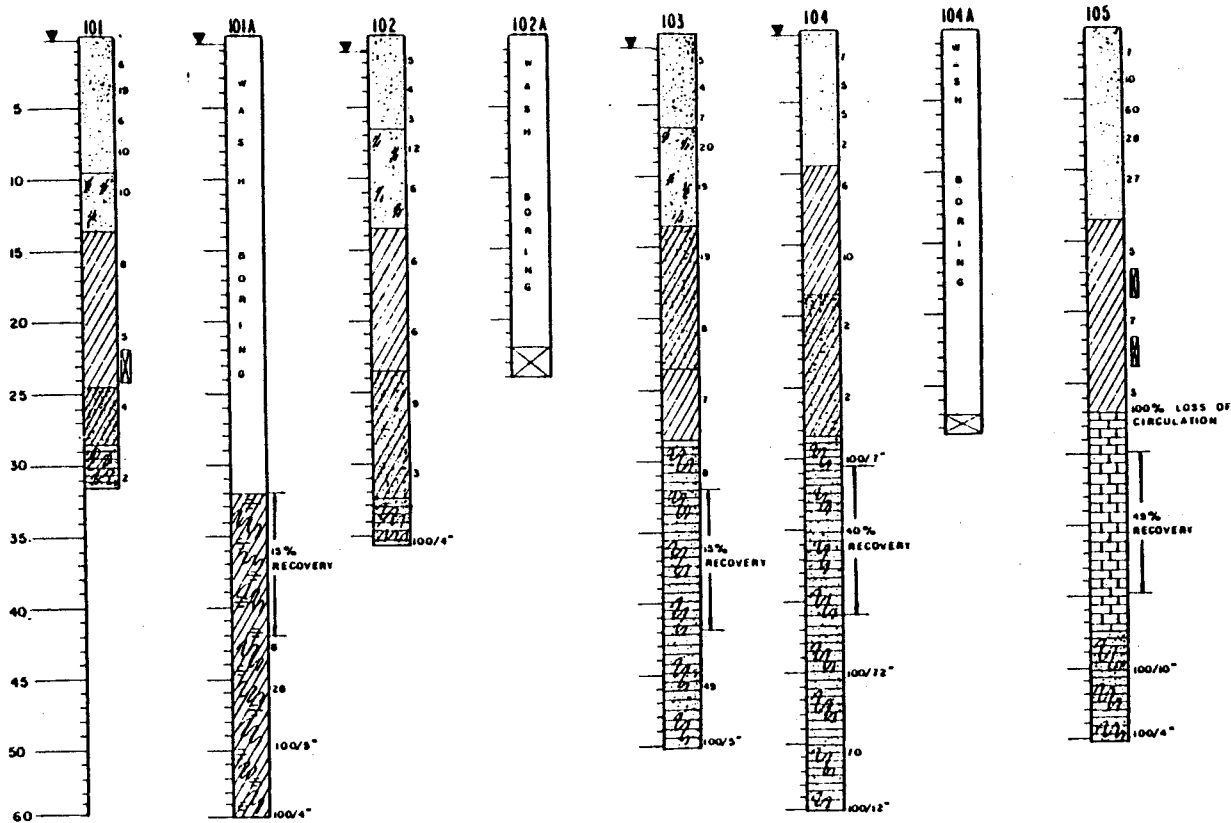
101



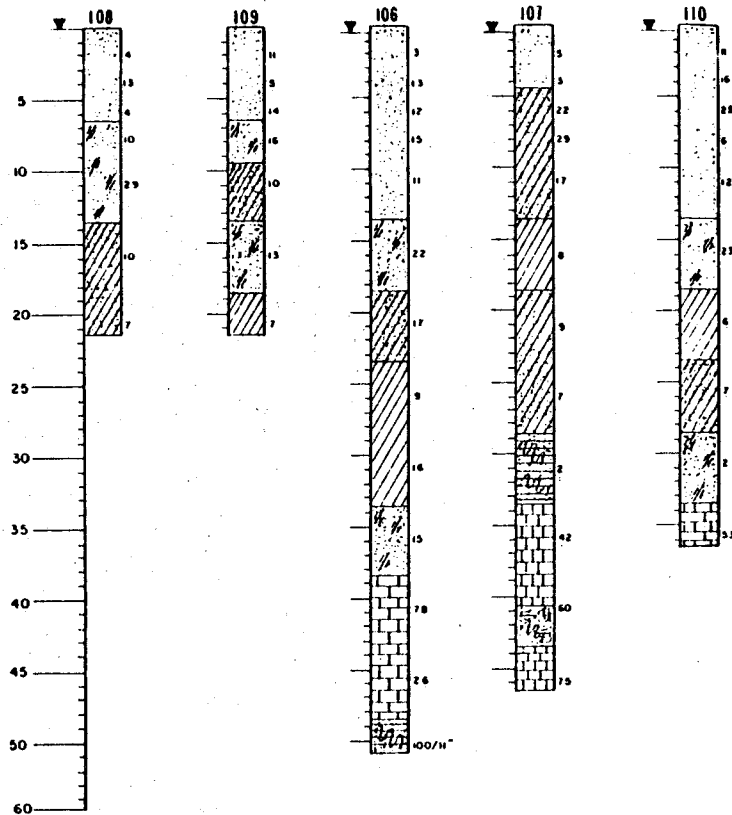
HILLSBOROUGH COUNTY, FLA.

WILLIAMS & ASSOCIATES INC. GEOTECHNICAL ENGINEERING & MATERIALS TESTING 18900 US HIGHWAY 18 SOUTH, CLEARWATER, FLORIDA 33048 TELEPHONE: CLEARWATER (813) 630-8802 TAMPA (813) 298-7080		
TITLE TEST LOCATIONS SOLID WASTE ENERGY RECOVERY PROJECT		
SCALE AS NOTED	DRN. BY DEC	DRAWING NO.
DATE 3-28-83	CK'D. BY SLS	062011/P-2

Revised 12 December 1983



WILLIAMS & ASSOCIATES INC. GEOTECHNICAL ENGINEERING & MATERIALS TESTING 10800 US HIGHWAY 19 SOUTH, CLEARWATER, FLORIDA 34645 TEL: 813/461-1111 FAX: 813/461-1112		
TITLE SOIL PROFILES SOLID WASTE ENERGY RECOVERY PROJECT		
SCALE AS NOTED	DR. BY DIC	DRAWING NO.
DATE 3-29-83	CHKD. BY SLS	DB2011P-3



LEGEND



SAND



CLAYEY SAND



SILTY SAND



CLAY



SANDY CLAY



SILTY CLAY



SANDY SILT



CLAYEY SANDY SILT



LIMESTONE



CALCAREOUS CEMENTED SOILS (LIMESTONE FORMATION)



UNDISTURBED SAMPLE

WATER TABLE

 NUMBERS TO THE RIGHT OF
COLUMNS REFER TO BLOWCOUNTS

WILLIAMS & ASSOCIATES INC. GEOTECHNICAL ENGINEERING & MATERIALS TESTING 10800 US HIGHWAY 18 SOUTH, CLEARWATER, FLORIDA 33846 TELEPHONE: CLEARWATER (813) 895-0500 TAMPA (813) 895-7000		
TITLE SOIL PROFILES SOLID WASTE ENERGY RECOVERY PROJECT		
SCALE AS NOTED	DWL BY DEC	DRAWING NO.
DATE 3-29-83	CK'D. BY SLS	0820117P-4

TEST BORINGS

A) Soil Test Borings

Drilling and Standard Penetration Testing were performed in accordance with ASTM D1586-67, and as modified by the job specifications. These test borings were advanced to the desired testing depths by a rotary drilling process. This process utilizes a viscous drilling fluid to flush cuttings and stabilize the bore hole. To drill these nominal 4-inch diameter holes, an upward baffled side discharge drill bit was utilized. The drill bit was then withdrawn and a penetration test performed with a standard 1.4-inch I.D., 2-inch O.D., split-barrel sampler.

In penetration testing, the sample was driven with a 140-pound hammer falling 30 inches until either:

- 1) 18 inches of penetration was achieved, or
- 2) 50 blows were applied with less than 6 inches of penetration.

The number of hammer blows required to drive this hammer each 6 inches was recorded. The first 6-inch increment was considered to be the seating drive. The number of blows required to drive the sampler the final foot is designated "penetration resistance". Where the sampler was advanced less than 12 inches for 50 blows, the number of hammer blows applied and the penetrations achieved were recorded. The actual energy being transmitted from the hammer to the sampler was calibrated by Dr. John H. Schmertmann. A copy of his report is included.

Soil test borings provide soil samples and standard penetration resistance from selected depth intervals. Based on previously developed empirical correlations, various engineering properties of the soils can be inferred from these data. A record of the test borings is attached.

EXPLORATION LOGS

BORING LOG

NO. 101

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P
Client Hillsborough County Engineering Dept.
Boring Date 2/28/83 Casing 20.0' Drill # 250
Location See Drawing 820117P-2
Ground Water 0.0 Date 2/28 Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
1	LOOSE TO MEDIUM DENSE gray fine SAND	●					2/2/4
2			●				4/6/13
3	LOOSE dark brown fine SAND with minor finely divided organic matter	●					2/3/3
4			●				3/4/6
5	LOOSE brown very clayey fine SAND	●					3/5/5
6							
7	FIRM green plastic CLAY with minor indurated zones	●					3/3/5
8							
9	Shelby Tube sample: light gray sandy CLAY with random horizontal seams of clay	●					4/3/2
10							
11	SOFT green sandy CLAY	●					2/2/2
12							
13	VERY SOFT tan calcareous slightly sandy clayey SILT (Limestone formation)	●					1/1/1
14	Bottom of Boring						
15	Grouted borehole						

BORING LOG

No. 101A

Sheet 1 of 2

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P
Client Hillsborough County Engineering Dept.
Boring Date 3/2/83 Casing none Drill # 250
Location See Drawing 820117P-2
Ground Water 0.5' Date 3/2 Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
1							
2							
3							
4							
5							
6							
7							
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100							

Wash Boring from 0.0' to 32.0'

NX Core: gray calcareous partially-indurated
sandy very silty CLAY (Limestone formation)
Interval Recovery % Recovery
32.0'-42.0' 1.5' 15

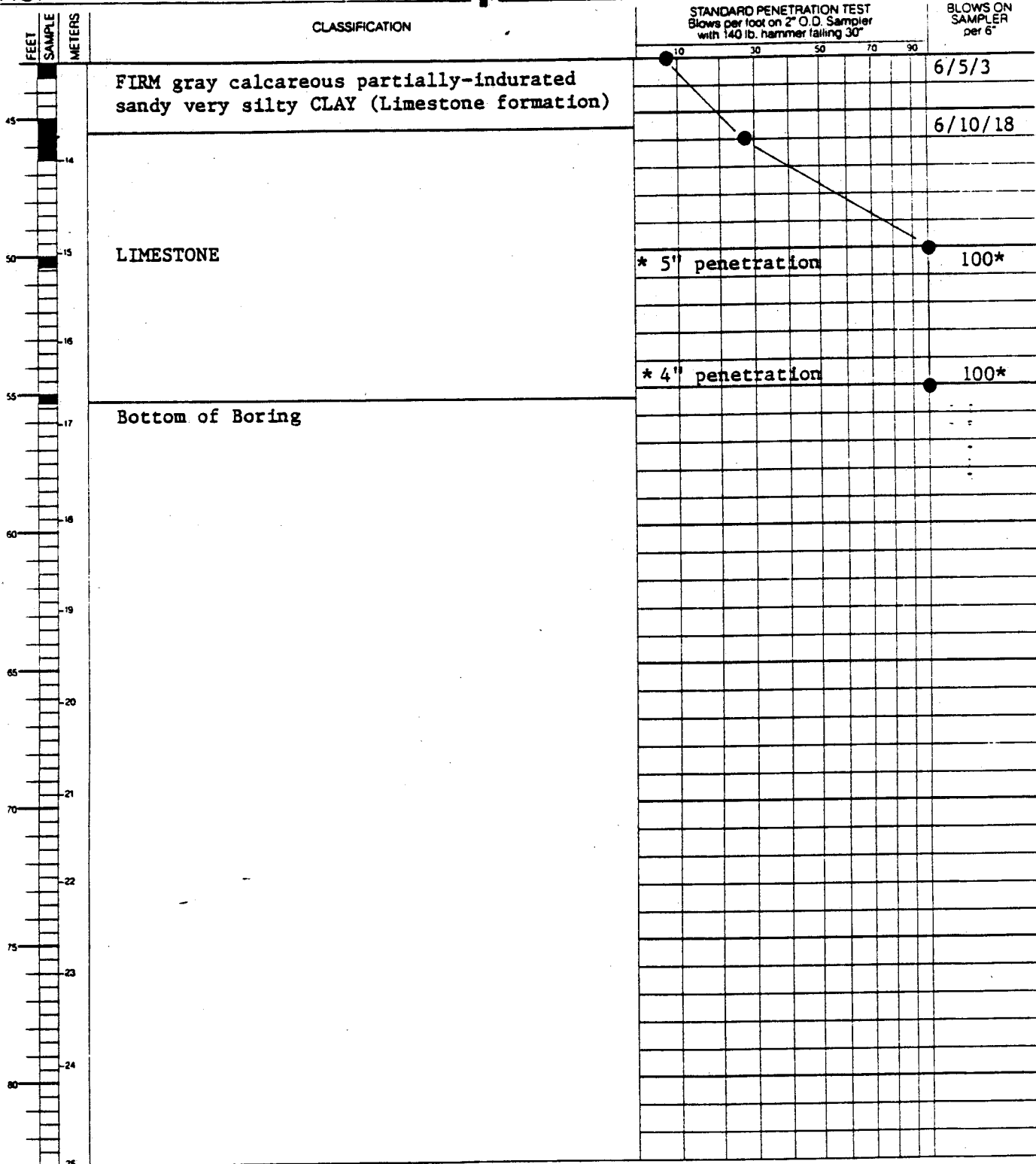
FIRM gray calcareous partially-indurated
sandy very silty CLAY (Limestone formation)

BORING LOG

No. 101A

Sheet 2 of 2

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P



Revised
12 December 1983

WAGE - G005.83

108 WILLIAMS & ASSOCIATES, INC. GEOTECHNICAL ENGINEERS

BORING LOG

NO. 102

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 2/22/83 Casing 35.0' Drill # 250
 Location See Drawing 820117P-2
 Ground Water 1.1' Date 2/22 Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
1	LOOSE gray fine SAND						2/2/3
2	VERY LOOSE dark brown fine SAND						1/2/2
3							2/1/2
4	MEDIUM DENSE TO LOOSE brown very clayey fine SAND						3/5/7
5							2/3/3
6	STIFF green plastic CLAY						2/3/3
7							2/3/3
8	STIFF TO SOFT gray slightly calcareous very sandy CLAY						3/4/5
9							2/1/2
10	HARD white calcareous very sandy SILT with chert pebbles (Limestone formation)						* 2" penetration 39/100*
11	Bottom of Boring						
12	Grouted borehole						

BORING LOG

NO. 102A

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 2/23/83 Casing none Drill # 250
 Location See Drawing 820117P-2
 Ground Water Date Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
0.0	Wash Boring from 0.0' to 22.0'						
0.5							
1.0							
1.5							
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8.5							
9.0							
9.5							
10.0							
22.0		Shelby Tube Sample: light gray sandy CLAY					
	Bottom of Boring						
22.5							
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BORING LOG

NO. 103

Sheet 1 of 2

Project Solid Waste Energy Recovery Project

Hillsborough County, Florida Job Number D820117P

Client Hillsborough County Engineering Dept.

Boring Date 2/22/83 Casing 32.0' Drill #1500

Location See Drawing 820117P-2

Ground Water 1.0' Date 2/22 Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
	LOOSE dark brown fine SAND with minor roots						2/2/3
1							2/2/2
5	VERY LOOSE TO LOOSE brown fine SAND						4/3/4
2							9/10/10
	MEDIUM DENSE brown very clayey fine SAND						7/9/10
3							
4							
15							8/9/10
5	VERY STIFF green very sandy CLAY						
6							
20	interpocketed FIRM green very sandy CLAY and FIRM white sandy CLAY						2/4/4
7							
25							
8	FIRM green plastic CLAY						2/3/4
9							
30	FIRM white calcareous partially-cemented very sandy SILT (Limestone formation)						3/1/7
10							
	NX Core: white calcareous partially-cemented very sandy SILT (Limestone formation)						
	Interval Recovery % Recovery						
	32.0'-42.0' 1.5' 15						
11							
12							
40							
13							
	HARD white calcareous partially-cemented very sandy SILT (Limestone formation)						
14							

BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P

No. 103

Sheet 2 of 2

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
45	HARD white calcareous partially-cemented very sandy SILT (Limestone formation)						23/23/26
46							
50	Bottom of Boring						100*
51							
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BORING LOG

NO. 104

Sheet 1 of 2

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 2/23/83 Casing 30.0' Drill # 250
 Location See Drawing 820117P-2
 Ground Water 0.3' Date 2/23 Ground Elevation unknown

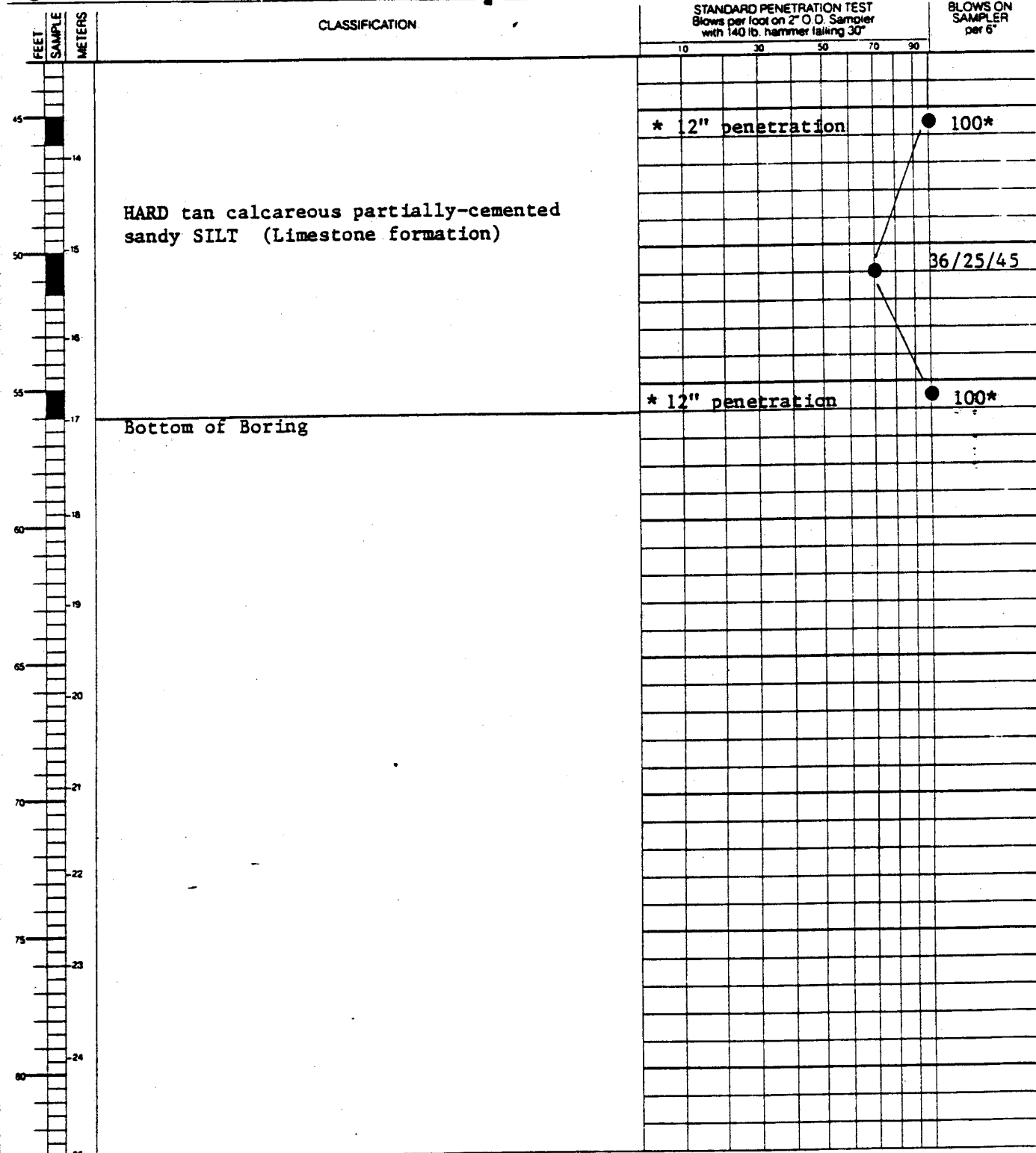
FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
1	LOOSE dark brown fine SAND with roots	•					3/4/3
2	LOOSE brown fine SAND	•					1/2/3
3	VERY LOOSE dark brown fine SAND with minor finely divided organic matter	•					2/2/3
4		•					2/1/1
5	FIRM TO STIFF green plastic CLAY	•					1/2/4
6		•					2/4/6
7		•					2/1/1
8	VERY SOFT gray slightly sandy plastic CLAY	•					1/1/1
9	HARD tan calcareous partially-cemented sandy SILT (Limestone formation)	* 8" penetration					100*
10							
11	NX Core: tan calcareous partially-cemented sandy SILT (Limestone formation)						
12	Interval Recovery % Recovery						
	30.6'-41.0' 4.0' 38						
13	HARD tan calcareous partially-cemented sandy SILT (Limestone formation)						

BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P

NO. **104**

Sheet **2** of **2**



BORING LOG

NO. 104A

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 2/24/83 Casing none Drill # 250
 Location See Drawing 820117P-2
 Ground Water Date Ground Elevation unknown

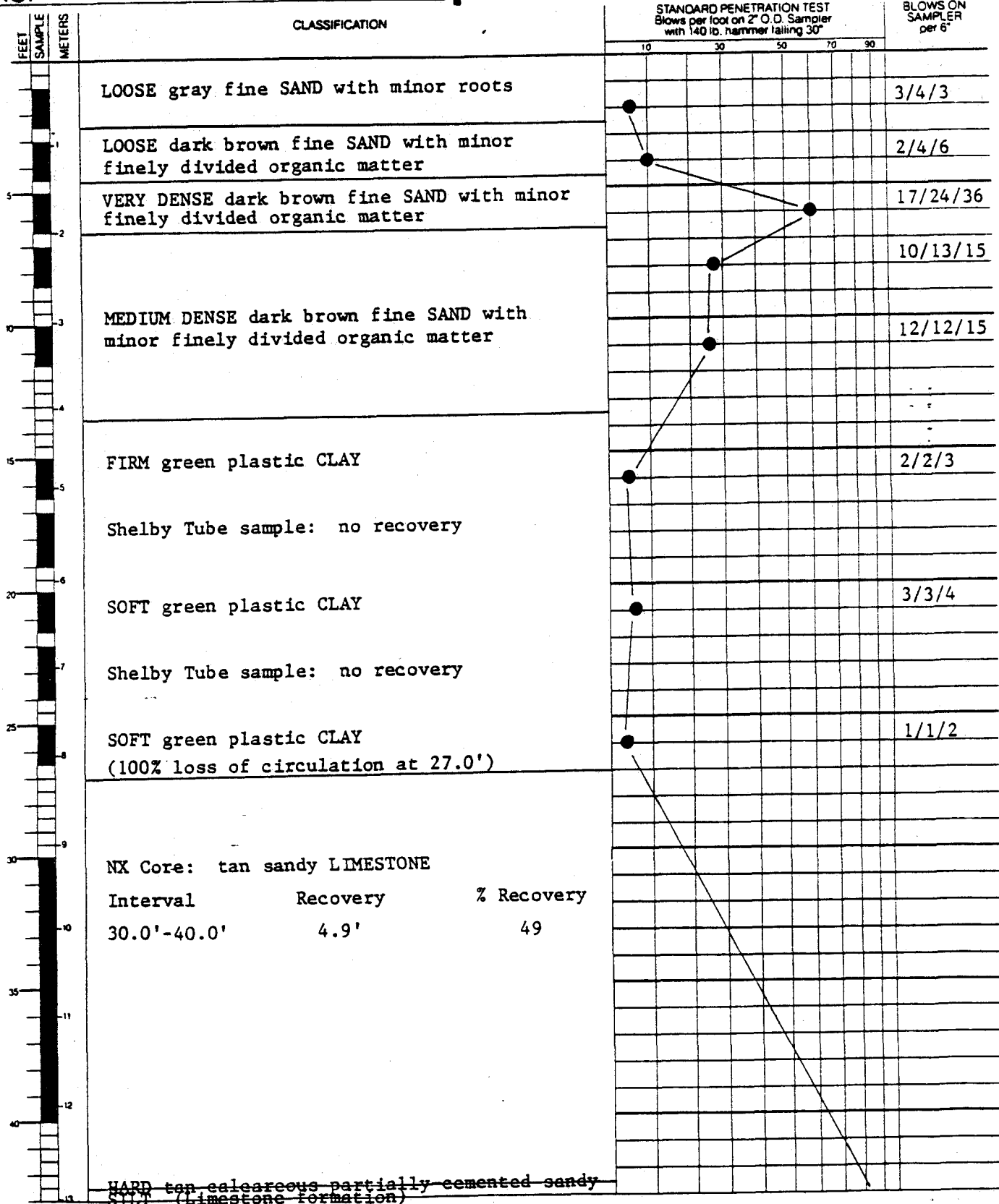
FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
1	Wash Boring from 0.0' to 27.0'						
2							
3							
4							
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27							
28	Shelby Tube sample: light gray sandy CLAY						
29	Bottom of Boring						
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BORING LOG

NO. 105

Sheet 1 of 2

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P
Client Hillsborough County Engineering Dept.
Boring Date 2/24/83 Casing 30.0' Drill # 250
Location See Drawing 820117P-2
Ground Water Date Ground Elevation unknown



BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P

No. 105

Sheet 2 of 2

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
45	HARD tan calcareous partially-cemented sandy SILT (Limestone formation)						100*
46							
50	Bottom of Boring						100*
51							
52							
53							
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90							

BORING LOG

No. 106

Sheet 1 of 2

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 3/1/83 Casing 20.0' Drill # 250
 Location See Drawing 820117P-2
 Ground Water 0.3' Date 3/1 Ground Elevation unknown

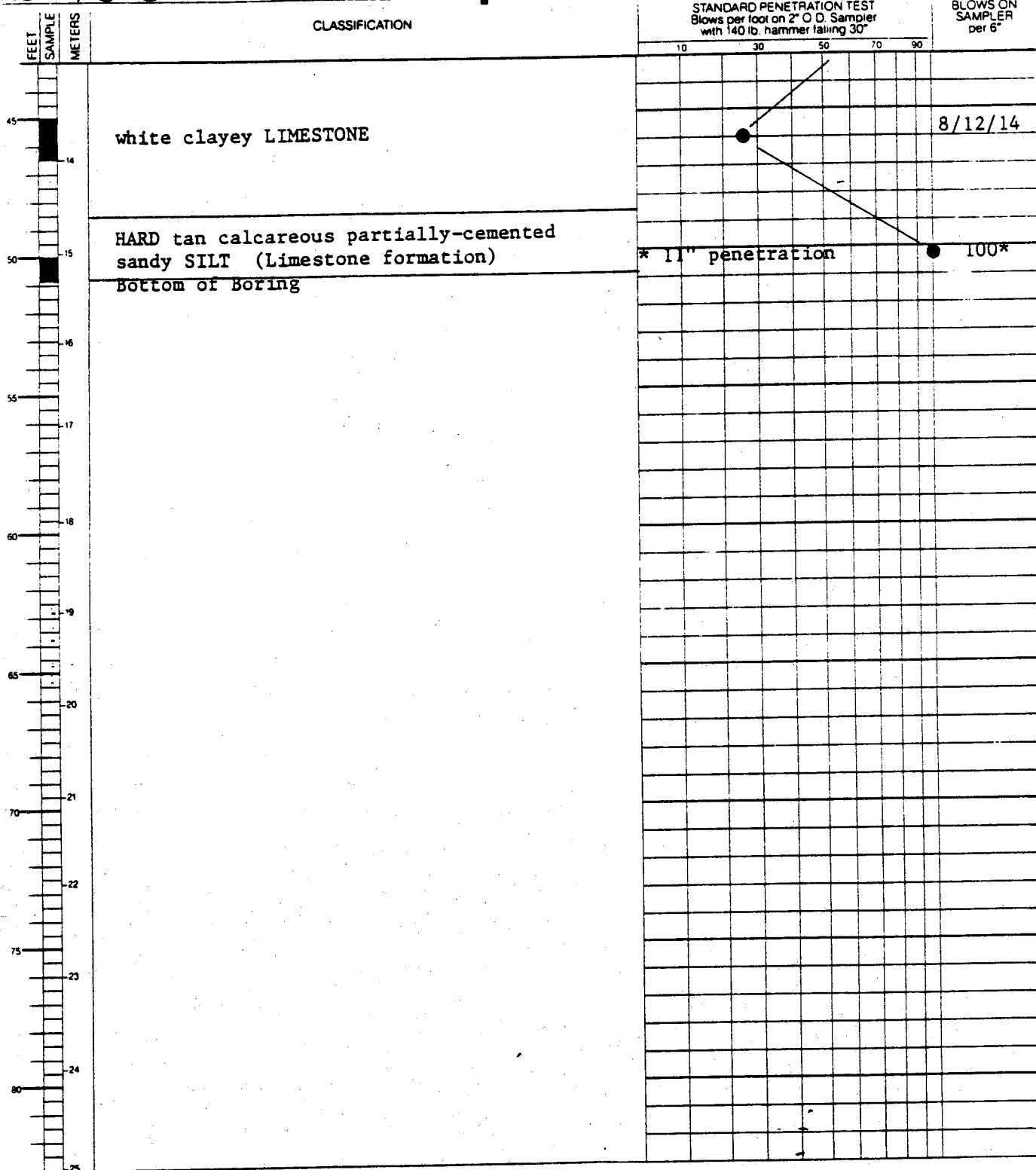
FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
0-1	VERY LOOSE brown fine SAND with minor roots	●					1/1/2
1-2	MEDIUM DENSE dark brown fine SAND with minor finely divided organic matter	●					3/5/8
2-3		●					3/5/7
3-4		●					7/7/8
4-5		●					2/3/8
5-6	MEDIUM DENSE brown fine SAND						
6-7	MEDIUM DENSE dark brown slightly clayey fine SAND						
7-8							12/10/12
8-9	VERY STIFF brown very sandy CLAY						
9-10							9/8/9
10-11	STIFF TO VERY STIFF green plastic CLAY						
11-12							2/4/5
12-13							5/7/9
13-14	MEDIUM DENSE gray very clayey fine SAND						
14-15							4/7/8
15-16	white clayey LIMESTONE						
16-17							16/30/48

BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P

No. 106

Sheet 2 of 2



BORING LOG

No. 107

Sheet 1 of 2

Project Solid Waste Energy Recovery Project

Hillsborough County, Florida Job Number D820117P

Client Hillsborough County Engineering Dept.

Boring Date 3/1/83 Casing 30.0' Drill # 250

Location See Drawing 820117P-2

Ground Water 0.3' Date 3/1 Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
1	LOOSE brown fine SAND with minor roots						1/2/3
2	VERY LOOSE tan fine SAND						2/2/1
3	VERY STIFF gray very sandy CLAY						5/9/13
4							7/13/16
5							6/8/9
6							4/4/4
7	FIRM green plastic CLAY						3/4/5
8							2/3/4
9							1/1/1
10	STIFF TO FIRM mottled gray and green partially-indurated sandy CLAY						
11	VERY SOFT gray calcareous very sandy SILT with chert pebbles and shells (Limestone formation) (100% loss of circulation at 31.5')						9/14/28
12	white silty LIMESTONE						12/24/36
13	VERY DENSE white calcareous very silty fine SAND (Limestone formation)						

BORING LOG

NO. 108

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
 Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 2/28/83 Casing none Drill # 250
 Location See Drawing 820117P-2
 Ground Water 0.0' Date 2/28 Ground Elevation unknown

FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
0	VERY LOOSE gray fine SAND with minor roots						3/2/2
1	MEDIUM DENSE dark brown fine SAND with minor finely divided organic matter						3/7/6
2	VERY LOOSE dark brown fine SAND						2/2/2
3	LOOSE TO MEDIUM DENSE brown very clayey fine SAND						3/4/6
4							
5	STIFF TO FIRM green slightly sandy plastic CLAY						7/13/16
6							
7							5/5/5
8							
9							
10							2/3/4
11	Bottom of Boring						
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
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BORING LOG

NO. 109

Sheet 1 of 1

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 2/25/83 Casing none Drill #250
 Location See Drawing 820117P-2
 Ground Water _____ Date _____ Ground Elevation unknown

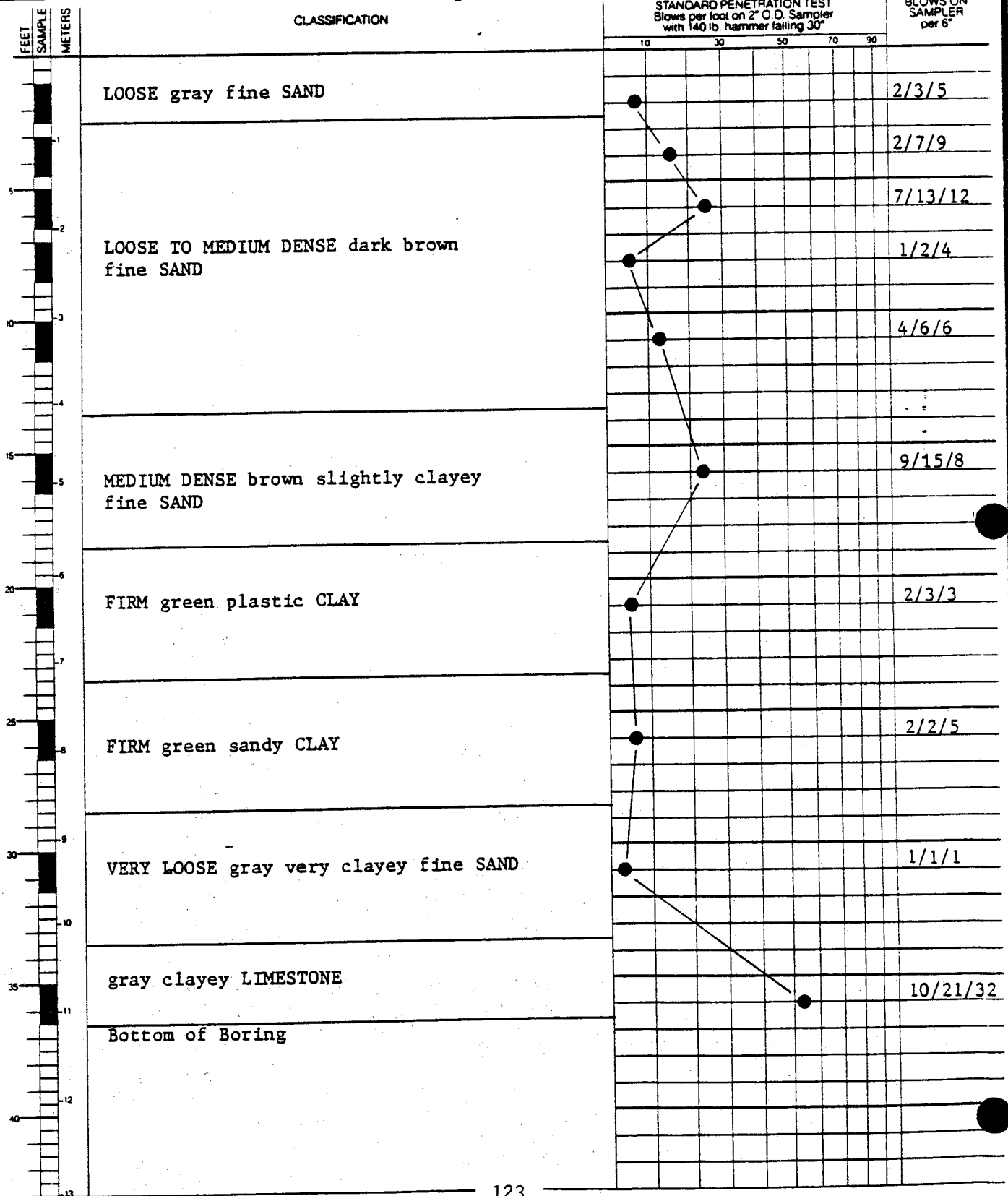
FEET SAMPLE METERS	CLASSIFICATION	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30"					BLOWS ON SAMPLER per 6"
		10	30	50	70	90	
1	MEDIUM DENSE dark brown fine SAND with minor finely divided organic matter	•					2/4/7
2	LOOSE brown fine SAND	•					2/2/3
3	MEDIUM DENSE dark brown fine SAND	•					2/3/11
4	MEDIUM DENSE brown slightly clayey fine SAND	•					8/9/7
5	STIFF green sandy CLAY with minor decaying roots	•					4/4/6
6	MEDIUM DENSE gray clayey fine SAND	•					3/6/7
7	FIRM green plastic CLAY	•					2/4/3
8	Bottom of Boring						
9							
10							
11							
12							
13							

BORING LOG

Project Solid Waste Energy Recovery Project
Hillsborough County, Florida Job Number D820117P
 Client Hillsborough County Engineering Dept.
 Boring Date 3/2/83 Casing none Drill # 250
 Location See Drawing 820117P-2
 Ground Water 0.3' Date 3/2 Ground Elevation unknown

NO. 10

Sheet 1 of 1



SECONDARY LABORATORY TESTING



125

CLIENT Hillsborough County, Department of Solid Waste JOB NO. D820117P

PROJECT Solid Waste Energy Recovery Project

SOIL CLASSIFICATION

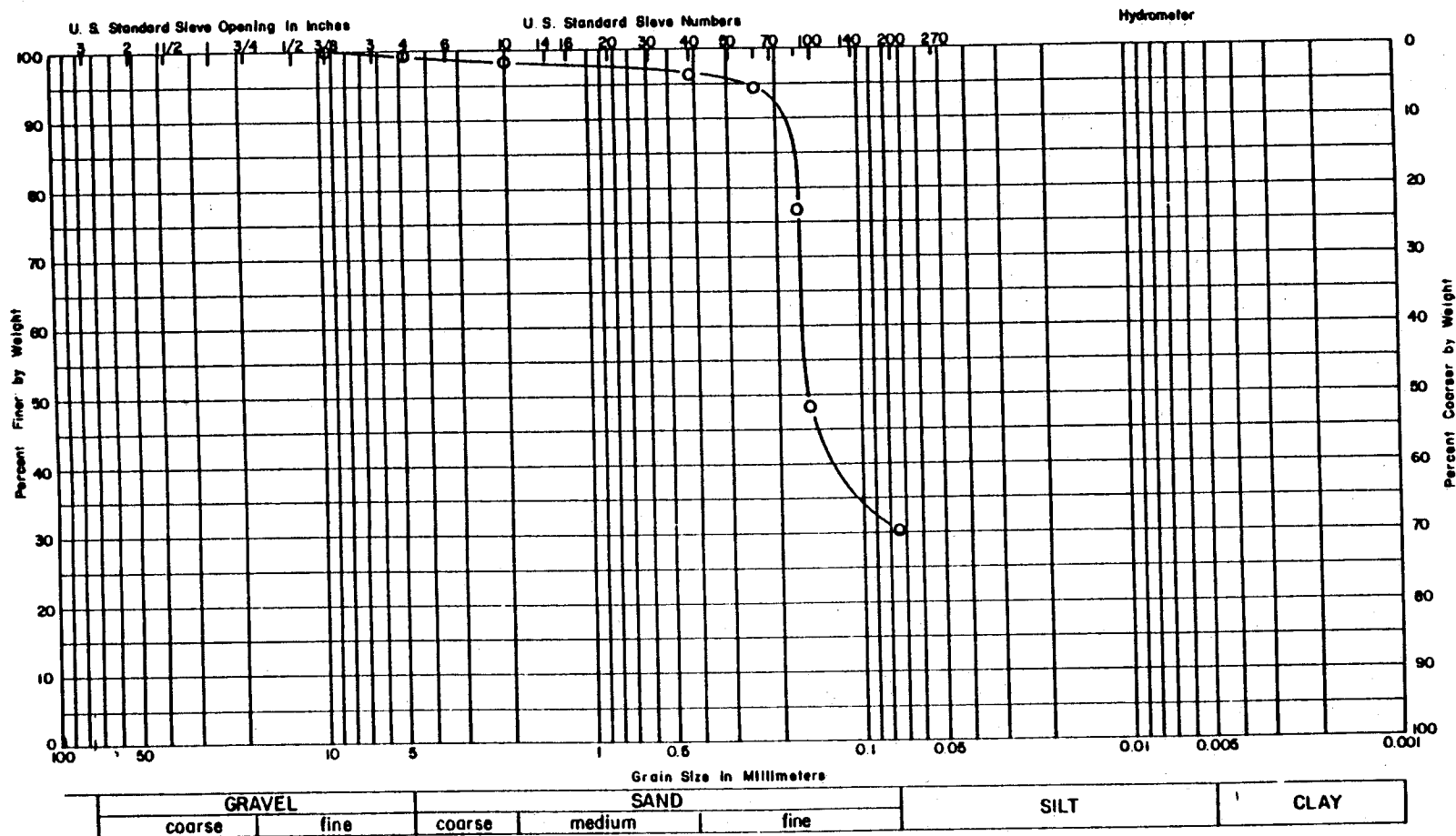
AASHTO _____ UNIFIED _____

summary of laboratory test results



WILLIAMS & ASSOCIATES, INC.
MATERIALS TESTING ENGINEERS

12280 US HIGHWAY 18 SOUTH, CLEARWATER, FLORIDA 33548
 TELEPHONE: CLEARWATER (813) 535-9802 TAMPA (813) 228-7020



PROJECT: Solid Waste Energy Recovery Project
 D820117P

CLIENT: Hillsborough County Engineering Dept.

SAMPLE LOCATION: Boring 101
 22.0' - 24.0'

SAMPLE DESCRIPTION: light gray sandy clay with
 random horizontal seams of clay

LL = 36

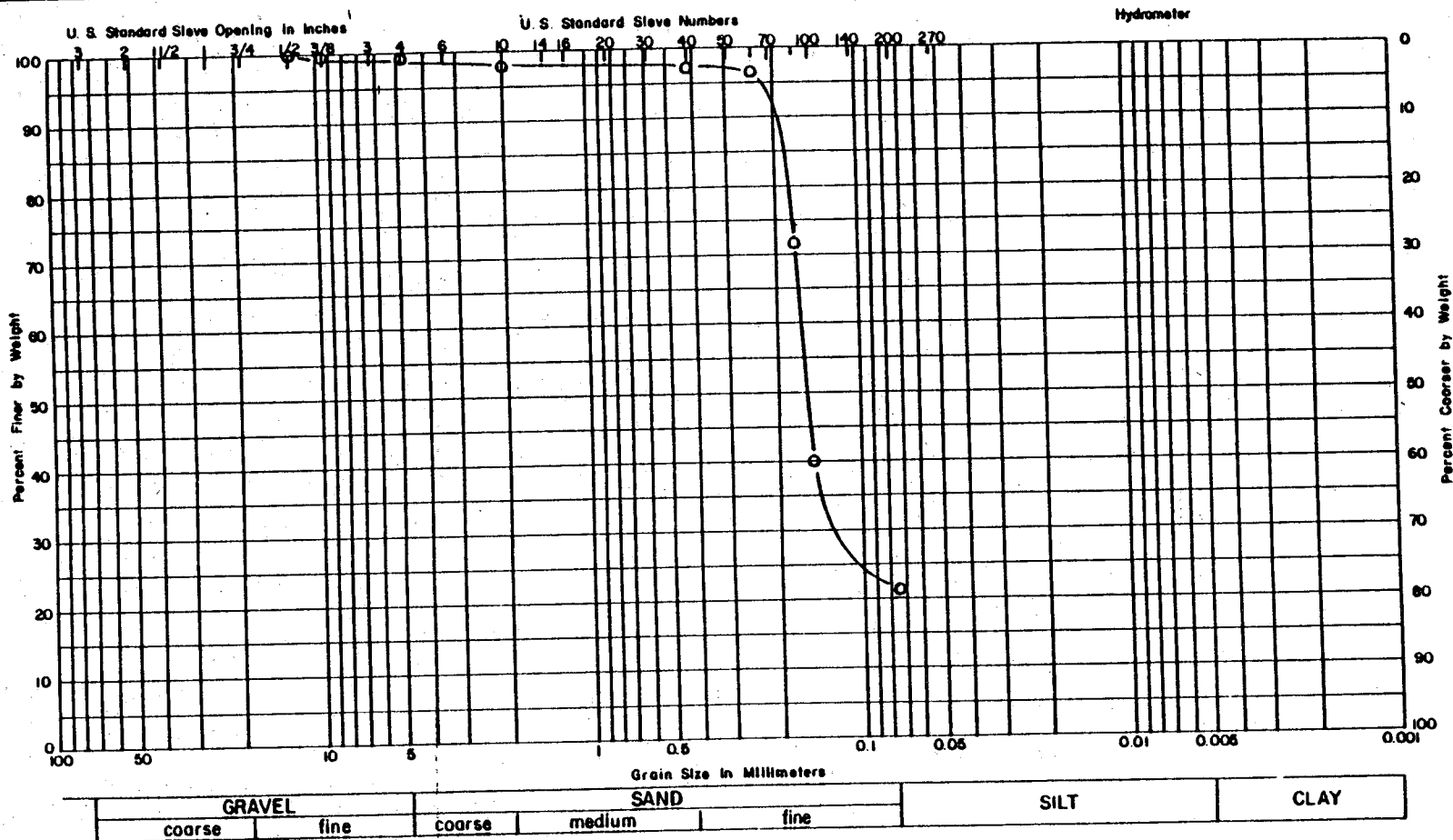
PI = 15

grain size analysis



WILLIAMS & ASSOCIATES, INC.
MATERIALS TESTING ENGINEERS

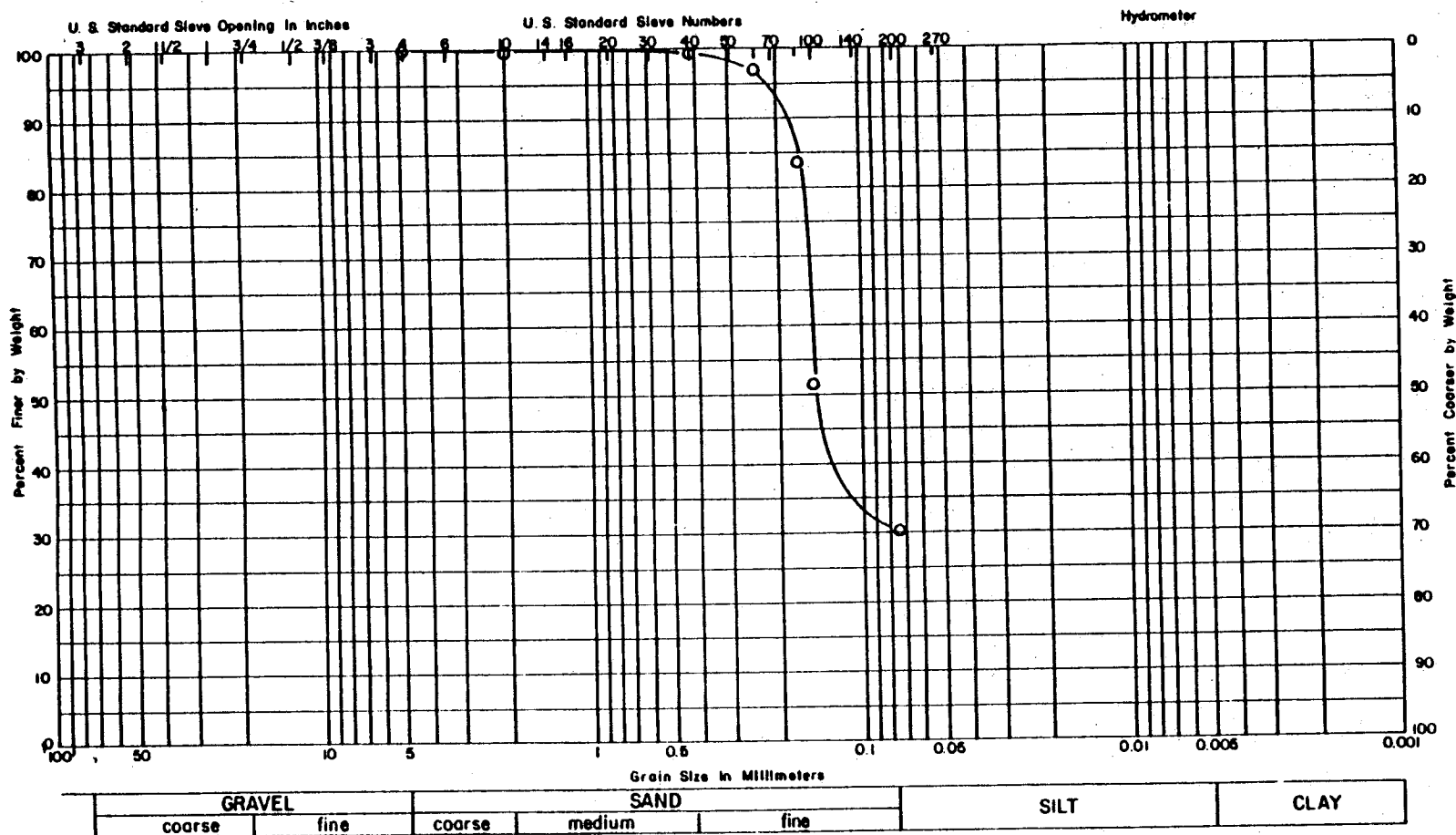
12290 US HIGHWAY 19 SOUTH, CLEARWATER, FLORIDA 33548
 TELEPHONE: CLEARWATER (813) 535-8802 TAMPA (813) 228-7020

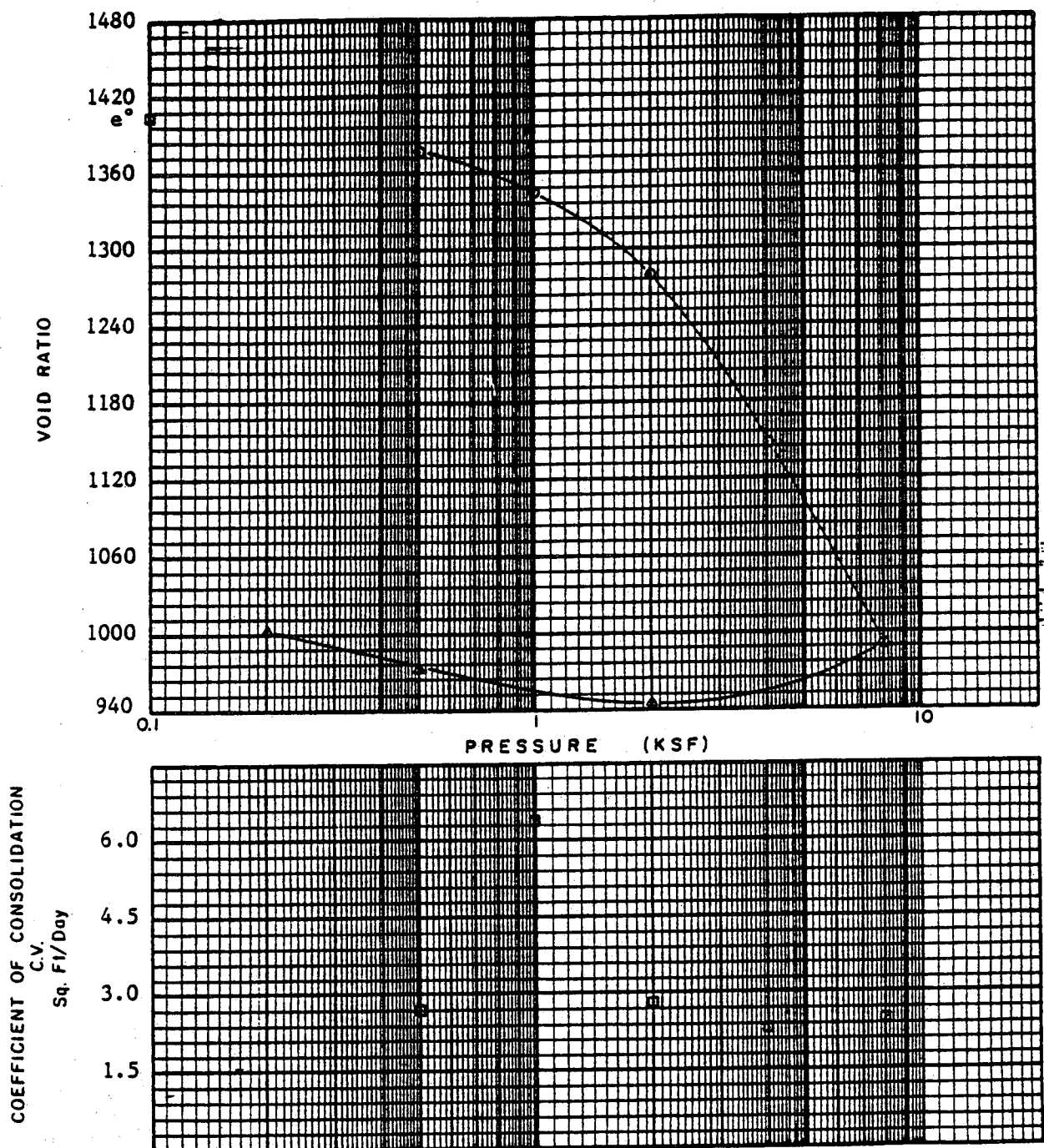




WILLIAMS & ASSOCIATES, INC.
MATERIALS TESTING ENGINEERS

12290 US HIGHWAY 19 SOUTH, CLEARWATER, FLORIDA 33548
 TELEPHONE: CLEARWATER (813) 535-9802 TAMPA (813) 228-7020





CONSOLIDATION TEST

CLIENT: Hillsborough County Engineering Dept.

LL = 48

PI = 21

PROJECT: Solid Waste Energy Recovery Project
D820117P

G_s = 2.650

INITIAL: s = 100%

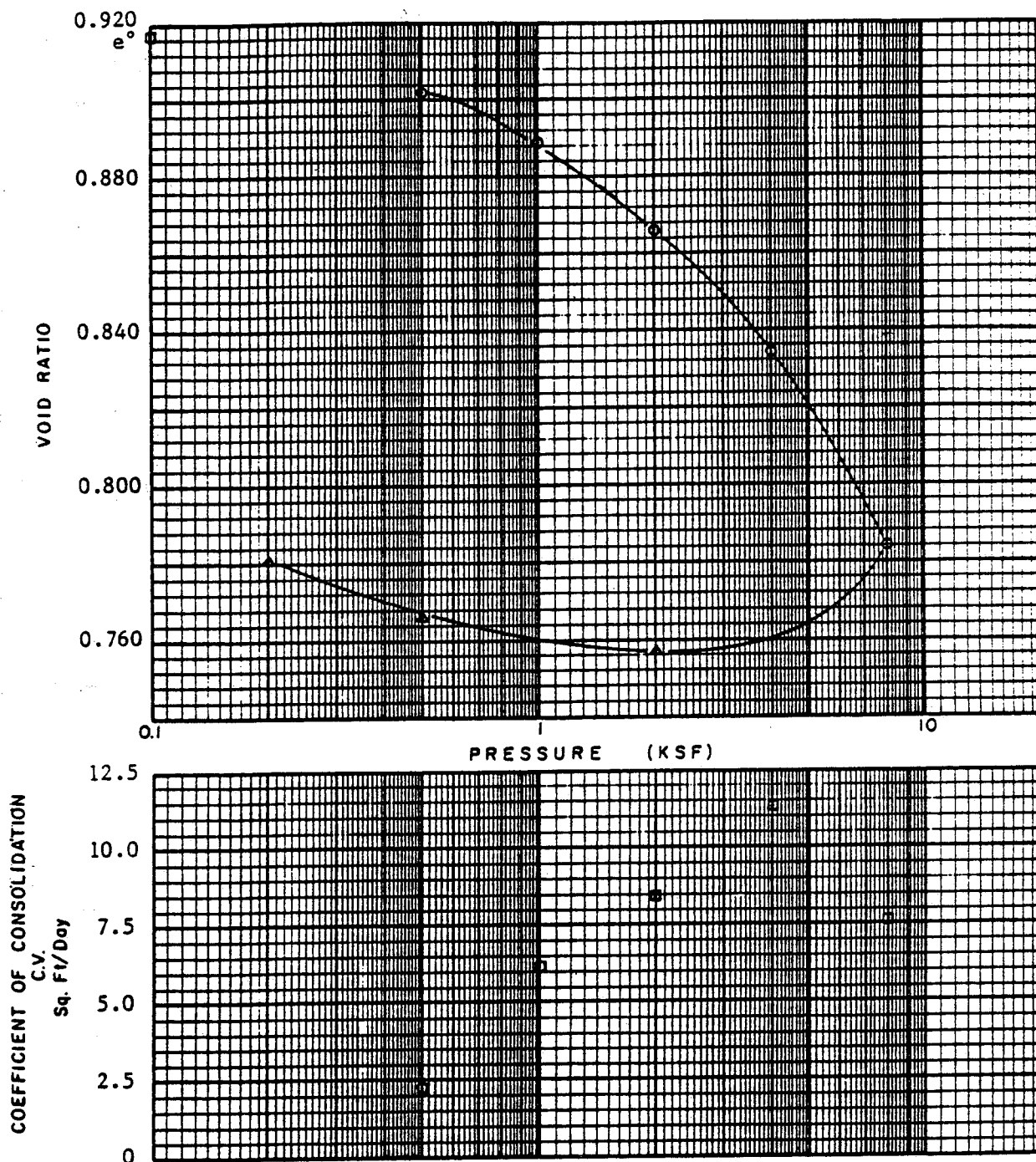
SAMPLE LOCATION: Boring 102A
22.0' - 24.0'

γ_d = 69.8

SOIL DESCRIPTION: Light gray sandy clay

FINAL: s = 100%

γ_d = 81.5



CONSOLIDATION TEST

CLIENT: Hillsborough County Engineering Dept.

LL = 39

PI = 18

PROJECT: Solid Waste Energy Recovery Project
D820117P

G_s = 2.645

INITIAL: s = 96.1%

γ_d = 87.4

SAMPLE LOCATION: Boring 104A
27.0' - 28.3'

FINAL: s = 100%

γ_d = 94.1

SOIL DESCRIPTION: Light gray sandy clay

Revised 12 December 1983

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, thanks to the Association of Soil and Foundation Engineers (ASFE).

When ASFE was founded in 1969, subsurface problems were frequently being resolved through lawsuits. In fact, the situation had grown to such alarming proportions that consulting geotechnical engineers had the worst professional liability record of all design professionals. By 1980, *ASFE-member consulting soil and foundation engineers had the best professional liability record.* This dramatic turn-about can be attributed directly to client acceptance of problem-solving programs and materials developed by ASFE for its members' application. *This acceptance was gained because clients perceived the ASFE approach to be in their own best interests.* Disputes benefit only those who earn their living from others' disagreements.

The following suggestions and observations are offered to help you reduce the geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of his report may affect his recommendations.

Unless your consulting geotechnical engineer indicates otherwise, *your geotechnical engineering report should not be used:*

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

A geotechnical engineer cannot accept responsibility for problems which may develop if he is not consulted after factors considered in his reports development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by the geotechnical engineer who then renders an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those opined to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. For example, the actual interface between materials may be far more gradual or abrupt than the report indicates, and actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their geotechnical consultant through the construction stage,* to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical-engineering report whose adequacy may have been affected by time.* Speak with the geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid these problems, the geotechnical engineer should be retained to work with other appropriate design professionals to explain relevant geotechnical findings and to review the adequacy

of their plans and specifications relative to geotechnical issues

BORING LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

Final boring logs are developed by the geotechnical engineer based upon his interpretation of field logs (assembled by site personnel) and laboratory evaluation of field samples. Only final boring logs customarily are included in geotechnical engineering reports. *These logs should not under any circumstances be redrawn* for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, *give contractors ready access to the complete geotechnical engineering report*. Those who do not provide such access may proceed under the *mistaken* impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgement and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical consultants. To help prevent this problem, geotechnical engineers have developed model clauses for use in written transmittals. These are *not* exculpatory clauses designed to foist the geotechnical engineer's liabilities onto someone else. Rather, they are definitive clauses which identify where the geotechnical engineer's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report, and you are encouraged to read them closely. Your geotechnical engineer will be pleased to give full and frank answers to your questions.

OTHER STEPS YOU CAN TAKE TO REDUCE RISK

Your consulting geotechnical engineer will be pleased to discuss other techniques which can be employed to mitigate risk. In addition, the Association of Soil and Foundation Engineers has developed a variety of materials which may be beneficial. Contact ASFE for a complimentary copy of its publications directory.

Published by

ASFE

ASSOCIATION OF SOIL AND FOUNDATION ENGINEERS

8811 Colesville Road/Suite 225
Silver Spring, Maryland 20910
301/565-2733

Appendix 10.11

APPENDIX 10.11

ECOLOGY

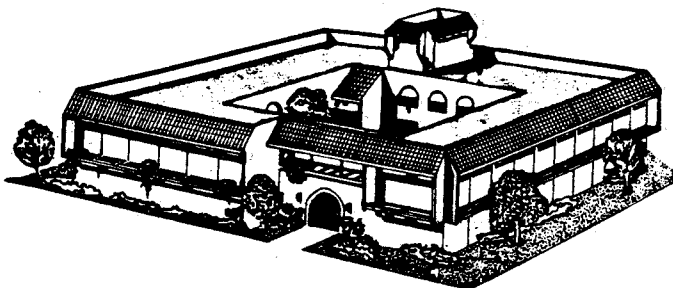
APPENDIX 10.11.1

CORRESPONDENCE WITH
HILLSBOROUGH COUNTY EPC

HILLSBOROUGH COUNTY
ENVIRONMENTAL PROTECTION

COMMISSION

E. L. BING
RODNEY COLSON
MATT JETTON
JOHN R. PAULK
JAN KAMINIS PLATT



ROGER P. STEWART
DIRECTOR

1900 - 9th AVE
TAMPA, FLORIDA 33605

TELEPHONE (813) 272-5960

October 19, 1983

Thomas Tetreault
Camp Dresser and McKee, Inc.
One Center Plaza
Boston, Mass. 02108

Dear Thomas:

On 31 August, 1983 I accompanied you and your associate, Phillip Kennedy, on an inspection of a tract of land on the west side of Faulkenburg Road, north of S.R. 60. The site is the proposed location for Hillsborough County's new resource recovery facility and sewage treatment plant.

The purpose of the inspection was to determine what portions of the tract, if any, lie within the jurisdiction of the Hillsborough County Environmental Protection Commission (EPC) as 'waters of Hillsborough County', as defined in Chapter 1-5 of the Rules and Regulations of the EPC.

The site would be classified as improved pasture with a few scattered live oaks and pines. Located in the south central portion of the tract is a small depression that contains standing water periodically but it is not a well defined, viable wetland and therefore, would not be within the jurisdiction of this agency as 'waters of Hillsborough County'.

During the construction phase, if dewatering of the site is necessary for the construction of the bunker, it is likely that discharge will be to the ditch near the southwest corner of the tract. The ditch appears to be contiguous with the Tampa By-Pass Canal. Please be advised that turbid discharges exceeding 50 Jackson units above background will be a violation of Section 18, Chapter 67-1504 of the Hillsborough County Environmental Protection Act. A temporary holding pond will be necessary to allow settleable substances time to precipitate before discharge to the ditch.

If the developer provides treatment for the first half inch of stormwater runoff generated by the project and there are no turbid discharges exceeding the values stated above, the environmental review department of the EPC has no objection to the resource recovery facility and sewage treatment plant at this location.

If you have any questions or require further information, please call me at 813-272-5960.

Sincerely,

Nancy Kirkley Woodard

Nancy Kirkley Woodard
Environmental Scientist Technician
Hillsborough County Environmental
Protection Commission

NKW:dr

cc: Patty Berry, Department of Solid Waste

APPENDIX 10.11.2

WETLAND VEGETATION INDICATORS

SOURCE: HILLSBOROUGH COUNTY ENVIRONMENTAL PROTECTION COMMISSION

APPENDIX 1: WETLAND VEGETATION INDICATORS

Listed within are those species of vascular plants to be used as wetland indicators as prescribed in Chapter 1-11.03 (g) of the Rules of the Hillsborough County Environmental Protection Commission. Within each wetland vegetation association, the indicator species are separated into two categories, primary and secondary, to delineate the Transition Zone of a Wetland as prescribed in Chapter 1-11.03 (g) of the Rules of the Hillsborough County Environmental Protection Commission.

1. Estuarine Marsh. These species constitute the wetland indicators for the estuarine marsh association.

a. Primary wetland indicators:

<i>Acnida cannabina</i>	water hemp
<i>Acrostichum aureum</i>	leather fern
<i>Batis maritima</i>	saltwort
<i>Borrchia arborescens</i>	sea daisy
<i>B. frutescens</i>	"
<i>Distichlis spicata</i>	saltgrass
<i>Eleocharis cellulosa</i>	spike rush
<i>Fimbristylis castanea</i>	saltmarsh fimbrystilis
<i>Heliotropium curassavicum</i>	seaside heliotrope
<i>Hymenocallis</i> sp.	spider lily
<i>Ipomoea pes-caprae</i>	railroad vine
<i>Juncus roemerianus</i>	black needlerush
<i>Laguncularia racemosa</i>	white mangrove
<i>Limonium carolinianum</i>	marsh rosemary
<i>Monanthochloe littoralis</i>	key grass
<i>Paspalum vaginatum</i>	siltgrass
<i>Phloxerus vermicularis</i>	beach carpet
<i>Rhizophora mangle</i>	red mangrove
<i>Salicornia bigelovii</i>	begelow's glasswort
<i>S. perennis</i>	glasswort
<i>S. virginica</i>	"
<i>Sesuvium portulacastrum</i>	sea purslane

<i>Spartina alterniflora</i>	smooth cordgrass
<i>S. patens</i>	marsh hay cordgrass
<i>S. spartinae</i>	prickly cordgrass
<i>Sporobolus virginicus</i>	coastal dropseed
<i>Suaeda linearis</i>	sea blite
<i>S. maritima</i>	"

b. Secondary wetland indicators:

<i>Aster multifolius</i>	aster
<i>Baccharis halimifolia</i>	groundsel
<i>Calitriche edentula</i>	sea rocket
<i>Coccoloba uvifera</i>	sea grape
<i>Iva frutescens</i>	marsh elder
<i>Sabal palmetto</i>	cabbage palm
<i>Spartina bakeri</i>	cordgrass
<i>Uniola paniculata</i>	sea oats

2. Estuarine Swamp. These species constitute the wetland indicators for the estuarine swamp association.

a. Primary wetland indicators:

<i>Acrostichum aureum</i>	leather fern
<i>Avicennia germinans</i>	black mangrove
<i>Batis maritima</i>	saltwort
<i>Borreria arborescens</i>	sea daisy
<i>B. frutescens</i>	"
<i>Conocarpus erecta</i>	buttonwood
<i>Distichlis spicata</i>	saltgrass
<i>Heliotropium curassavicum</i>	seaside heliotrope
<i>Juncus roemerianus</i>	black needlerush
<i>Laguncularia racemosa</i>	white mangrove
<i>Limonium carolinianum</i>	sea lavender
<i>Monanthochloa littoralis</i>	keygrass
<i>Paspalum vaginatum</i>	siltgrass
<i>Phloxeris vermicularis</i>	beach carpet

<i>Rhizophora mangle</i>	red mangrove
<i>Ruppia maritima</i>	widgeon grass
<i>Salicornia virginica</i>	glasswort
<i>Sesuvium portulacastrum</i>	sea purslane
<i>Spartina alterniflora</i>	smooth cordgrass
<i>S. cynosuroides</i>	big cordgrass
<i>S. patens</i>	marsh hay cordgrass
<i>Sporobolus virginicus</i>	coastal dropseed
<i>Suaeda linearis</i>	sea blite
<i>S. maritima</i>	"

b. Secondary wetland indicators:

<i>Baccharis halimifolia</i>	groundsel
<i>Cakile edentula</i>	sea rocket
<i>Cyperus</i> sp.	sedge
<i>Dalbergia ecastophyllum</i>	dalbergia
<i>Ipomoea pes-caprae</i>	railroad vine
<i>Rhabdadenia biflora</i>	rubber vine

3. Estuarine Coastal Flat. These species constitute the wetland indicators for the estuarine coastal flat association.

a. Primary wetland indicators:

<i>Acanthophora</i> spp.	red algae
<i>Acnida cannabina</i>	water hemp
<i>Batis maritima</i>	saltwort
<i>Enteromorpha</i> spp.	green algae
<i>Fimbristylis cellulosa</i>	sedge
<i>Gracilaria</i> spp.	red algae
<i>Halodule wrightii</i>	cuban shoal weed
<i>Hypnea</i> spp.	red algae
<i>Phloxerus vermicularis</i>	beach carpet
<i>Ruppia maritima</i>	widgeon grass
<i>Salicornia perennis</i>	glasswort
<i>Sesuvium portulacastrum</i>	sea purslane
<i>Spartina spartinae</i>	prickly cordgrass

Suaeda linearis

sea blite

Ulva lactuca

sea lettuce

4. Freshwater Marsh. These species constitute the wetland indicators for the freshwater marsh association.

a. Primary wetland indicators:

Alternanthera philoxeroides

alligator weed

Azolla caroliniana

mosquito fern

Bacopa caroliniana

Brasenia schreberi

water shield

Ceratophyllum demersum

coontail

Cladium jamaicense

sawgrass

Crinum americanum

string lily

Cyperus haspan

✓ sedge

Eleocharis baldwinii

spikerush

E. cellulosa

"

Eriocaulon decangulare

giant pipewort

Hydrochloa carolinensis

water grass

Hymenocallis palmeri

alligator lily

Hypericum fasciculatum

sand bush St. Johnswort

Iris hexagona

prairie iris

Juncus effusus

✓ softrush

J. repens

"

Lemna sp.

duckweed

Limnobium spongia

frog's bit

Lycopus rubellus

Najas guadalupensis

naiad

N. marina

"

Nelumbo lutea

lotus

Nuphar luteum

yellow pond lily

Nymphaea odorata

white water lily

Nymphoides aquatica

floating hearts

Panicum hemitomon

maidencane

<i>P. joorii</i>	
<i>Peltandra sagittaeifolia</i>	white arum
<i>P. virginica</i>	green arum
<i>Phragmites australis</i>	reedgrass
<i>Pistia stratiodes</i>	waterlettuce
<i>Polygonum hydropiperoides</i>	smartweed
<i>P. punctatum</i>	
<i>Pontederia cordata</i>	southern pickerelweed
<i>Proserpinaca pectinata</i>	mermaid weed
<i>Sacciolepis striata</i>	
<i>Sagittaria lancifolia</i>	arrowhead
<i>S. subulata</i>	"
<i>Salix caroliniana</i>	southern willow
<i>Salvinia rotundifolia</i>	water fern
<i>Saururus cernuus</i>	lizard's tail
<i>Thalia geniculata</i>	arrowroot
<i>Utricularia inflata</i>	bladderwort
<i>U. vulgaris</i>	"
b. Secondary wetland indicators:	
<i>Acrostichum danaeifolium</i>	leather fern
<i>Amphicarpum muhlenbergianum</i>	blue maidencane
<i>Centella asiatica</i>	coinwort
<i>Dichondra carolinensis</i>	
<i>Dichromena latifolia</i>	white top
<i>Erianthus giganteus</i>	Sugarcane plumegrass
<i>Eriocaulon compressum</i>	lesser pipewort
<i>Fimbristylis miliacea</i>	fringe marsh
<i>Fuirena scirpoidea</i>	umbrella grass
<i>Hibiscus grandiflorus</i>	swamp hibiscus
<i>Hydrocotyle bonariensis</i>	water pennywort
<i>H. umbellata</i>	marsh pennywort
<i>Juncus polycephalus</i>	soft rush

1		
2		
3	<i>Lachnanthes caroliniana</i>	redroot
4	<i>Lachnocaulon anceps</i>	bogbutton
5	<i>Lyonia lucida</i>	fetterbush
6	<i>Osmunda cinnamomea</i>	cinnamon fern
7	<i>O. regalis</i>	royal fern
8	<i>Oxypolis filiformis</i>	water dropwort
9	<i>Panicum repens</i>	torpedo grass
0	<i>P. virgatum</i>	switchgrass
1	<i>Ptilimnium capillaceum</i>	bishop's weed
2	<i>Rhynchospora inundata</i>	beakrush
3	<i>R. tracyi</i>	"
4	<i>Sabatia dodecandra</i>	marsh pink
5	<i>Scirpus sp.</i>	bulrush
6	<i>Scleria triglomerata</i>	nutrush
7	<i>Spartina bakeri</i>	
8	<i>Xyris platylepis</i>	yellow-eyed grass
9	5. Shallow Grasspond. These species constitute the wetland indicators for	
0	the shallow grasspond association.	
1	a. Primary wetland indicators:	
2	<i>Alternanthera philoxeroides</i>	alligator weed
3	<i>Azolla caroliniana</i>	mosquito fern
4	<i>Bacopa caroliniana</i>	
5	<i>Brasenia schreberi</i>	water shield
6	<i>Ceratophyllum demersum</i>	coontail
7	<i>Cladium jamaicense</i>	sawgrass
8	<i>Crinum americanum</i>	string lily
9	<i>Cyperus haspan</i>	sedge
0	<i>Eleocharis baldwinii</i>	spikerush
1	<i>E. cellulosa</i>	"
	<i>Eriocaulon decangulare</i>	giant pipewort
	<i>Hydrochloa caroliniensis</i>	watergrass
	<i>Hymenocallis palmeri</i>	alligator lily

Hypericum fasciculatum	sand bush St. Johnswort
Juncus effusus	soft rush
J. repens	"
Lemna sp.	duckweed
Ludwigia repens	
Lycopus rubellus	
Micranthemum glomeratum	
Najas guadalupensis	naiads
N. marina	"
Nelumbo lutea	lotus
Nuphar luteum	yellow pond lily
Nymphoides aquatica	floating hearts
Oxypolis filiformis	water dropwort
Panicum hamitomon	maidencane
P. jooi	
Paspalum repens	river paspalum
Peltandra sagittaeifolia	white arum
P. virginica	green arum
Phragmites australis	reedgrass
Polygonum hydropiperoides	smartweed
Pontaderia cordata	southern pickerelweed
Proserpinaca pectinata	mermaid weed
Sacciolepis striata	
Sagittaria lancifolia	arrowhead
S. subulata	
Salvinia rotundifolia	waterfern
Saururus cernuus	lizard's tail
Thalia geniculata	arrowroot
Utricularia inflata	bladderwort
U. vulgaris	"
b. Secondary wetland indicators:	
Amphicarpum muhlenbergianum	blue maidencane
Centella asiatica	coinwort

Dichondra caroliniensis

Dichromena latifolia

Erianthus giganteus

Eriocaulon compressum

Fimbristylis miliacea

Fuirena scirpoides

Gratiola virginiana

Hydrocotyle bonariensis

H. umbellata

Juncus polycephalus

Lachnanthes caroliniana

Lachnocaulon anceps

Osmunda cinnamomea

O. regalis

Panicum virgatum

Ptilimnium capillaceum

Rhynchosphora inundata

R. microcephala

R. tracyi

Sabatia dodecandra

Scleria triglomerata

Spartina bakerii

Xyris platylepis

white top

sugarcane plume grass

lesser pipewort

fringe marsh

umbrella grass

hedge-hyssop

water pennywort

marsh pennywort

redroot

bogbutton

cinnamon fern

royal fern

switchgrass

bishop's weed

beak rush

"

"

marsh pink

nutrush

yellow-eyed grass

6. Cypress Swamp. These species constitute the wetland indicators for the cypress swamp association.

a. Primary wetland indicators

Acer rubrum

red maple

Acrostichum danaeifolium

leather fern

Alternanthera philoxeroides

alligator weed

Azolla caroliniana

mosquito fern

Bacopa caroliniana

Blechnum serrulatum

swamp fern

Brasenia schreberi

water shield

1		
2		
3	<i>Cephalanthus occidentalis</i>	buttonbush
4	<i>Cicuta mexicana</i>	water hemlock
5	<i>Cladium jamaicense</i>	sawgrass
6	<i>Crinum americanum</i>	string lily
7	<i>Cyperus haspan</i>	sedge
8	<i>Gordonia lasianthus</i>	loblolly bay
9	<i>Habenaria repens</i>	water spider
0	<i>Hymenocallis palmeri</i>	alligator lily
1	<i>Juncus effusus</i>	soft rush
2	<i>Lemna sp.</i>	duckweed
3	<i>Ludwigia repens</i>	
4	<i>Lycopus rubellus</i>	
5	<i>Nuphar luteum</i>	yellow pond lily
6	<i>Nymphaea odorata</i>	white water lily
7	<i>Nymphoides aquatica</i>	floating hearts
8	<i>Orontium aquaticum</i>	golden club
9	<i>Osmunda regalis</i>	royal fern
0	<i>Panicum hemitomon</i>	maidencane
1	<i>Polygonum densiflorum</i>	
2	<i>P. hydropiperoides</i>	smartweed
3	<i>P. punctatum</i>	
4	<i>Pontederia cordata</i>	southern pickerelweed
5	<i>Proserpinaca pectinata</i>	mermaid weed
6	<i>Rumex verticillatus</i>	water dock
7	<i>Sacciolepis striata</i>	
8	<i>Sagittaria lancifolia</i>	arrowhead
9	<i>S. subulata</i>	
0	<i>Salix caroliniana</i>	southern willow
1	<i>Salvinia rotundifolia</i>	water fern
2	<i>Saururus cernuus</i>	lizard's tail
3	<i>Taxodium ascendens</i>	pond cypress
4	<i>T. distichum</i>	bald cypress
5	<i>Thalia geniculata</i>	arrowroot

<i>Utricularia inflata</i>	bladderwort
<i>U. vulgaris</i>	"
b. Secondary wetland indicators:	
<i>Carex</i> sp.	
<i>Dichondra caroliniensis</i>	
<i>Eriocaulon compressum</i>	lesser pipewort
<i>E. decangulare</i>	giant pipewort
<i>Fraxinus caroliniana</i>	water ash
<i>Gleditsia aquatica</i>	water locust
<i>Hydrocotyle umbellata</i>	marsh pennywort
<i>Hypericum fasciculatum</i>	sand bush St. Johnswort
<i>Ilex cassine</i>	dahoon
<i>Ita virginica</i>	tasselwhite
<i>Juncus polycephalus</i>	
<i>Lachnanthes caroliniana</i>	redroot
<i>Lachnocaulon anceps</i>	bogbutton
<i>Lyonia lucida</i>	fetterbush
<i>Magnolia virginiana</i>	swamp bay
<i>Nyssa biflora</i>	blackgum
<i>Osmunda cinnamomea</i>	cinnamon fern
<i>Oxypolis filiformis</i>	water dropwort
<i>Panicum virgatum</i>	switchgrass
<i>Persea borbonia</i>	red bay
<i>P. palustris</i>	swamp bay
<i>Styrax americana</i>	snowbell
<i>Thelypteris normalis</i>	
<i>Woodwardia virginica</i>	chain fern

7. Bay/Gum Swamp. These species constitute the wetland indicators for the bay/gum swamp association.

a. Primary wetland indicators:

<i>Acer rubrum</i>	red maple
<i>Acrostichum danaeifolium</i>	leather fern
<i>Alternanthera philoxeroides</i>	alligator weed
<i>Azolla caroliniana</i>	mosquito fern

1	<i>Bacopa caroliniana</i>	
2	<i>Blechnum serrulatum</i>	swamp fern
3	<i>Brasenia schreberi</i>	water shield
4	<i>Cephalanthus occidentalis</i>	buttonbush
5	<i>Cicuta mexicana</i>	water hemlock
6	<i>Cladium jamaicense</i>	sawgrass
7	<i>Crimm americanum</i>	string lily
8	<i>Cyperus haspan</i>	sedge
9	<i>Gordonia lasianthus</i>	loblolly bay
0	<i>Habenaria repens</i>	water spider
1	<i>Hymenocallis palmari</i>	alligator lily
2	<i>Juncus effusus</i>	soft rush
3	<i>Lemna sp.</i>	duckweed
4	<i>Ludwigia repens</i>	
5	<i>Lycopus rubellus</i>	
6	<i>Magnolia virginiana</i>	swamp bay
7	<i>Nyssa biflora</i>	blackgum
8	<i>Orontium aquaticum</i>	golden club
9	<i>Osmunda regalis</i>	royal fern
0	<i>Panicum hemitomon</i>	maidencane
1	<i>Persea palustris</i>	swamp bay
2	<i>Polygonum densiflorum</i>	smartweed
3	<i>P. hirsutum</i>	
4	<i>P. punctatum</i>	
5	<i>Pontederia cordata</i>	southern pickerelweed
6	<i>Rumex verticillatus</i>	water dock
7	<i>Sacciolepis striata</i>	
8	<i>Sagittaria lancifolia</i>	arrowhead
9	<i>S. subulata</i>	
0	<i>Salix caroliniana</i>	southern willow
1	<i>Salvinia rotundifolia</i>	waterfern
	<i>Saururus cernuus</i>	lizard's tail

<i>Taxodium ascendens</i>	pond cypress
<i>T. distichum</i>	bald cypress
<i>Thalia geniculata</i>	arrowroot
<i>Utricularia inflata</i>	bladderwort
b. Secondary wetland indicators:	
<i>Dichondra carolinensis</i>	
<i>Eriocaulon compressum</i>	lesser pipewort
<i>E. decangulare</i>	giant pipewort
<i>Hydrocotyle umbellata</i>	marsh pennywort
<i>Hypericum fasciculatum</i>	sand bush St. Johnswort
<i>Ilex cassina</i>	dahoon
<i>Itea virginica</i>	tasselwhite
<i>Juncus polycephalus</i>	
<i>Lachnanthes caroliniana</i>	redroot
<i>Lachnocaulon anceps</i>	bogbutton
<i>Lyonia lucida</i>	fetterbush
<i>Osmunda cinnamomea</i>	cinnamon fern
<i>Oxypolis filiformis</i>	water dropwort
<i>Panicum virgatum</i>	switchgrass
<i>Persea borbonia</i>	red bay
<i>Styrax americana</i>	snowbell
<i>Thelypteris normalis</i>	
<i>Woodwardia virginica</i>	chain fern

8. Hydric Hammock. These species constitute the wetland indicators for the hydric hammock association.

a. Primary wetland indicators:

<i>Acer rubrum</i>	red maple
<i>Acrostichum danaeifolium</i>	leather fern
<i>Alternanthera philoxeroides</i>	alligator weed
<i>Azolla caroliniana</i>	mosquito fern
<i>Bacopa caroliniana</i>	
<i>Blechnum serrulatum</i>	swamp fern
<i>Brasenia schreberi</i>	water shield

1		
2		
3	<i>Cephalanthus occidentalis</i>	buttonbush
4	<i>Cicuta mexicana</i>	water hemlock
5	<i>Cladium jamaicense</i>	sawgrass
6	<i>Crimum americanum</i>	stringlily
7	<i>Cyperus haspan</i>	sedge
8	<i>Fraxinus caroliniana</i>	water ash
9	<i>Gleditsia aquatica</i>	water locust
0	<i>Gordonia lasianthus</i>	loblolly bay
1	<i>Habenaria repens</i>	water spider
2	<i>Hymenocallis palmeri</i>	alligator lily
3	<i>Itea virginica</i>	tasselwhite
4	<i>Juncus effusus</i>	soft rush
5	<i>Lemna sp.</i>	duckweed
6	<i>Lycopus rubellus</i>	
7	<i>Nyssa biflora</i>	blackgum
8	<i>Orontium aquaticum</i>	golden club
9	<i>Osmunda regalis</i>	royal fern
0	<i>Panicum hemitomon</i>	maidencane
1	<i>Polygonum punctatum</i>	smartweed
2	<i>Pontederia cordata</i>	southern pickerelweed
3	<i>Sagittaria lancifolia</i>	arrowhead
4	<i>S. subulata</i>	"
5	<i>Salix caroliniana</i>	southern willow
6	<i>Salvinia rotundifolia</i>	water fern
7	<i>Saururus cernuus</i>	lizard's tail
8	<i>Taxodium ascendens</i>	pond cypress
9	<i>T. distichum</i>	bald cypress
0	<i>Thalia geniculata</i>	arrowroot
1	<i>Ulmus americana var. floridana</i>	florida elm
	b. Secondary wetland indicators:	
	<i>Carya aquatica</i>	water hickory
	<i>Eriocaulon compressum</i>	lesser pipewort
	<i>E. decangulare</i>	giant pipewort

1		
2		
3	Hydrocotyle umbellata	marsh pennywort
4	Ilex cassine	dahoon
5	Juncus polycephalus	
6	Lachnanthes caroliniana	redroot
7	Lachnocaulon anceps	bogbutton
8	Lyonia lucida	fetterbush
9	Magnolia virginiana	swamp bay
0	Osmunda cinnamomea	cinnamon fern
1	Panicum virgatum	switchgrass
2	Persea borbonia	red bay
3	P. palustris	swamp bay
4	Polygonum hirsutum	
5	Sabal palmetto	cabbage palm
6	Styrax americana	snowbell
7	Thelypteris normalis	
8	Woodwardia virginica	chain fern

9. Riverine System. These species constitute the wetland indicators for the riverine system association.

a. Primary wetland indicators:

9		
0	Acer rubrum	red maple
1	Acrostichum danaeifolium	leather fern
2	Alternanthera philoxeroides	alligator weed
3	Azolla caroliniana	mosquito fern
4	Bacopa caroliniana	lemon bacopa
5	Carpinus caroliniana	ironwood
6	Cephalanthus occidentalis	buttonbush
7	Cicuta mexicana	water hemlock
8	Cladium jamaicense	sawgrass
9	Crinum americanum	string lily
0	Fraxinus caroliniana	water ash
1	Gleditsia aquatica	water locust
	Gordonia lasianthus	loblolly bay

1		
2		
3	<i>Habenaria repens</i>	spider lily
4	<i>Hymenocallis palmeri</i>	alligator lily
5	<i>Iris hexagona</i>	prairie iris
6	<i>Itea virginica</i>	tasselwhite
7	<i>Juncus effusus</i>	soft rush
8	<i>Ludwigia repens</i>	
9	<i>Lycopus rubellus</i>	
0	<i>Micranthemum glomeratum</i>	
1	<i>M. umbrosum</i>	
2	<i>Nyssa biflora</i>	black gum
3	<i>Orontium aquaticum</i>	golden club
4	<i>Osmunda regalis</i>	royal fern
5	<i>Panicum hemitomon</i>	maidencane
6	<i>P. joorii</i>	
7	<i>Paspalum fluitans</i>	water paspalum
8	<i>Peltandra sagittifolia</i>	white arum
9	<i>P. virginica</i>	green arum
0	<i>Polygonum punctatum</i>	
1	<i>Pontederia cordata</i>	southern pickerelweed
2	<i>Potamogeton illinoensis</i>	illinois pondweed
3	<i>Sagittaria lancifolia</i>	arrowhead
4	<i>S. subulata</i>	"
5	<i>Salix caroliniana</i>	southern willow
6	<i>Salvinia rotundifolia</i>	water fern
7	<i>Saururus cernuus</i>	lizard's tail
8	<i>Taxodium ascendens</i>	bald cypress
9	<i>Thalia geniculata</i>	arrowroot
0	<i>Ulmus americana</i> var. <i>floridana</i>	florida elm
1	<i>Vallisneria spiralis</i>	eel-grass
2	b. Secondary wetland indicators:	
3	<i>Acer negundo</i>	box elder
4	<i>Carya aquatica</i>	water hickory
5	<i>Dichondra carolinensis</i>	

Gratiola virginiana

Ilex cassina

Juncus polycephalus

Liquidambar styraciflua

Magnolia virginiana

Nuphar luteum

Persea borbonia

Quercus laurifolia

Rhododendron serrulatum

Sabal palmetto

Styrax americana

Thelypteris normalis

Viburnum nudum

V. obovatum

Woodwardia virginica

hedge-hyssop

dahoon

softrush

sweetgum

swamp bay

yellow pond lily

red bay

laurel oak

wild azalea

cabbage palm

snowbell

possum haw

black haw

chain fern

10. Lacustrine System. The wetland portion of a lake or pond typically consists of a littoral zone vegetated with those species listed from Shallow Grass-pond or Freshwater Marsh. The littoral zone may also be contiguous with a swamp composed of those species listed for Cypress or Bay/Gum Swamp.

APPENDIX 10.11.3

LIST OF ENDANGERED OR THREATENED PLANT
AND ANIMAL SPECIES IN HILLSBOROUGH COUNTY

SOURCE: FLORIDA GAME AND FRESH WATER FISH COMMISSION

FLORIDA GAME AND FRESH WATER FISH COMMISSION

C. TOM RAINEY D.V.M.
Chairman, Miami

WILLIAM G. BOSTICK JR.
Vice Chairman, Winter Haven

CECIL C. BAILEY
Jacksonville

W. D. (DON) BAXTER
Marianna

THOMAS L. HIRES SR.
Tampa

ROBERT M. BRANTLY, Executive Director
F. G. BANKS, Assistant Executive Director



2202 Lakeland Hills Blvd.
Lakeland, Florida 33801

October 21, 1982

Mr. Phillip Kennedy
Camp, Dresser, and McKee, Inc.
One Center Plaza
Boston, Ma. 02103

Dear Mr. Kennedy:

Enclosed is a list of endangered or threatened plant and animal species in Hillsborough County that you requested. This list should be helpful to you as you conduct your routine environmental impact investigation on the proposed sights. Unfortunately, I cannot provide you any habitat or species occurrence maps for these areas. We do have nest locations of many of the eagle nests in the county and for your convenience I have enclosed a copy of the map.

If you have any questions regarding this information, please feel free to contact me at 1-800-282-8002.

Sincerely,

Gregory L. Holder
Regional Biologist
Bureau of Wildlife Resources

GLH/bw

Enclosure

Table 1. Legal status of endangered and potentially endangered species in Florida

Species	Legal Status ¹		
	GEWFC ²	USFWS ³	CITES ⁴
Fishes			
Shortnose sturgeon (<u>Acipenser brevirostrum</u>)	E	E	I
Atlantic sturgeon (<u>Acipenser oxyrinchus</u>)	SSC		II
Key silverside (<u>Menidia conchorum</u>)	E		
Bluestripe shiner (<u>Notropis callitaenia</u>)	T	UR	
Blackmouth shiner (<u>Notropis undescribed species</u>)	T		
Lake Eustis Pupfish (<u>Cyprinodon variegatus hubbsi</u>)	SSC		
Saltmarsh topminnow (<u>Fundulus jenkinsi</u>)	SSC		
Rivulus (<u>Rivulus marmoratus</u>)	SSC		
Okaloosa darter (<u>Etheostoma okaloosae</u>)	E	E	
Harlequin darter (<u>Etheostoma histrio</u>)	SSC		
Southern tessellated darter (<u>Etheostoma olmstedii maculaticeps</u>)	SSC		
Crystal darter (<u>Ammocrypta asprella</u>)	T	UR	
Key blenny (<u>Starksia starcki</u>)	SSC		
Shoal bass (<u>Micropterus undescribed species</u>)	SSC		
Suwannee bass (<u>Micropterus notius</u>)	SSC		
Amphibians and Reptiles			
Pine Barrens treefrog (<u>Hyla andersonii</u>)	SSC	E	
Gopher frog (<u>Rana arcolata</u>)	SSC		
American crocodile (<u>Crocodylus acutus</u>)	E	E	I
American alligator (<u>Alligator mississippiensis</u>)	SSC	T	II
Leatherback turtle (<u>Dermochelys coriacea</u>)	E	E	I
Atlantic green turtle (<u>Chelonia mydas mydas</u>)	E	E	I
Atlantic hawksbill turtle (<u>Eretmochelys imbricata imbricata</u>)	E	E	I
Atlantic ridley turtle (<u>Lepidochelys kempii</u>)	E	E	I
Atlantic loggerhead turtle (<u>Caretta caretta caretta</u>)	T	T	I
Key mud turtle (<u>Kinosternon bauri bauri</u>)	T		
Barbour's map turtle (<u>Graptemys barbouri</u>)	SSC		
Suwannee cooter (<u>Chrysemys concinna suwanniensis</u>)	SSC	UR	
Gopher turtle (<u>Gopherus polyphemus</u>)	SSC		II
Florida key mole skink (<u>Eumeces egregius egregius</u>)	SSC		

Species	Legal Status ¹		
	GFWFC ²	USFWS ³	CITES ⁴
Blue-tailed mole skink (<u>Eumeces egregius lividus</u>)	T		
Sand skink (<u>Neoseps reynoldsi</u>)	T		
Atlantic salt marsh water snake (<u>Nerodia fasciata taeniata</u>)	E	T	
Short-tailed snake (<u>Stilosoma extenuatum</u>)	T	UR	
Big Pine Key ringneck snake (<u>Diadophis punctatus acricus</u>)	T		
Red rat snake (<u>Elaphe guttata guttata</u>)--lower Keys population only	SSC		
Florida brown snake (<u>Storeria dekayi victa</u>)--lower Keys population only	T		
Miami black-headed snake (<u>Tantilla oolitica</u>)	T	UR	
Eastern indigo snake (<u>Drymarchon corais couperi</u>)	T	T	
Florida ribbon snake (<u>Thamnophis sauritus sackeni</u>)--lower Keys population only	T		
Birds			
Eastern brown pelican (<u>Pelecanus occidentalis carolinensis</u>)	T	E	
Wood stork (<u>Mycteria americana</u>)	E		
Golden eagle (<u>Aquila chrysaetos</u>)			II
Bald eagle (<u>Haliaeetus leucocephalus</u>)	T	E	I
Osprey (<u>Pandion haliaetus</u>)			II
Everglade kite (<u>Rostrhamus sociabilis plumbeus</u>)	E	E	
Marsh hawk (<u>Circus cyaneus</u>)			II
Southeastern kestrel (<u>Falco sparverius paulus</u>)	T		II
Eastern kestrel (<u>Falco sparverius sparverius</u>)			II
Pigeon hawk (<u>Falco columbarius</u>)			II
Peregrine falcon (<u>Falco peregrinus</u>)	E	E	I
Audubon's caracara (<u>Caracara cheriway auduboni</u>)	T		
Burrowing owl (<u>Athene cunicularia</u>)	SSC		
Cuban snowy plover (<u>Charadrius alexandrinus tenuirostris</u>)	E		
Florida sandhill crane (<u>Grus canadensis pratensis</u>)	T		II
American oystercatcher (<u>Haematopus palliatus</u>)	SSC		
Little blue heron (<u>Florida caerulea</u>)	SSC		
Snowy egret (<u>Egretta thula</u>)	SSC		
Reddish egret (<u>Dichromanassa rufescens</u>)	SSC		
Louisiana heron (<u>Hydranassa tricolor</u>)	SSC		

Species	Legal Status ¹		
	GFWFC ²	USFWS ³	CITES ⁴
Roseate spoonbill (<u>Ajaia ajaja</u>)	SSC		
Limpkin (<u>Aramus guarauna</u>)	SSC		
Roseate tern (<u>Sterna dougallii</u>)	T		
Least tern (<u>Sterna albifrons</u>)	T		
White-crowned pigeon (<u>Columba leucocephala</u>)	T		
Ivory-billed woodpecker (<u>Campephilus principalis</u>)	E	E	
Red-cockaded woodpecker (<u>Picoides borealis</u>)	T	E	
Florida scrub jay (<u>Aphelocoma coerulescens</u>)	T		
Marian's marsh wren (<u>Cistothorus palustris marianae</u>)	SSC		
Worthington's marsh wren (<u>Cistothorus palustris griseus</u>)	SSC		
Bachman's warbler (<u>Vermivora bachmanii</u>)	E	E	
Kirtland's warbler (<u>Dendroica kirtlandii</u>)	E	E	
Dusky seaside sparrow (<u>Ammodramus maritima nigriscens</u>)	E	E	
Cape Sable seaside sparrow (<u>Ammodramus maritima mirabilis</u>)	E	E	
Scott's seaside sparrow (<u>Ammodramus maritima peninsulae</u>)	SSC		
Wakulla seaside sparrow (<u>Ammodramus maritima junicola</u>)	SSC		
Florida grasshopper sparrow (<u>Ammodramus savannarum floridanus</u>)	E		
<u>Mammals</u>			
Gray bat (<u>Myotis grisescens</u>)	E	E	
Indiana bat (<u>Myotis sodalis</u>)	E	E	
Eastern chipmunk (<u>Tamias striatus</u>)	SSC		
Mangrove fox squirrel (<u>Sciurus niger avicennia</u>)	T		
Sherman's fox squirrel (<u>Sciurus niger shermani</u>)	SSC		
Goff's pocket gopher (<u>Geomys pinetis goffi</u>)	E		
Silver rice rat (<u>Oryzomys argentatus</u>)	E	UR	
Pallid beach mouse (<u>Peromyscus polionotus decoloratus</u>)	E		
Choctawhatchee beach mouse (<u>Peromyscus polionotus allophrys</u>)	T		
Perdido Bay beach mouse (<u>Peromyscus polionotus trissyllepsis</u>)	T		

Species	Legal Status ¹		
	GEWFC ²	USFWS ³	CITES ⁴
Florida mouse (<u>Peromyscus floridanus</u>)	T		
Key Largo cotton mouse (<u>Peromyscus gossypinus allapaticola</u>)	E	UR	
Chadwick Beach cotton mouse (<u>Peromyscus gossypinus restrictus</u>)	SSC		
Key Largo woodrat (<u>Neotoma floridana smalli</u>)	E	UR	
Florida black bear (<u>Ursus americanus floridanus</u>)--except in Baker and Columbia counties and Apalachicola National Forest	T		
Key Vaca raccoon (<u>Procyon lotor auspicatus</u>)	T		
Everglades mink (<u>Mustela vison evergladensis</u>)	T		
River otter (<u>Lutra canadensis</u>)		UR	II
Florida panther (<u>Felis concolor coryi</u>)	E	E	I
Bobcat (<u>Lynx rufus</u>)		UR	II
Caribbean manatee (<u>Trichechus manatus latirostris</u>)	E	E	I
Key deer (<u>Odocoileus virginianus clavium</u>)	T	E	
Blue whale (<u>Balaenoptera musculus</u>)	E	E	I
Finback whale (<u>Balaenoptera physalus</u>)	E	E	II
Sei whale (<u>Balaenoptera borealis</u>)	E	E	II
Humpback whale (<u>Megaptera novaeangliae</u>)	E	E	I
Sperm whale (<u>Physeter catodon</u>)	E	E	
<u>Invertebrates</u>			
Stock Island tree snail (<u>Orthalicus reses</u>)	T	T	
Bahamas swallowtail butterfly (<u>Papilio andraemon bonhotei</u>)	T	T	
Schaus swallowtail butterfly (<u>Papilio aristodemus ponceanus</u>)	T	T	
Atala butterfly (<u>Eumaeus atala florida</u>)		UR	
Oklawaha sponge (<u>Dorsilia palmeri</u>)		UR	
Kissimmee sponge (<u>Ephydatia subtilis</u>)		UR	
<u>Plants</u>			
Chapman's rhododendron (<u>Rhododendron chapmanii</u>)		E	
Harper's beauty (<u>Harperocallis flava</u>)		E	
Orchids (all species)			II
Cycads (all species)			II

Species	Legal Status ¹		
	GEWFC ²	USFWS ³	CITES ⁴
Euphorbias (all succulent species)			II
Lignum-vitae (<u>Guaiacum sanctum</u>)			II
Cacti (all species)			II

¹E=Endangered; T=Threatened; SSC=Species of Special Concern;
 UR=Under Review (for possible listing); I=included in Appendix I;
 II=included in Appendix II.

²Game and Fresh Water Fish Commission.

³U. S. Fish and Wildlife Service.

⁴Convention on International Trade in Endangered Species of Wild Fauna
 and Flora.

ENDANGERED AND THREATENED PLANTS AND ANIMALS IN HILLSBOROUGH COUNTY

PLANTS

Auricled spleenwort (E)
Florida Golden aster (E)
Curtiss Milkweed (T)
Needle Palm (T)
Jackson vine (T)
Spoon Flower (R)

MAMMALS

Sherman's Fox Squirrel (E)
Florida Mouse (T)
Big Brown Bat (R)
Hoary Bat (R)
Southeastern Big-Eared Bat (R)
Florida Weasel (R)

BIRDS

Wook Stork (E)
Red Cockaded Woodpecker (E)
Southern Bald Eagle (E)
Osprey (T)
Southeastern American Kestrel (T)
Florida Sandhill Crane (T)
Florida Scrub Jay (T)
Short-Tailed Hawk (R)

AMPHIBIANS AND REPTILES

Florida Gopher Frog (T)
Short-Tailed Snake (E)
Suwannee Booter (T)
American Alligator (T)

E - Endangered
T - Threatened
R - Rare

APPENDIX 10.12

NOISE TECHNICAL ANALYSIS

APPENDIX 10.12

NOISE TECHNICAL ANALYSIS

Existing Noise Environment

This section provides the background information necessary to evaluate, quantify, and locate potential increases of noise levels (above baseline or existing ambient noise levels) due to the proposed construction and operation of the Hillsborough County Resource Recovery Facility.

Noise is most often and most simply defined as unwanted sound. The magnitude of air pressure fluctuations produced by sound is referred to as the sound level and is measured in decibels (dB). The sound pressure disturbance that humans are capable of hearing is very small, relative to atmospheric pressure. Nevertheless, the range of pressures from the faintest to the loudest sound is very large. The decibel scale compresses this large range of pressures using a logarithmic function into a meaningful scale from 0 dB which corresponds to the faintest audible sound, to in excess of 140 dB which produces pain in humans. Also, because human hearing sensitivity is frequency dependent, the A-weighting filter, which simulates this human hearing frequency dependency, is used in measuring and reporting environmental noise levels and is annotated "dBA".

Since the decibel scale presents a compressed view of actual sound pressure variations, the manner in which the decibel scale is related to these pressure variations is complicated. A 26 percent change in the energy level changes the sound level one dB. The most sensitive human ear would not detect this change, except in an acoustical laboratory. A doubling of the energy level would result in a 3-dB increase which would be barely perceptible in natural environments. A tripling in energy level would result in a clearly noticeable change of 5-dB in the sound level. A change of ten times in the energy level would result in a 10-dB change in the sound level. This would be perceived as a doubling (or halving) of the apparent loudness.

The noise descriptors used in this analysis are the equivalent sound level, L_{eq} and the exceedence levels L_{10} , L_{50} , and L_{90} . The equivalent sound level is a single value of sound level for any desired duration, which includes all of the time-varying sound energy in the measurement period. The equivalent noise level correlates reasonably with the effects of noise on people for wide variations in environmental sound levels and time patterns. It is also easily measurable by available equipment. The exceedence levels present the noise levels which are exceeded in a given percentage (defined by subscript) of the time. For example, the L_{10} is the noise level which is exceeded 10 percent of the time and is regarded as a measure of the more serious intruding noise levels, whereas the L_{90} is the noise level exceeded 90 percent of the time and is considered the ambient noise level (Peterson 1980).

The County of Hillsborough has criteria for ambient noise levels, also in equivalent sound levels and are used for comparison of monitored data as well as the predicted data. These elements, categorized by land use for the appropriate time periods, are presented in Table 1.

Table 1 HILLSBOROUGH COUNTY NOISE CRITERIA
(Sound Levels by Receiving Land Use)

Receiving Land Use Category	Time	Sound Level Limit dBA (Leq)
Residential, Public Space, Open Space	7 a.m.-10 p.m.	60
	10 p.m.-7 a.m.	55
Commercial or Business	7 a.m.-10 p.m.	65
	10 p.m.-7 a.m.	60
Manufacturing or Industrial	At All Times	75

Source: HCEPC (1976)

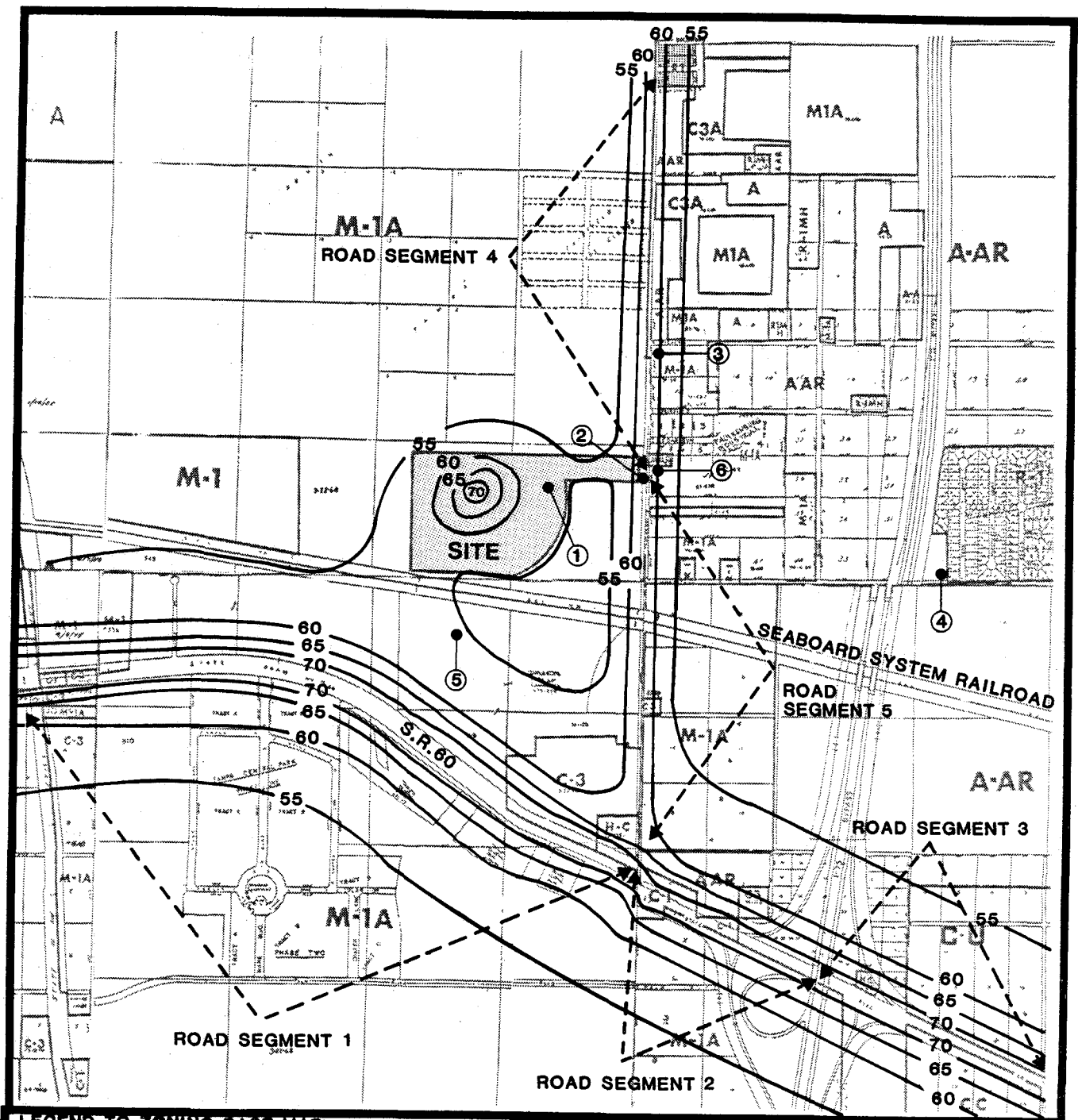
Since the operation of the facility (designed with noise control equipment) should not result in significantly increasing noise levels, the major noise source would be the truck traffic approaching and departing from the proposed facility. Because the terrain grade does not vary greatly, noise levels of trucks accelerating from a stop should not be greater than the noise levels associated with normal road speeds. To aid in assessing potential increases over the current noise levels, a baseline noise monitoring program was implemented. The program was designed to represent the current traffic induced noise levels in the area. Sound level measurements were obtained in the vicinity of the site by Camp Dresser and McKee (CDM) as well as by the Hillsborough County Environmental Protection Commission (1983). The work plan and correspondence related to the ambient noise monitoring program is included in Exhibit A of this appendix.

The baseline sound level survey was designed to provide a gross survey of ambient noise conditions during day and night time periods. The survey determined representative ambient noise levels at locations on and adjacent to the facility site. The locations for this noise inventory are the circled numbers 1 through 6 as shown on Figure 1 and the basis for their selection is described in Table 2.

Noise measurements were made using a hand-held meter which measures dBA sound pressure levels. The meter is a Columbia Research Laboratories, Inc., Sound Pressure Level Meter, Model SPL-103, Serial Number D2204.

Spot noise measurements were made at each of the above indicated locations in order to determine a representative sound pressure level for the daytime period (7:00 a.m. to 10:00 p.m.) and a representative sound pressure level for the nighttime period (10:00 p.m. to 7:00 a.m.). Measurements at each location were conducted every five seconds for twenty-five to sixty seconds with a full 360° sweep so that omnidirectional noise sources did not overly influence the ambient noise estimates for a particular location. The one minute equivalent sound levels (Leq) for two representative peak hours and one nighttime hour are presented in Table 3.

Measurements were taken by CDM at five monitoring locations (1 through 5) during the approximate time periods noted below:



LEGEND TO ZONING BASE MAP

A Agricultural
A-AR Acreage Agricultural Residential
R-1 Single Family Residential
R-1MH Single Family Residential & Mobile Home

C-C Community Commercial
C-U Community Unit
H-C Highway Commercial
C-1 Neighborhood Commercial

C-3A Limited Light Industrial
C-3 Commercial Light Industrial
M-1A Restricted Industry
M-1 Industrial

**HILLSBOROUGH COUNTY
 ENERGY RECOVERY PROJECT**

**FIGURE 1
 NOISE MONITORING SITE LOCATIONS,
 ROAD SEGMENT LOCATION,
 AND IMPACT ANALYSIS**

Table 2 INFORMATION ON SELECTED NOISE MONITORING LOCATIONS

Monitoring Site Number	Rationale for Selection
1	This location was selected to collect existing ambient noise levels at the boundary of that portion of the site where development would occur (between the proposed facility and the nearest residential receptors).
2	This location was chosen because it is near the closest residence, while remaining on the site property. This location is representative of the ambient conditions at L.B. Foster Pipe Company just to the south.
3	This location was selected because it is in the vicinity of the closest main residential area to the site and Faulkenburg Road. It is also zoned Acreage-Agricultural Residential (A-AR).
4	This location was selected because it is the closest established neighborhood to the site. It is zoned R-1 (Single Family Residential).
5	This location is the nearest site to the proposed facility that is planned for development. Currently undeveloped, this location is within the Interstate Park of Commerce. It is anticipated that warehousing/light industrial activities will locate here in the future.
6	This location was selected because it is at the closest residence to the proposed site and site access road. This area is zoned A-AR. An M-1A district (Restricted Industry) presently used for mixed light industrial and limited residential surrounds the A-AR district. Four single family dwellings are located along this stretch of Faulkenburg Road.

Table 3 NOISE BASELINE DATA SUMMARY
2-3 NOVEMBER 1983

Site	Time	Leq
1 (CDM)	8:00 AM	56
	6:00 PM	53
	10:00 PM	49
2 (CDM)	8:00 AM	60
	6:00 PM	56
	10:00 PM	56
3 (CDM)	8:00 AM	66 ^a
	6:00 PM	66 ^a
	10:00 PM	50
4 (CDM)	8:00 AM	52
	6:00 PM	55
	10:00 PM	49
5 (CDM)	8:00 AM	49
	6:00 PM	51
	10:00 PM	44
6 (HCEPC)	8:00 AM	63 ^{a,b}
	6:00 PM	61 ^{a,b}
	10:00 PM	55 ^b

Source: HCEPC (1983a), CDM

^a Currently exceeds Hillsborough County
EPC noise criteria.

^b 1-Hour Leq.

<u>Date</u>	<u>Daytime</u>	<u>Nighttime</u>
November 2, 1983	3:30 p.m.-4:00 p.m. 5:30 p.m.-6:00 p.m. 8:30 a.m.-9:00 p.m.	11:15 p.m.-11:45 p.m.
November 3, 1983	8:30 a.m.-9:00 a.m. 12:15 p.m.-12:45 p.m.	5:15 a.m.-5:45 a.m.

During each measurement, the monitoring station, noise level in dBA, time, temperature and weather conditions, wind speed and direction, and other notes (such as major noise sources) were recorded.

In addition to these measurements, the Hillsborough County Environmental Protection Commission (HCEPC) provided 24-hour monitoring data at monitoring Site 6. The HCEPC set up a Metrosonics 602 sound level analyzer approximately 50 feet east of Faulkenburg Road. The County's three peak hour Leqs corresponding to CDM's noise measurement periods are presented in Table 3. Material related to the Hillsborough County EPC 24-hour monitoring near the site is included in Exhibit B of this appendix.

Because heavy duty trucks emit higher noise levels than light trucks and cars, the percentage of each category for each road segment was identified for the resultant noise environment modeling discussed later. Therefore, a traffic count was conducted along Faulkenburg and Woodberry Roads for the two segments (see Figure 1, road segments 4 and 5) of the Faulkenburg Road to determine the current traffic mix. Because hourly mix data was not available for State Road 60, these percentages were applied to the daily traffic data for that road segment. The specific hourly traffic counts for the two peak hours (8:00 AM and 6:00 PM) and the one nighttime hour (10:00 PM) for the five road segments (see Figure 1) and for the two possible cases for traffic configuration on Faulkenburg Road are presented in Table 4.

Case 1 assumes that the county will direct the specific routes to be utilized by the transfer trailers coming from the County's NW Transfer Station and packer trucks coming from the NE area of the County. Since the north portion of Faulkenburg Road (Segment 4) is much more utilized by residential traffic and trailers would be directed to use the south portion of Faulkenburg Road (Segment 5). Case 2 does not assume any such traffic

Table 4 TRAFFIC DATA USED IN PEAK HOUR ANALYSIS

Segment	Daytime 8:00 AM	Daytime 6:00 PM	Nighttime 10:00 PM
SR60 Segment 1 -- 55 mph			
Average Hourly Traffic (existing)	3474	4089 ^a	1234
Average Hourly Traffic (with Facility)	3506	4089 ^a	1240
SR60 Segment 2 -- 55 mph			
Average Hourly Traffic (existing)	3853	4489 ^a	1355
Average Hourly Traffic (with Facility)	4004	4489 ^a	1358
SR60 Segment 3 -- 55 mph			
Average Hourly Traffic (existing)	3853	4489 ^a	1355
Average Hourly Traffic (with Facility)	3914	4489 ^a	1357
Faulkenburg Segment 4			
Average Hourly Traffic (existing)	478	556 ^a	168
Case 1 - Average Hourly Traffic (w/Facility)	487	556 ^a	174
Case 2 - Average Hourly Traffic (w/Facility)	592 ^a	556	174
Faulkenburg Segment 5			
Average Hourly Traffic (existing)	401	467 ^a	141
Case 1 - Average Hourly Traffic (w/Facility)	584 ^a	467	150
Case 2 - Average Hourly Traffic (w/Facility)	479 ^a	467	150

^a Peak traffic volume hour used in Isopleth Analysis in Figure 7 and Table 6

routing from the county, and estimates the traffic split as 60 percent for Segment 4 and 40 percent for Segment 5 (versus 10 percent and 90 percent respectively for Case 1).

Resultant Noise Environment

Construction Impacts. There are two basic areas of concern associated with potential noise related impacts. One area is with short-term noise impacts from construction and the other area is with longer-term impacts from facilities operation. While construction noise impacts are important, their short-term nature and availability of effective mitigative measures minimizes their significance in what is essentially a noise analysis for long-term land use impacts.

Noise at a given construction site will depend on the phase of construction and the type of equipment being used. Construction noise will vary with time of day. Additionally, the noise produced by construction equipment depends on the phase of construction and the type of equipment being used.

The noise produced by construction equipment depends upon the source of power used to run the equipment, and the material properties and operational characteristics of the equipment. A noise characterization, based on the dominant noise sources of commonly used construction equipment is:

- o Earth moving equipment, including excavating machinery such as bulldozers, shovels, front-end loaders, and trucks
- o Materials handling equipment, such as cranes, concrete mixers, and concrete pumps
- o Stationary equipment, such as pumps and compressors

Typical construction equipment noise ranges are shown in Table 5.

Construction noise impacts, as mentioned, will be of short duration. Because of the shielding due to vegetation, coupled with the industrialized nature of the local area, these temporary noise levels should result in only a slightly adverse impact on the local area.

Table 5 CONSTRUCTION EQUIPMENT SOUND LEVELS

Equipment	Sound Level at 50 ft. (dBA)
<u>Earth Moving</u>	
Compactors (Rollers)	72 - 75
Front Loaders	72 - 85
Backhoes	72 - 93
Tractors	76 - 93
Scrapers, Graders	80 - 94
Trucks	83 - 95
<u>Material Handling</u>	
Concrete Mixers	75 - 88
Concrete Pumps	82 - 85
Cranes (Movable)	76 - 87
Cranes (Derrick)	86 - 89
<u>Stationary</u>	
Pumps	69 - 71
Generators	71 - 83
Compressors	75 - 87
<u>Impact Equipment</u>	
Pneumatic Wrenches	82 - 89
Jack Hammers & Rock Drills	81 - 98
Impact Pile Drivers (Peaks)	95 - 110
<u>Miscellaneous</u>	
Vibrator	69 - 81
Saws	71 - 82

Source: US EPA (January 1976)

Operational Impacts. The operation of the proposed facility involves many activities and pieces of equipment and machinery that are major noise generators. Noise levels may exceed 90 dBA in the tipping area of a mass-burning plant if refuse trucks dump within an enclosed building housing both tipping bays and charging floor. Studies at refuse transfer stations and refuse burning plants with enclosed tipping areas show noise levels of 93 to 96 dBA and up to 102 to 104 dBA. The primary sources of noise at all locations were the packer-ejection mechanism during truck dumping, truck traffic, and release of the air brakes on the packers and transfer vans. All the noise levels, with the exception of truck traffic, were significantly attenuated or reduced outside the building and with increasing distance from the buildings.

Additionally, induced and forced draft fans generally have high decibel levels. Single frequency noise levels are primary concerns with this equipment.

Walls (cinder block) and doors (heavy wood) will cause decibel loss during transmission through the material, ranging from 25 to 40 dBA. Thus, if a 100 dBA noise source is in operation within the facility structure, directly outside the structure about 75 dBA level would be noted.

CDM's Noise Impact Model (NIM), which is based on conventional techniques (White 1975, BLM 1982, Von Giecke 1977), was used to predict the reduction of sound pressure levels from a noise source over distance outdoors. The basic algorithm used in the model represents the standard formulation of attenuation of noise over distance. This formula has been verified for a variety of sources by the U.S. EPA, Department of Commerce, and Department of Transportation. A flow diagram of the NIM algorithm is illustrated on Figure 2. It was assumed that the facility would be an omnidirectional noise source; therefore, the sound would be radiated equally in all directions from the source. Decibel loss over distance from this point source was calculated using a normal atmospheric attenuation factor of 6dB loss with a doubling of distance.

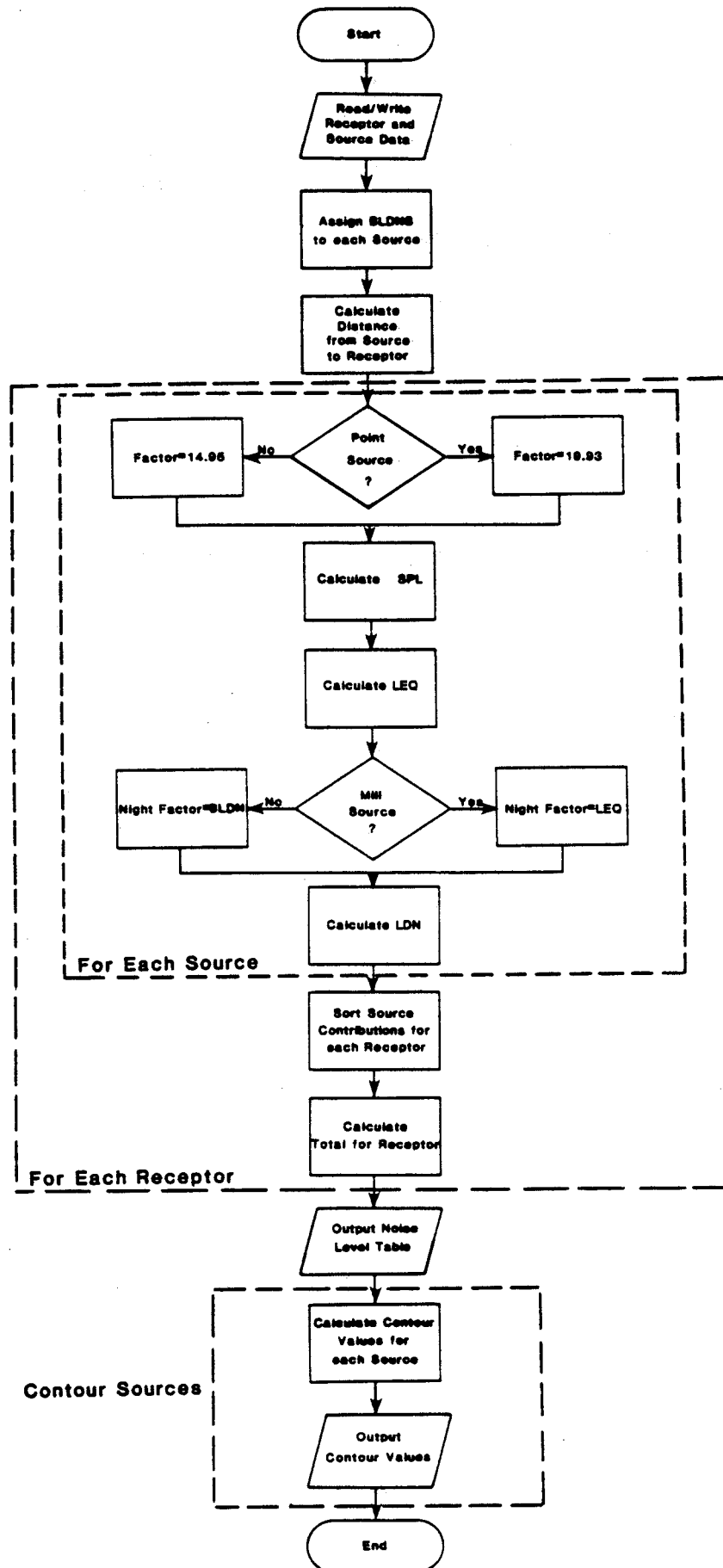


Figure 2 CDM Noise Model (NIM)
Algorithm Flowchart

For the noise analysis, it was assumed that there would be an enclosed tipping bay and that trucks, overhead cranes, and fans within the facility would be operating concurrently. The reference noise source level and distance was assumed to be 75dBA at 50 feet from the facility.

For the noise analysis a sensitive receptor is defined as a residential area, school, hospital, or other type of community institution. There are two existing groups of receptors potentially affected by noise impacts. The closest sensitive receptor is the residence directly across from the entrance to the site about 1,700 feet east of the proposed source (Site 6 on Figure 1). Although not considered a "sensitive receptor", another receptor potentially affected by noise is the L.B. Foster Pipe Company (a light industrial area) about 1400 feet east of the facility (represented by Site 2 on Figure 1).

The predicted sound pressure reduction over the 1,400 feet to the light industrial use area would be about 29 dBA. The perceived sound pressure level from the proposed facility would be about 46 dBA (75 minus 29). This is well below the current observed daytime ambient level. The predicted sound pressure reduction over the 1,700 feet to the nearest residence would be about 30 dBA. The perceived sound pressure level from the proposed facility at this residential location would be about 45 dB (75 minus 30). This is well below the current observed daytime ambient level at this location. All other potential sensitive receptors are beyond this distance and, therefore, would not be impacted by noise levels from the operation of the proposed facility itself.

Conclusions

From this analysis it can be seen that daytime operations of the proposed facility would not result in any perceived noise impacts at the closest sensitive receptors. Nighttime ambient noise monitoring conducted by HCEPC at the closest residence indicate nighttime noise levels of 55 dBA. With the expected facility noise levels at the location of the sensitive receptors to be in the vicinity of 44 to 46 dBA, no significant impact is anticipated.

Efforts will be made during the design phases of this project to include appropriate mitigative measures for reducing expected noise levels. Mitigative measures presently being considered include:

- o locating major noise producing components, such as ID (induced draft) fans on the far side of the structure from sensitive receptors;
- o locating individual components which can be separated from the structure, i.e., condensers at remote locations on the site;
- o use of structural noise screens and where appropriate, planting of vegetative buffers; and
- o requiring the use of higher performance standards for noise producing equipment.

It should be noted that while an additional effort will be made to minimize noise levels, the expected sound levels at the receiving receptors will be well below Hillsborough County EPC noise criteria. The rules of the Hillsborough County Environmental Protection Commission (Rule 1-10) allow a dBA sound level limit of 55 and 60 for a receiving residential land use category between the nighttime hours of 10 p.m. and 7 a.m. and daytime hours of 7 a.m. to 10 p.m., respectively. The predicted noise levels of the proposed facility will be well below these limits.

Noise levels from the facility at other residential areas in the vicinity of the site will be well below existing day and nighttime ambient levels. There would be no impact to ambient noise levels in the vicinity of the nearest established neighborhood, Woodberry Estates, which is located about 2,700 feet east of the proposed resource recovery site and 4,200 feet east of where the proposed facility would be situated on the site.

As the design of the facility becomes finalized the expected level of noise to be experienced at the closest sensitive receptors will again be evaluated. The predicted nighttime noise levels will be calculated and the need for further mitigative measures will be considered as appropriate. The facility can be designed to minimize the potential adverse impact to local nighttime ambient noise levels.

The operation of the proposed facility will increase daytime truck traffic levels along roadways in the vicinity of the site. Truck traffic will be restricted to daytime hours, more specifically 8 a.m. to 5 p.m. As a result of the truck traffic, noise levels can be expected to increase somewhat in the vicinity of the site's access road, Faulkenburg Road, and State Road 60.

The noise that would be generated by traffic related to the proposed facility was determined by using the FHWA Level 2 Highway Traffic Noise Prediction Model, Stamina 2.0 (1982). The results compared the existing modeled sound levels with and without the proposed resource recovery facility. The existing modeled noise levels, which are presented in Table 6 and 7, compare well with the 1 minute Leqs monitored by CDM and with the 15-minute Leqs monitored by the County. Table 6 presents the predicted 1-hour equivalent sound levels for two daytime peak traffic hours and one nighttime traffic hour for each of the six receptors with and without the facility traffic and facility noise sources. Table 7 presents the peak traffic noise with and without the facility at the given intervals of distance from the roadway. The hour which has the highest traffic volume for each road segment was used to determine the composite "peak" traffic hour in Table 7. These hours are typically associated with the afternoon rush hour.

The noise level at a point away from the roadway is a function of:

- o The distance from the roadway
- o The relative elevations of roadway and receiver
- o Traffic volume on the roadway
- o The percentage of light-duty (two axles and four tires), medium duty (two axles and six tires), and heavy-duty (more than three axles) vehicles
- o Vehicle speed
- o Roadway grade
- o Topographic features such as trees, shrubbery, and buildings
- o The noise source height of the vehicles

Table 6 NOISE IMPACT ASSESSMENT SUMMARY FOR HILLSBOROUGH COUNTY
RESOURCE RECOVERY FACILITY

Case	Receptor Site Locations					
	1	2	3	4	5	6
Leq Noise Level without Facility (6:00 PM) Peak Day Traffic	49.4	62.6	62.9	45.4	51.9	62.6
Leq Noise Level with Facility (6:00 PM) Peak Day Traffic	52.4 ^a	62.6	62.9	45.4	54.9 ^a	62.6
Leq Noise Level without Facility (8:00 AM) Day Traffic	48.7	62.0	62.3	44.8	51.2 ^a	62.0
Leq Noise Level with Facility (8:00 AM) Case 1 Day Traffic	52.2 ^a	62.8	62.4	45.0	54.4 ^a	62.8
Leq Noise Level with Facility (8:00 AM) Case 2 Day Traffic	52.2 ^a	62.8	63.2	44.9	54.3 ^a	62.8
Leq Noise Level without Facility (10:00 PM) Peak Night Traffic	44.2	57.4	57.7	40.2	46.7	57.4
Leq Noise Level with Facility (10:00 PM) Peak Night Traffic	51.0 ^a	57.6	57.9	40.3	52.0 ^a	57.6

^a Increase due to facility operations

NOTE: All values are 1-hour equivalent sound levels. See Figure 1 for location of receptors.

Table 7 PEAK HOUR NOISE LEVEL ATTENUATION FROM ROADWAYS -
HILLSBOROUGH RESOURCE RECOVERY FACILITY

Roadway Section	Distance	Leq ^a	Predicted Noise Levels						
			Without Facility			Leq ^a	With Facility		
			L10	L50	L90		L10	L50	L90
SR60 #1	50	73.9	76.5	73.1	69.6	73.9	76.5	73.1	69.6
	100	69.2	71.4	68.7	66.1	69.2	71.4	68.7	66.1
	150	66.4	68.3	66.0	63.7	66.4	68.3	66.0	63.7
	200	64.3	66.1	64.0	61.9	64.3	66.1	64.0	61.9
	300	61.2	62.8	61.0	59.2	61.2	62.8	61.0	59.2
	500	57.2	58.6	57.0	55.5	57.2	58.6	57.0	55.5
	1,000	51.5	52.6	51.3	50.1	51.5	52.6	51.3	50.1
SR60 #2 & SR60 #3	50	74.3	76.9	73.5	70.2	74.3	76.9	73.5	70.2
	100	69.6	71.7	69.2	66.6	69.6	71.7	69.2	66.6
	150	66.8	68.6	66.4	64.3	66.8	68.6	66.4	64.3
	200	64.7	66.4	64.4	62.4	64.7	66.4	64.4	62.4
	300	61.6	63.2	61.4	59.7	61.6	63.2	61.4	59.7
	500	57.6	58.9	57.4	56.0	57.6	58.9	57.4	56.0
	1,000	51.9	53.0	51.8	50.6	51.9	53.0	51.8	50.6
Faulkenburg #4	50	62.9	66.4	60.0	53.7	63.2	66.7	60.4	54.1
	100	58.4	61.7	56.6	51.4	58.7	61.9	56.9	51.9
	150	55.8	58.9	54.5	50.1	56.1	59.1	54.8	50.5
	200	54.0	56.8	52.9	49.0	54.2	57.0	53.2	49.4
	300	51.5	53.9	50.8	47.6	51.7	54.2	51.0	47.9
	500	48.5	50.4	48.1	45.8	48.7	50.6	48.4	46.1
	1,000	45.2	46.4	45.1	43.9	45.4	46.5	45.3	44.1
Faulkenburg #5	50	62.2	65.8	59.1	52.5	63.2	66.7	60.4	54.1
	100	57.8	61.2	55.9	50.6	58.7	62.0	57.0	52.0
	150	55.4	58.4	54.0	49.6	56.2	59.2	55.0	50.8
	200	53.7	56.5	52.7	48.9	54.5	57.2	53.6	49.9
	300	51.6	53.9	51.0	48.2	52.2	54.5	51.7	48.9
	500	49.5	51.0	49.3	47.6	49.9	51.4	49.7	48.0
	1,000	48.1	48.8	48.0	47.2	48.2	49.0	48.2	47.4

^a Hourly Leq

Trucks traveling along Faulkenburg Road will probably maintain a relatively steady speed of 45 mph. At the railroad tracks and at the access road to the site these trucks will have to slow down to about 20 mph or stop.

Nevertheless, the model treated the velocity as a constant higher velocity to maintain the conservatism of the analysis. Trucks hauling along State Road 60 will maintain a speed of 55 mph. Faulkenburg Road and the proposed access road will not have grades that could increase truck generated noise levels.

The maximum hourly truck volume expected to be added to Faulkenburg Road from the proposed project is 106 vehicle trips. At this volume, the median sound level expected from the trucks along with the current existing trucks traveling along Faulkenburg at 100 feet from the roadway is between 58 to 59 dBA with or without the facility. The closest residence along Faulkenburg Road is about 100 feet from the roadway. Truck traffic could be expected to slightly increase ambient noise levels by 0.5 to 1 dBA during this maximum truck volume period along Faulkenburg Road south of the sites entrance. As stated earlier, an increase of 3dB is barely perceptible in the natural environment. The Hillsborough County EPC noise criteria allows a sound level limit of 75 dBA at manufacturing or industrial receiving land uses, a level of 65 dBA at commercial or business receiving land uses, and a sound level limit of 60 dBA at residential land uses between the hours of 7 a.m. and 10 p.m. The peak hourly traffic with the facility traffic is not expected to exceed the County criteria at any of the receptors except at Site 6. Based on the one 24 hour measurement made by HCEPC at this site, the noise criteria are currently being exceeded.

Monitoring by the county at Site 6, which is at the residence along the east side of Faulkenburg Road indicate the existing daytime equivalent noise levels (Leqs) range between 61-64 dBA and nighttime Leqs range from 55-58 dBA. Modeling of the existing traffic levels at all of the monitoring sites, as shown on Table 6 at the indicated peak and nighttime hours along with the steady noise source of 75 dBA at 50 ft from the facility, again predicts an insignificant increase of only 0.5 to 1.0 dBA above existing monitored and modeled data.

Figure 1 also presents the contour analysis using data from the modeling runs. Contours are shown as broad lines and are in 5 dBA increments ranging from 75 to 55 dBA. These contours represent the worst case (maximum noise levels) for each receptor from peak traffic for the hour with the highest existing traffic volume as indicated on Table 4 and the peak hourly traffic associated with the facility operations. Care must be exercised when interpreting these results because the contour lines were generated using rush hour traffic values which occur only two hours a day and thus are not representative of a 24-hour period. This map indicates no substantial increase of noise levels (between 0-1 dBA) due to this facility.

REFERENCES

- Bureau of Land Management. 1982. Guidelines for preparing noise impact analysis. Transportation and Noise Analysis Handbook, 17 February 1982.
- Camp Dresser & McKee Inc. (CDM) 1983. Project file: Hillsborough County noise monitoring data sheets. 2-3 November.
- Hillsborough County Environmental Protection Commission (HCEPC). 1976. Rules of the Hillsborough County Environmental Protection Commission, Chapter 1-10, 1976.
- _____. 1983. Letter of transmittal from P. Berry to P. Kennedy of CDM, 11 November 1983.
- Peterson, A.P.G. 1980. Handbook of noise measurement. Ninth Edition. Gen. Rad. Inc. Concord, Massachusetts.
- United States Environmental Protection Agency. 1971. Noise from construction equipment and operations, building equipment and home appliances, 31 December 1971. NTID300.1.
- Von Gierke, H.E. 1977. Guidelines for preparing environmental impact statements on noise. Sponsored by the Office of Naval Research, AO/A-044-384. June, 1977. National Academy of Sciences.

EXHIBIT A

WORK PLAN AND CORRESPONDENCE
RELATED TO NOISE MONITORING PROGRAM

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To: _____	Locn.: _____	
To: _____	Locn.: _____	
To: _____	Locn.: _____	
From: _____	Date: _____	
Reply Optional []	Reply Required []	Info. Only []
Date Due: _____	Date Due: _____	

TO: Buck Oven

FROM: Dennis Wile *DW*

DATE: September 13, 1983

SUBJECT: Hillsborough County Resource Recovery Project; Plan of Study, Noise Assessment

Since Hillsborough County has a noise ordinance, I recommend that Bob Jones (Environmental Specialist, Hillsborough Environmental Protection Commission, 9th Avenue, Tampa, 33605, 813/272-5960) be contacted to determine possible violations of the County's receiving land use standards of 60 dB(A), 7 AM to 10 PM, and 55 dB(A), 10 PM to 7 AM, for any residential area that might be impacted. No predicted levels have been indicated by this report.

Enclosed are recommended levels for construction equipment that might be used during the construction. All contractors and subcontractors coming onto or leaving the site should be required to meet the state's noise standards for motor vehicles as monitored and enforced by the Florida Highway Patrol.

Concerns over startup times (7:00 AM) and other voluntary compliance with reasonable hours for construction (startup or shutdown) during weekdays and weekends should be adhered to. All pumps should be contained by berms or adequate acoustic wall construction and the noisiest of reciprocating engines should be equipped with hospital-type mufflers to provide relief for any residential site that may be affected by construction activity.

If the ambient levels for the site will be exceeded once the plant is in operation, consideration should be given to operational engineering noise control to minimize such noise impact on residential sites nearby.

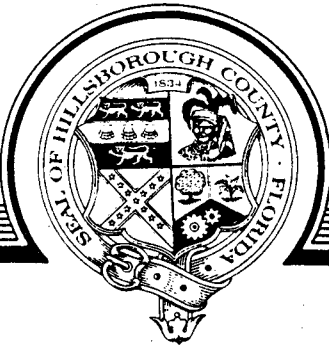
Transportation to and from the site should be routed to minimize noise or dangerous traffic impact on any nearby residential site once the plant is in operation. All trucks hauling recoverable material to the plant for waste fuel should also meet the in-use truck standards in Florida regulations. It would be advisable to publish a telephone number for the plant in the event complaints may develop. Immediate response should be the hallmark of the management in handling such events and attempts to furnish relief should be made posthaste.

DEW:mpt

Attachment

COUNTY OF HILLSBOROUGH

P.O. BOX 1110 TAMPA, FLORIDA 33601



NORMAN W. HICKEY, COUNTY ADMINISTRATOR

October 20, 1983

Mr. Hamilton S. Oven, Jr.
Administrator
Power Plant Siting Section
Florida Dept. of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: Hillsborough County Solid Waste Energy
Recovery Program - Plan of Study

Dear Mr. Oven:

This letter describes the proposed ambient noise monitoring program and analytical procedures to be used in evaluating potential noise impacts from the proposed Hillsborough County energy recovery project. The material presented herein expands upon Section 6.2.9 of the Plan of Study for Completion of the Application for Certification of Proposed Electrical Power Generating Plant Site submitted to FDER in August, 1983.

Due to the scale of the proposed facility (ultimately capable of processing 1,600 tons per day of MSW) and the type of equipment required for its construction and operation (fans, trucks, etc.), the evaluation of potential noise issues was included in the Plan of Study for the Application for Site Certification. However, it is important to realize that noise impacts are not expected to be major at the facility as presently envisioned.

Preliminary noise analyses conducted during this project's site selection activities indicated that noise impacts from plant operation would not be a problem. Influencing factors leading to this conclusion include:

- readily available and commonly used mitigation measures that can be easily integrated into facility design.

Mr. Hamilton S. Oven
Page Two
10/20/83

- adequate buffer distances between the proposed plant location and nearby sensitive receptors.
- existing ambient noise levels which are presently within the limits set for various land uses by Hillsborough County's Noise Criteria.

Since the operation of the facility (designed with noise control equipment) should not result in major noise problems, the objective of the noise analysis to be conducted for the Application for Site Certification is principally threefold:

1. Determine potential noise impacts and required mitigation measures associated with construction activities.
2. Determine potential noise impacts and required mitigation measures associated with project related truck traffic.
3. Verify and present the conclusions developed during the preliminary noise analysis, i.e., plant operation will not result in major noise problems.

The principal analytical techniques to be used to predict noise impacts will be similar to those presented in the following references:

"Direct Environmental Factors at Municipal Wastewater Treatment Works", EPA-430/9-76-003.

"Highway Noise - General and Control", Transportation Research Board, Report 173.

"Highway Noise - A Design Guide for Prediction and Control", Transportation Research Board, Report 174.

Hillsborough County Noise Criteria (Rules of the Hillsborough County Environmental Protection Commission, Chapter 1-10, 1976) will be used in evaluating the significance of noise impacts at receiving land uses. In addition, the items noted by Dennis Wile of FDER in his memo to Buck Oven (dated September 13, 1983) will be addressed.

Preliminary ambient noise data was obtained by Camp, Dresser and McKee, Inc. in the vicinity of the site during the preliminary site selection activities for this project. In support of the noise analyses to be conducted for this project, additional data collection activities are planned. This includes obtaining more ambient noise information on and near the site and estimating traffic mix along Faulkenburg Road.

Mr. Hamilton S. Oven
Page Three
10/20/83

The proposed noise inventory is designed to provide a gross survey of ambient noise conditions during day and night time periods. The inventory will determine representative ambient noise levels at locations on and adjacent to the facility site. The locations proposed for this noise inventory are shown on Figure 1 and the basis for their selection is described in Table 1.

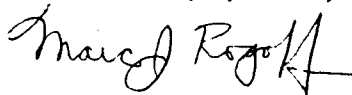
Noise measurements will be made with a hand-held meter which measures dBA sound pressure levels. Spot noise measurements will be made at each of the indicated locations in order to determine a representative sound pressure level for the daytime period (7:00 a.m. to 10:00 p.m.) and a representative sound pressure level for the nighttime period (10:00 p.m. to 7:00 a.m.). From this data a representative combined day/night weighted measure can be calculated. Measurements at each location will be conducted with a full 360° sweep so that omnidirectional noise sources will not overly influence the ambient noise estimates for a particular location. If the Hillsborough County Environmental Protection Commission (HCEPC) provides 24-hour monitoring data, these data will be used to supplement the measurements described above.

Traffic mix information will be obtained by spot checks along Faulkenburg Road. This data will be used to estimate the existing truck traffic volume and associated noise levels.

If you have any questions or comments, please do not hesitate to call. Please see that the appropriate agencies, including the HCEPC Noise Group, are provided with a copy of this Noise Work Plan.

We plan to conduct the data collection activities described in this letter during early November, so any recommended changes or comments received before November 4, 1983, could be easily integrated into our data collection activities.

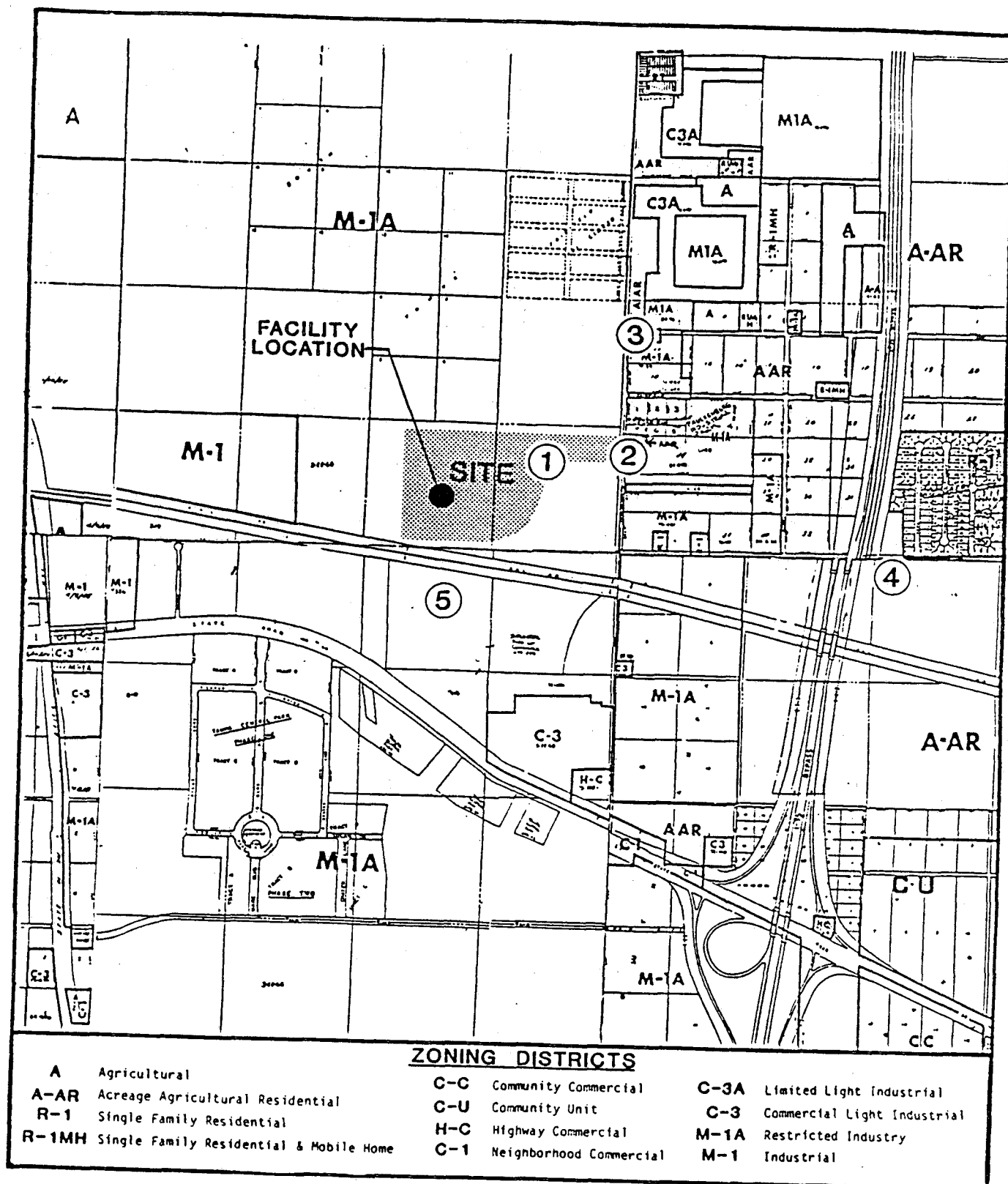
Very truly yours,



Marc J. Rogoff, Ph.D
Resource Recovery Program Coordinator

MJR/pd
Attachment

cc: Warren N. Smith, Director, Dept. of Solid Waste
Phillip C. Kennedy, CDM



Hillsborough County Resource Recovery Facility
and Wastewater Treatment Plant

Hillsborough County Division of Public Works

Department of Solid Waste

Department of Water and Wastewater Utilities

FIGURE 1
NOISE MONITORING LOCATIONS

TABLE 1
Additional Information on Selected Noise
Monitoring Locations

<u>Location Number</u>	<u>Basis for Selection</u>
1	This location was selected to collect existing ambient noise levels at the boundary of that portion of the site where development would occur (between the proposed facility and the nearest residential receptors).
2	This location was selected because it is at the closest residence to the proposed site and site access road. This area is zoned A-AR (Acreage Agricultural Residential). An M-1A district (Restricted Industry) presently used for mixed light industrial and limited residential surrounds the A-AR district. Four single family dwellings are located along this stretch of Faulkenburg Road.
3	This location was selected because it is in the vicinity of the closest main residential area to the site and Faulkenburg Road. It is also zoned A-AR.
4	This location was selected because it is the closest major residential development to the site. It is zoned R-1 (Single Family Residential). Ambient levels at the location are expected to increase once Route I-75 is open for traffic.
5	This location is the nearest site to the proposed facility that is planned for development. Currently undeveloped, this location is within the Interstate Park of Commerce. It is anticipated that warehousing/light industrial activities will locate here in the future.

COUNTY OF HILLSBOROUGH



Date: October 25, 1983

TO: Bob Jones, Environmental Protection Commission
FROM: Patricia V. Berry *PVB* Solid Waste Department
SUBJECT: NOISE MONITORING FOR THE FAULKENBURG ROAD
RESOURCE RECOVERY FACILITY SITE

The Hillsborough County Resource Recovery Project is moving ahead in the development of a solid waste energy recovery facility to be located north of State Road 60 and west of Faulkenburg Road.

The County is obtaining the necessary environmental permitting through the Florida Department of Environmental Regulation's Application for Certification of Proposed Electrical Power Generating Plant Site. A copy of our Plan of Study was distributed to your office in September.

To fulfill the requirements for determining the ambient noise levels at the property, our consultants, Camp, Dresser and McKee, Inc., will be monitoring the vicinity with hand-held noise meters. These readings will be analyzed to determine if mitigative measures are necessary to lessen the noise impact from the Project.

We are requesting, by this memo, that twenty-four (24) hour noise monitoring also be conducted at the site by the Environmental Protection Commission to assure that the most accurate ambient readings are obtained.

As per our previous discussion, please contact this office so that we can schedule a time that is convenient for you to set up the monitor. We will provide you with a layout of the property and will accompany you to the site to locate a monitoring station.

PVB/pd

EXHIBIT B

MATERIAL RELATED TO HILLSBOROUGH COUNTY
24-HOUR MONITORING NEAR THE SITE

COUNTY



OF HILLSBOROUGH

MEMORANDUM

Date 7 November 1983

To Patricia V. Berry, Solid Waste Department

From Bob Jones, EPC. BJ

Subject: Noise Monitoring for the Faulkenburg Road Resource Recovery Facility Site

In reply to your memo dated October 25, 1983, sound level measurements were taken at a site designated by your consultants which was across Faulkenburg Road from the entrance to the proposed site.

A chart of the readings requested is enclosed. The L_{dn} was computed to be 74 dBA.

I feel the majority of the noise generated during the testing period was due to traffic on Faulkenburg Road. 50% of the time the noise level was 60 dBAs or less. The graph shows the increase starting at 0500 and is fairly steady between 55 and 60 dB level from 0630 to 1830.

There is a great amount of truck traffic on Faulkenburg and with the completion of the extension of Faulkenburg south of 60, I believe truck traffic may increase. There is no doubt that the L_{dn} at the sampling site will increase with the completion and operation of the Resource Recovery facility.

If you need further noise monitoring, please let me know.

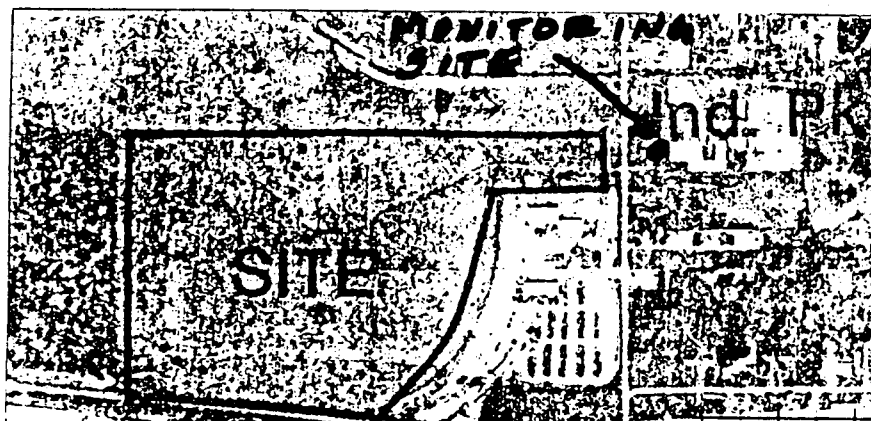
BJ/rr

Enc.

RECEIVED

NOV 7 1983

DEPARTMENT OF SOLID WASTE



SITE: R-3 BOX 95 TAMPA - LA

DATE: 2-3 NOVEMBER 1983

START: 1430 2 NOV

STOP: 1430 3 NOV

LDN 74

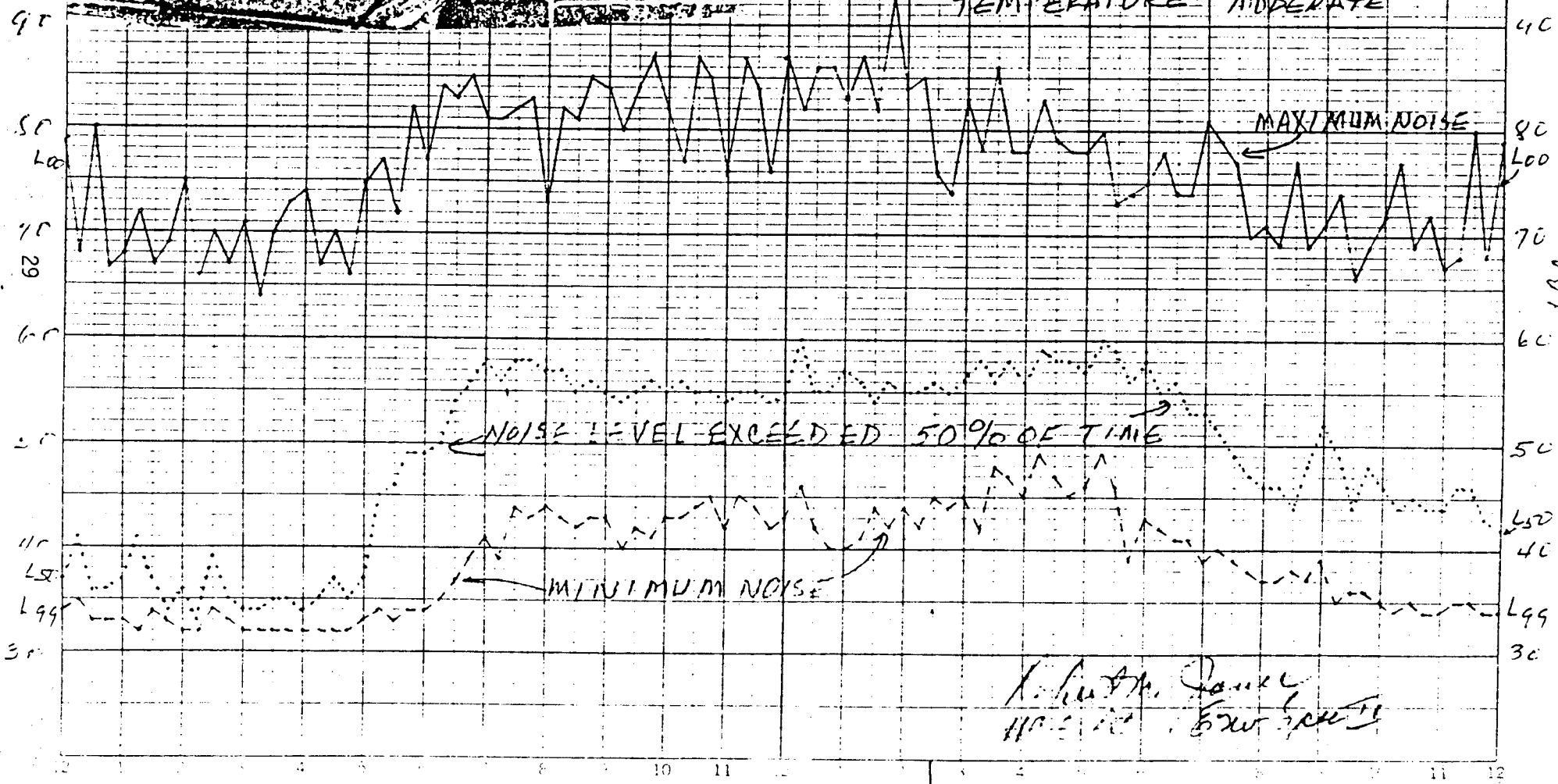
METER: METROSOUND 16602

MIKE: GENRAD 1/2 INCH ON 4 FT TRIPOD

WEATHER: FAIR TO PARTLY CLOUDY

WIND: NE 5-15 MPH

TEMPERATURE: MODERATE



Leg Reading

Start 1430 11-2-62
Stop 1430 11-3-62
Survey for
Solid Rock Dept
across street from
entry to Tank Room
Site
Wider / Fair
W / NE Corner to Tank

062
066
066
066
079
066
067
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061
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061
060 1/4

Leg



1st Reading

L max Reading

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082
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075
085
087
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074 16
078
086
076
0815
07415

L max

1st Reading

starting time 1430

L50 Readings

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056
055 1500
055 1446

L50

1st reading

Starting time 1430 11-2-83

L49

[illegible]

242
245 1500
246 1445 - 1st reading

June

PRELIMINARY

OPERATING INSTRUCTIONS

for

db-602 Sound Level Analyzer

by: METROSONICS, INC.
Box 18090
Rochester, NY 14618

GENERAL

The db-602 is a completely self-contained sound level analyzer. One portable box contains all sound measuring, computer/memory storage and display circuits with a rechargeable battery and charging circuitry.

A completely automatic data taking and analyzing system, the db 602 Sound Level Analyzer offers several modes of operation. It can perform as a sound level meter with digital readout. In this mode, calibration of the unit is easily accomplished since the display includes SPL (sound pressure level) and shows exactly what the unit is recording.

While the signal is being processed, its magnitude is being sampled and stored in a unique electronic memory. This working memory consists of 100 storage registers, each 1 dB wide, with a capability of retaining over 65,000 samples per register.

The 602 performs L_n and L_{eq} measurements. L_n is a value that the measured sound exceeded "n" percent of the time. As an example, the value for L_{99} is the level that was exceeded 99% of the time. L_{50} is the value that was exceeded 50% of the time and so forth from L_1 to L_{99} . L_0 is the value not exceeded or the highest peak value measured during the test duration.

L_{eq} (equivalent sound level) is defined as the constant sound level which in a given situation and time period, would convey the same sound energy as does the actual time varying sound. L_{eq} is useful in relating to the effects of non-steady sound, as commonly encountered in community environments. L_{dn} is L_{eq} modified with a 10 dB penalty applied to nighttime sounds (10 pm to 7 am).

The SINGLE INTERVAL compute mode provides for automatic computation of any L_n number by dialing the "N" value on two front panel thumbwheel switches. Computation from data in the working memory is updated each second during the test and does not affect new data being recorded. A test duration clock is also provided to display the total test time. In the MULTIPLE INTERVAL mode, calculation of four (4) preset L_n values are automatically performed at predetermined intervals and stored in a second, longer storage memory.

With available options, L_{eq} and L_{dn} are automatically calculated and displayed on the front panel. Additionally, contents of the memory can be read out and P_1 or L_n versus level scans presented to external printers, plotters, or computers.

BATTERY CHARGING

The internal 6 volt sealed lead-acid battery can be recharged from either a 120 volt ac or 12 volt dc power source. Ac power connections to the db-602 power connector are supplied. To charge from a 12 Vdc source, connect the positive lead to pin D and the negative lead to pin E of the power connector P1.

When an external power source is connected, the internal battery will recharge in all operating modes and the off mode. Full battery charge is indicated by an illuminated dot in the lower right corner of the display (when the db-602 is connected to an external source). Internal circuits prevent the battery from damage of overcharge.

Charging circuits are fully automatic and are self-regulating. Protection is accomplished by fuses mounted on the internal chassis. A 3AG 1 ampere fuse is utilized in the ac charging circuit and a 3AG 4 ampere fuse in the dc circuit. The following table lists the pin functions of the power connector:

<u>Pin</u>	<u>Function</u>
A	Ac Hot
B	Ac Neutral
C	Chassis Ground
D	12 Vdc Positive
E	12 Vdc Negative Return (chassis ground)
F	Load Inhibit
G	Spare
H	Spare

NOTE

Recharging time is normally 8 to 10 hours with 90% of full battery capacity being accomplished in the first hour.

CONTROLS

The following is a list of the front panel controls or indicators on the db-602 Sound Level Analyzer.

<u>Control or Indicator</u>	<u>Position</u>	<u>Function</u>
FUNCTION switch	OFF	Disables all internal circuitry and clears memory. Normal position for battery charging.
	STANDBY	Inhibits measured data from being stored in working memory and the Test Duration Clock from advancing. All other functions remain operational.
	MULTIPLE INTERVAL	Operating mode for storage of L_n values at discrete time intervals. Operates in conjunction with working memory and MULTIPLE INTERVAL switch.
	SINGLE INTERVAL	Operating mode for storing data into working memory.
	CLEAR MEMORY	Clears memory when selected and after ACTIVATE BUTTON is pressed.
DISPLAY MODE switch	OFF	Turns off display to reduce battery power drain. Normal position when sound measurements are being made over an extended period of time.
	TEST DURATION	Displays in hours and minutes on front panel the total cumulative test time data was measured from last "clear memory". A maximum of 99 hours 59 minutes can be displayed. Time displayed is less all inhibit time from external inhibit functions such as a wind velocity detector and from the STANDBY mode.
	L_n COMPUTE	Displays the computed L_n values of the data stored in memory. Computed value is updated once per second.

Control or IndicatorPositionFunctionDISPLAY MODE switch
(cont.)

SOUND LEVEL dB

Provides direct display of sound level being measured. RESPONSE switch controls averaging of display value.

 L_{eq}
(optional 600-02
feature)Calculates and displays L_{eq} of the values stored in memory. The computed value is updated once per second. L_{dn}
(optional 600-02
feature)Calculates and displays L_{dn} of the values stored in memory. The computed value is updated once per second.TIME SET HOURS
(operable only
with L_{dn} option)

When selected, display indicates local time on internal clock. ACTIVATE button will advance hour until release.

TIME SET MIN

Same as hours except minutes are advanced.

NOTE

The internal L_{dn} Clock must be reset to the correct time after the FUNCTION switch is set at OFF.

 L_n Scan

When selected, provides a readout of all 100 values of L_n , starting at L_{99} and ending at L_0 , at a one per second rate. Scan starts when ACTIVATE button is pressed. Values are also provided at Output connector for digital printers (or XY plotters when 600-05 is installed).

NOTE

MULTIPLE INTERVAL pushbutton switches L_a , L_b , L_c , L_d must all be "up" to obtain the L_n scan.

<u>Control or Indicator</u>	<u>Position</u>	<u>Function</u>
DISPLAY MODE switch (cont.)	P ₁ SCAN	When selected, calculates and displays the percentage of time that the measured sound was present at each 1 dB level of the 100 dB range to a resolution of 0.1 percent. Scan starts when the ACTIVATE button is pressed and begins at the lowest level of the selected amplitude range and continues in 1 dB steps to the highest level. Output is provided at Output connector for digital printers (or XY plotters when 600-05 option is installed).
RESPONSE switch	FAST or SLOW	Selectable averaging of response to either fast or slow by controlling time constant of RMS detector. Fast/Slow rate is defined by ANSI S1.4-1971 Type 1.
INPUT switch	MK-A	Provides input circuitry to match low level common microphones 1/2" or 1" diameter with a sensitivity greater than 25 dB re 1V/Pa and with a dynamic range from 20 to 120 dB.
	MK-B	Provides input circuitry to match low level common microphones 1/2" or less diameter with a dynamic range of 30 to 130 dB.
	Input Levels 50 to 130 in 10 dB steps	Provides variable attenuation to calibrate high level input sources to the analyzer.
L _n and TIME DIAL		For manually selecting value of L _n to be displayed with DISPLAY MODE switch at L _n COMPUTE.
ACTIVATE switch		When pressed, initiates desired operation by Display and Mode switches selected.

Control or IndicatorPositionFunctionMULTIPLE INTERVAL
switch

Thumbwheel switches

 L_a, L_b, L_c, L_d

Programs each of four sets of registers, (a, b, c, d) to calculate and store manually selected values of L_n .

Any L_n may be programmed into each of the four registers, with the exception that L_{00} in register "a" calculates and stores L_{eq} when this option is installed.

NOTE

L_{00} should not be programmed into L_a if the L_{eq} option is not installed.

TIME X 15 MIN

For manually selecting the time interval between multiple interval readings. Programmable in steps of 15 minutes (i.e., 04 is 1 hour).

Pushbutton switches

 L_a, L_b, L_c, L_d

Selects the set of storage registers L_a, L_b, L_c , or L_d to be read out during the 602 scan cycle.

THEORY OF OPERATION

Operation of the db-602 Sound Level Analyzer can best be understood with reference to the simplified block diagram in Figure 1.

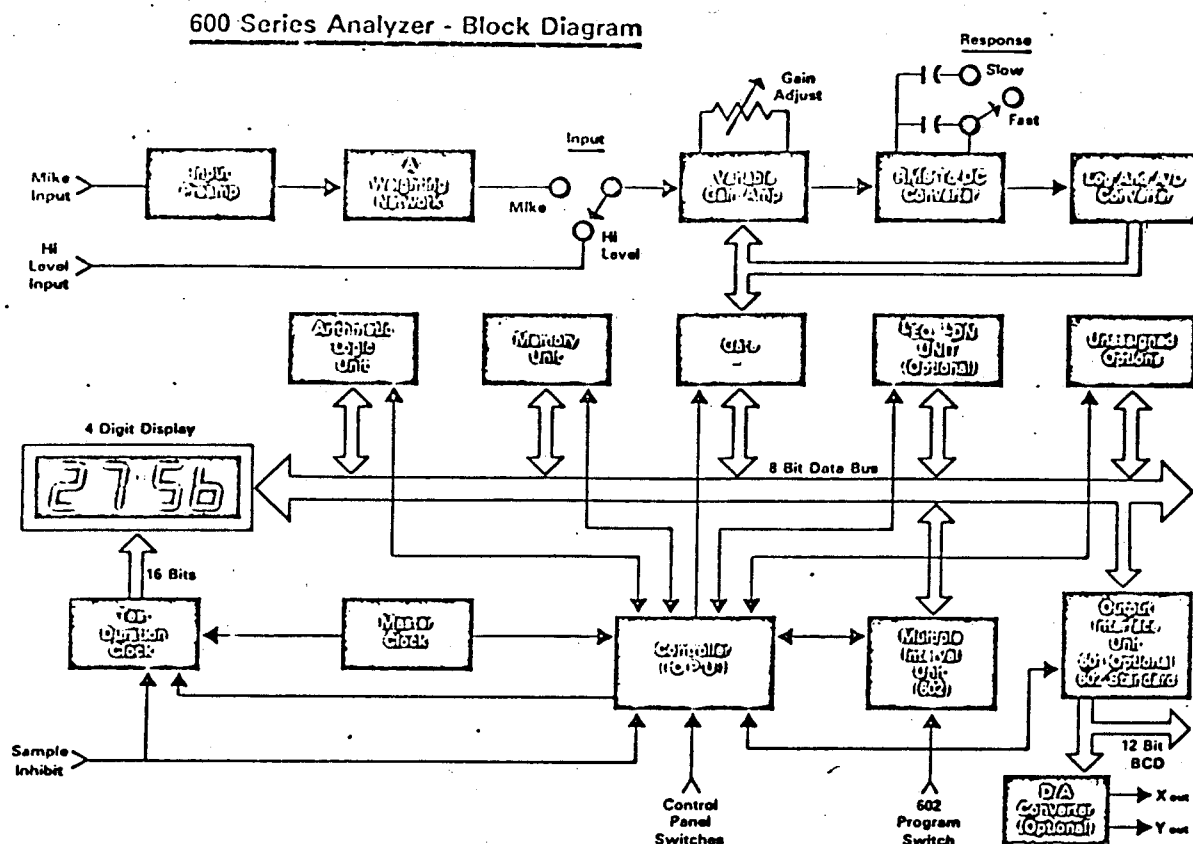


Figure 1

DATA LOGGING

Inputs to the db-600 series are through two separate audio circuits. The low level circuit accepts signals from external microphones with sensitivities of -24 to -50 dB relative to 1V/Pa. and can process signals with a wide 100 dB dynamic range. "A" weighting is performed on signals by built-in precision filter networks. The unit is designed to utilize METROSONICS, B&K and GR microphones with their associated preamplifiers.

The high level input accepts ac signals from magnetic tape recorders, sound level meters and other precision audio sources. Both the input preamplifier

and the A-weighting networks are bypassed when this input is used. Dynamic range of extended signals is limited primarily by the input device used. A wide range input switch matches the analyzer to the full scale of the input source.

The signal is rectified in a true RMS detector and converted into digital format. Data is then gated on to the internal data bus. Simultaneously the signal is sampled by the computer circuits. The central processor directs this amplitude information into the built-in 100 storage register electronic memory for later analysis.

DATA ANALYSIS

For L_n calculation, the algorithm utilized in the microprocessor is similar to the technique in manual analysis. Total number of samples are counted in the arithmetic logic unit, then multiplied by the desired L percent, programmed by the front panel switch. The arithmetic logic determines the level above which the sum of the samples in the level counters equal the L percentage value selected. This information is displayed on the front panel LED display.

L_{eq} calculation utilizes the digital information on the data bus. The antilog is taken of each sample and added to the antilog of the preceding samples. The summation of the antilogs is then divided by the number of samples. The log of this value yields L_{eq} .

A separate digital memory computes L_{dn} . The actual test starting time is entered into the L_{dn} memory through the DISPLAY MODE switch and the central processor. The 10 dB penalty is then automatically added to the sampled value for the hours between 10 pm and 7 am.

The db-602 includes a Multiple Interval Unit (MIU). The MIU's long term storage memory records L_n computations of up to four (4) variables at programmed time intervals. Selected variable can be any of the L_n values or L_{eq} , as programmed by thumbwheel switches on the db-602 control panel.

Time interval between computations is programmable from 15 minutes to 24 hours 45 minutes in units of 15 minutes. At the end of each interval, the four (4) computations are performed and put into the longer storage MIU memory. The sample storage memory is then cleared to begin another time interval.

A total of 96 separate sets of storage registers are provided. For example 96 sets of readings can be taken once every hour for 4 days, or once every day for over 3 months.

DATA READOUT

Data readout is selected by the DISPLAY MODE switch and is automatically presented on the front panel digital display.

Along with test duration, L_n compute, sound level, L_{eq} , and L_{dn} , the db-602 automatically computes and scans the 100 data prints of L_n and P_1 , and the 96 sets of storage registers for L_n . The latter sets of data are transferred by the Output Interface Unit in parallel BCD code for readout by external peripheral equipment.

The 600-05 Analog Plotter Interface (optional) utilizes a built-in digital to analog converter to convert the BCD code to a dc signal to drive an XY plotter. This allows direct graphing of percentile at each sound level (histograms), accumulated level versus L_n , or L_n values versus time.

OPERATION

Initial

1. Set FUNCTION switch at STANDBY for 1 minute. (Although the db-602 is a solid state instrument, a brief warm-up period is required for the input amplifiers and capacitors to reach voltage and thermal stabilization).
2. If operating with a microphone input, calibrate the db-602 according to the following calibrating procedures.
 - a. Set INPUT switch at MK-A or MK-B depending on the type of microphone and desired range, see CONTROLS section.
 - b. Set the FUNCTION switch at STANDBY, DISPLAY MODE switch at SOUND LEVEL dB.
 - c. Place the calibrator over the microphone and adjust the gain adjust control (below the display) to read the calibrator output level.

3. If operating with a high level output source calibrate the db-602 according to the following procedures.
 - a. Calibrate external source according to its instructions using a calibrated source.
 - b. Leave the source connected and set FUNCTION switch at STANDBY, DISPLAY MODE switch at SOUND LEVEL dB.
 - c. With the calibrated source connected, observe the value displayed. Advance the INPUT switch starting from 50 until the display can be adjusted by the gain adjust control for the correct (calibrated source) value. When a sound level meter is used as the source, the INPUT switch setting is normally the full scale reading of the meter.

NOTE

If INPUT switch is changed after calibration, then the value recorded or displayed will have to be corrected by the value and direction the INPUT switch was moved from the calibrated position.

4. Set FUNCTION switch at CLEAR MEMORY and press ACTIVATE button.

- NP
5. If operating with the L_{dn} option the internal clock must be set to the local standard time, see CONTROLS section.

DATA LOGGING

Single Interval Mode (used when data is to be taken and analyzed over only one time period).

1. Set FUNCTION switch at SINGLE INTERVAL and DISPLAY MODE switch at OFF.

Multiple Interval Mode (used when data is to be taken and analyzed over more than one time period).

1. Set MULTIPLE INTERVAL L_a thumbwheel switches to the L_n value to

- be stored in the first set of registers. Similarly set the L_b , L_c , and L_d thumbwheel switches for the L_n values to be stored in the next three registers respectively. L_{eq} may be stored by setting L_a to 00. *THE FIRST REGISTER SHOULD NOT BE SET TO 00 IF L_{eq} IS NOT INSTALLED AS ERRONEOUS READINGS WILL BE PUT INTO ALL REGISTERS*
2. Set MULTIPLE INTERVAL TIME thumbwheel switches to the desired time for each interval. The switches program the db-602 in multiples of 15 minutes, -i.e., "04" is one hour, "96" is 24 hours.
 3. *read carefully* Set FUNCTION switch at MULTIPLE INTERVAL and DISPLAY MODE switch at OFF. by placing the FUNCTION switch into the CLEAR MEMORY position and pressing the ACTIVATE switch. The 602 must be cleared before programming the front panel switch settings into the unit.

WARNING

Do not reset any of the MULTIPLE INTERVAL L_a , L_b , L_c , L_d or TIME switches during a test. If this occurs erroneous data will be placed in the memory and the test must be reinitiated.

4. Data logging can be inhibited during tests by either placing the FUNCTION switch in the STANDBY position or applying a ground to pin F of the power connector manually, through a wind sensor or other external means. Inhibiting data will stop the test duration clock from running but will not affect other clocks in the db-602. The amount of valid data can thus be easily determined.

DATA READOUT

Single Interval Mode

After the sound levels have been recorded and stored in memory perform the following steps.

1. Place the FUNCTION switch at STANDBY to stop further measurements from taking place.
2. Set the DISPLAY MODE switch at TEST DURATION and record the total test time.
3. Refer to the DISPLAY MODE portion of the CONTROLS section and record the values as necessary by selecting the desired function (i.e., L_n , L_{eq} , L_{dn} , L_n scan, P_1 scan).

NOTE

Graphs of L_n vs level can be plotted manually by advancing the L_n & TIME dial and recording the displayed value.

Multiple Interval Mode

After the sound levels have been recorded and stored in memory perform the following steps.

1. Place the FUNCTION switch at STANDBY to stop further measurements from taking place.
2. Set the DISPLAY MODE switch at TEST DURATION and record the total test time.
3. L_n for each of the set of registers can be read by depressing the desired L_n pushbutton, setting the FUNCTION switch at L_n SCAN and pressing the ACTIVATE BUTTON. The L_n values over the time period will be recalled and presented sequentially at a one per second rate at the front panel display and at the output connector on the side of the db-602.
4. Similarly all four L_n registers can be scanned for output data. After a scan has been completed rotate the DISPLAY MODE switch back through the TIME SET-HOURS position to the L_n SCAN position before pressing the ACTIVATE button. This resets the scan counters. All data is in a circulating memory and can be recalled when desired until the scan memory is manually cleared.

NOTE

L_{eq} , cumulative L_n and P_1 functions are available from the working memory during the multiple interval mode. However, this data covers the time frame from the start of the last working memory erase (start of the last time interval).

DATA INTERFACES AND OTHER ACCESSORIES

1. Digital Printer. Data is available to an external digital printer in 3 digit BCD parallel code, TTL/DTL compatible positive logic. Print command, a TTL compatible positive 10 millisecond pulse accompanies each data output.

Data is presented to the output connector at the same time as it appears on the front panel display. Table 3 lists the functions

appearing on each pin of the output connector.

2. XY Plotter. Analog signal information is available at the output connector for direct graphing of data. Data of 10 volts represents full scale readings of both the X and Y axis. If graphs with greater resolution are required, sensitivity of the XY plotter may be increased.
3. Autotimer: The 600-06 Autotimer (optional) is programmable for automatically starting and inhibiting sampling signals into the db-602 working memory.
 - A. Program the TIME BEFORE TURN-ON Thumbwheel switches to the desired "off" time, or time before starting.
 - B. Program the ON TIME Thumbwheel switches to the desired "on" time.
 - C. Set the INTERVAL switch to either the SINGLE or MULTIPLE position and press the ACTIVATE button. In the SINGLE position the timer will proceed through one off-on cycle and then inhibit the db-602 memory from taking additional data. In the MULTIPLE position the off-on cycle will be repeated until manually stopped.
4. Sampling Time Selector. The 600-08 Sampling Time Selector (optional) provides selection of any of 10 preset sampling intervals. Set the front panel switch to 1/16, 1/8, 1/4, 1/2, 1, 2, 4, 8, 16 or 32 seconds per sample, as desired. Increased sampling rate will provide finer resolution while longer sampling rate permits extended field usage.
5. Preset Level Actuator. The 600-09 Preset Level Actuator (optional) activates external devices when a preset level is exceeded.
 - A. Turn the DISPLAY MODE switch to the PRESET LEVEL position.
 - B. Preset the L_n AND TIME SELECT switch to the desired level and press the ACTIVATE button. A contact closure will be made at the miniature phone plug in the front panel.
6. B&K and GR Options 600-09 and 600-10 (optional). Correct power and interface is automatically supplied for the B&K 2619 or the GR 9600 preamplifiers. Voltages and corresponding input connector pins are shown on Table 2.

Table 2 - Input Connector Pin/Functions

<u>Pin</u>	<u>Function</u>
A	Low level input
B	Hi level input
C	mk-602 Return
D	Mike return
E	Shield return (ground)
F	Mike + 3V
G	Mike + 15V
H	Mike + 28V
I.	Mike +200V **
J	Heater + 12V **
K	Heater return **
L	Spare
M	Spare
N	Spare

* 600-10 Option only

** 600-09 Option only

APPENDIX 10.13

TRANSPORTATION ANALYSIS

APPENDIX 10.13

TRANSPORTATION ANALYSIS

A mass-burn resource recovery facility with a capacity of 1,600 tons per day (tpd) is the largest concept under consideration for the proposed resource recovery plant. It is this configuration that would result in the largest increase of vehicle traffic. As a result, the transportation analysis considered this size unit to be the "worst-case" condition with regard to potential traffic-related impacts.

The following transportation analysis was prepared by Camp Dresser and McKee with the assistance of traffic consultants, Kimley-Horn and Associates, Inc. A supplemental transportation analysis conducted by Kimley-Horn and Associates responds to specific comments from the Hillsborough County Road Department to the traffic analysis presented in the County's Resource Recovery Facility and Wastewater Treatment Plant Rezoning Application #83-274. That supplemental analysis is incorporated in the following sections and included in its entirety in Exhibit A to this appendix.

Traffic Generation of Proposed Action

Truck traffic associated with the delivery of refuse to the facility and the removal of ash residue for disposal will be the major contributor to vehicle traffic. A much smaller volume will be added as a result of commuting employees and administrative and support functions for both the resource recovery facility and the wastewater treatment plant.

Truck Traffic Generation

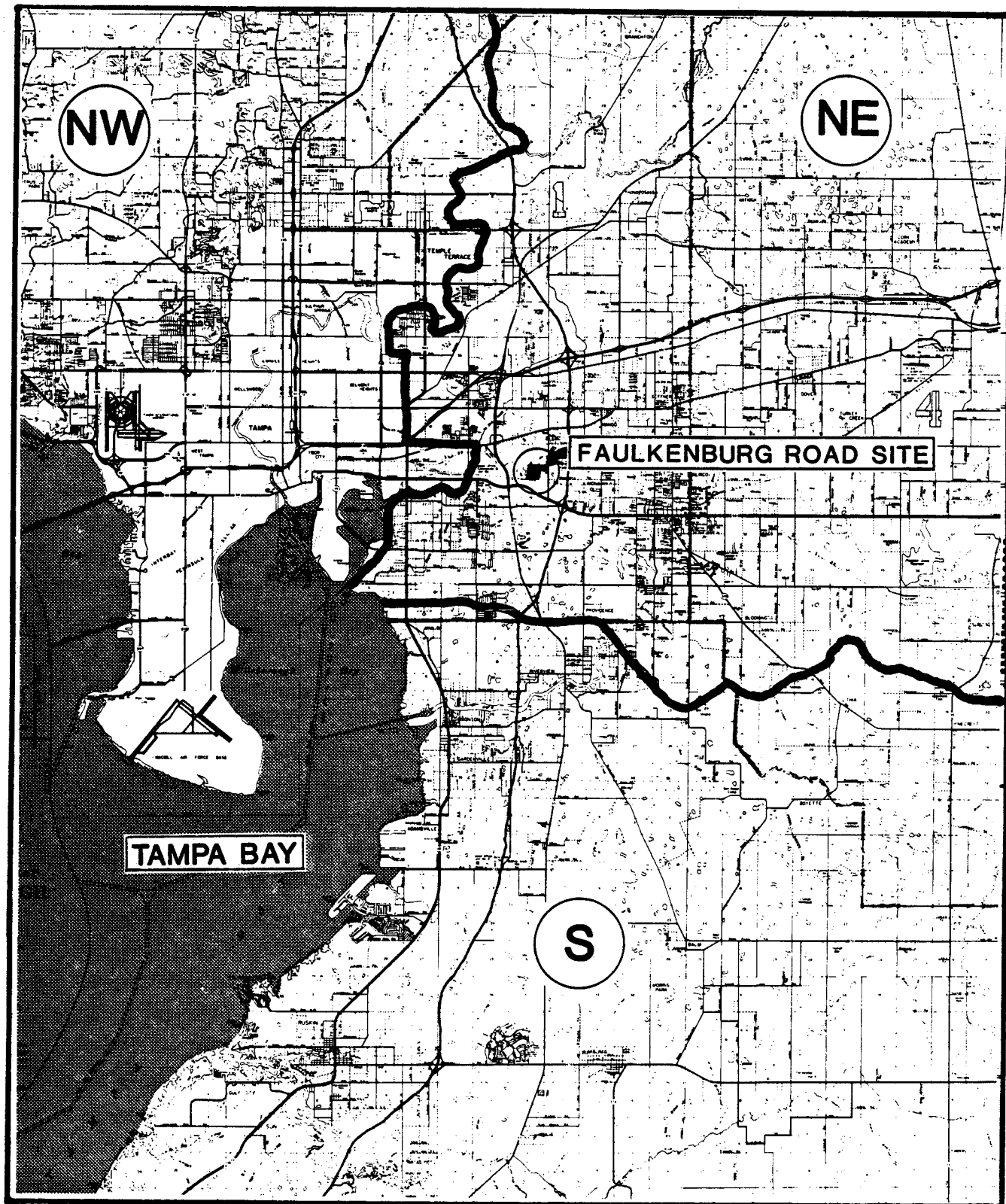
Three major solid waste generation planning regions were defined and utilized for this transportation analysis. The three major solid waste generation regions are the Northwest County Transfer Station (NW), the South County Transfer Station (S), and the Northeast County solid waste

generation regions (NE). The general boundaries of these designated waste sheds are shown on Figure 1. On a total county basis, the approximate split of waste quantities generated within these regions is 43 percent from the NW, 20 percent from the S and 37 percent from the NE.

The transport of wastes to the site from the NW and S regions will be by transfer trailer (assumed 18 to 20 tons per trailer capacity). This will account for 44 and 21 transfer trailer truck deliveries per working day, respectively. Transport from the NE region and local areas will be by packer truck with an assumed four- to six-ton capacity. This will account for 168 packer truck deliveries per day. It should be noted that more modern packer trucks typically have an eight to ten ton capacity. Therefore, this analysis is very conservative since realistically the actual number of packer truck deliveries could be half of that assumed herein. It is planned that the facility will receive refuse six days per week. Residue from the resource recovery site will be hauled by trucks to the Southeast County Landfill. This operation will take place seven days per week and would require about 24 truck loads per day.

The estimated total number of trips for trucks entering and leaving the Faulkenburg Road site is 514 trips (65 transfer trailers + 168 packer trucks + 24 residue trucks x 2). This volume of traffic would occur during typical weekdays. On weekends, the truck traffic volume would be less.

The principal access to Faulkenburg Road is from its intersection with State Road 60. Transfer trailers from the NW region could travel east on Route 60 from Route 301 and/or Route 41. Transfer trailers from the S region and most packer trucks from the NE region could typically travel west toward Faulkenburg Road for a short distance on Route 60 from Interstate Route 75. This truck traffic could then travel north on Faulkenburg Road to the facility. The facility access road would be on the west side of Faulkenburg Road just north of the intersection with Woodberry Road. Some truck traffic, primarily packer trucks, could utilize Route 574 to approach the site from the north by heading south on Faulkenburg Road. The residue trucks leaving the resource recovery facility would travel south on Faulkenburg Road to Route 60 and then east on Route 60 to Route I-75 South to the Southeast County Landfill.



HILLSBOROUGH COUNTY
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FIGURE 1
SOLID WASTE GENERATION
PLANNING REGIONS

The operation and maintenance of the wastewater treatment plant may generate a small volume of fixed body truck traffic that could be associated with the delivery of chemicals and/or removal of sludge. The expected frequency of truck traffic would be approximately two to three trucks per week. This traffic volume is addressed in the next section.

Other Vehicle Traffic Generation

The principal direct generator of traffic as a result of the proposed site use is refuse delivery and ash residue disposal. However, there will be other traffic associated with the proposed site use requiring consideration in this transportation analysis. This other traffic includes commuting employees and miscellaneous routine traffic associated with the operation and maintenance of the proposed resource recovery facility and the wastewater treatment plant.

It is expected that there will be a total of 73 full-time employees operating the resource recovery facility and wastewater treatment plant (58 and 15, respectively). These facilities will operate with a three-shift cycle. The day shift will account for approximately 60 percent of the staff while the other two shifts will each require only 20 percent of the work force. Most, if not all, of the employees will probably commute via use of single rider auto. With allowances for routine absenteeism (illness, vacation, etc.), it is anticipated that commuting employees will generate 130 vehicle trips per day. Over weekend and holiday periods, the volume would be considerably less, probably in the vicinity of 80 vehicle trips per day.

The distribution of the traffic generated by commuting employees will basically be patterned according to the density and proximity of major population centers. Based upon population density it is expected that the majority of the employees will come from that area which corresponds with the NW region. For the purposes of this transportation analysis, it has been assumed that 75 percent of the employees would come from the NW region (including Tampa) and that 20 percent and five percent would come from the NE and S regions respectively.

The miscellaneous routine traffic associated with the operation and maintenance of the proposed resource recovery facility and the wastewater treatment plant will probably generate an average of 14 vehicle trips per day. Most of this traffic would be associated with administrative functions, deliveries and visitor activities. Some of this traffic would be comprised of truck traffic. For example, the facilities require truck delivery of chemicals for the treatment processes. At this stage of project planning, it is not possible to realistically estimate the volume or frequency of miscellaneous routine traffic. However, as previously indicated, routine traffic would only amount to a minimal number of trucks per week.

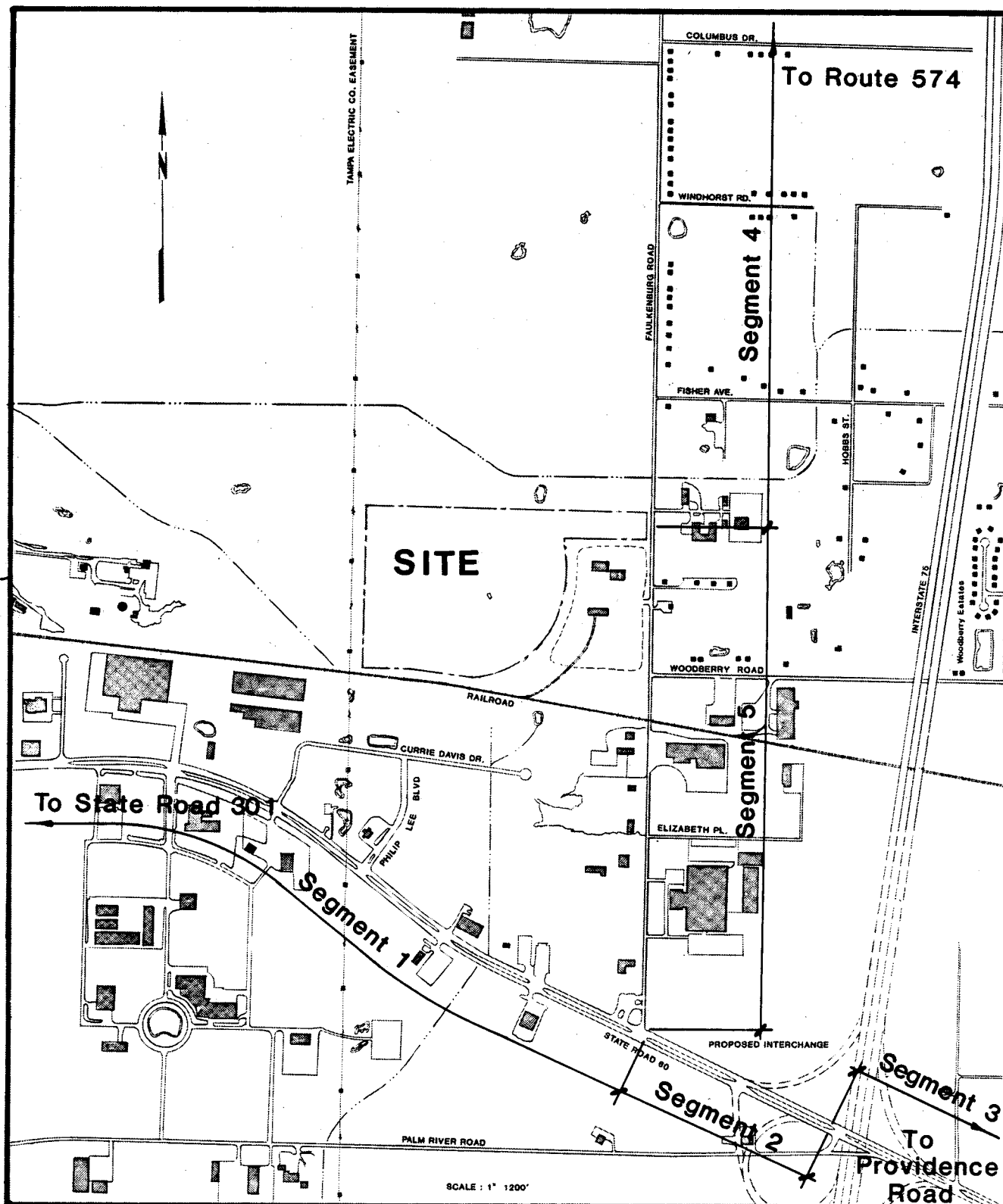
It is expected that this routine support traffic would originate in Tampa or come from Route 75. Therefore, this traffic would travel east or west along Route 60 and then north on Faulkenburg Road when approaching the site.

Total Trip Generation

The site development of a proposed resource recovery facility and the wastewater treatment plant will result in the generation of 658 vehicle trips over the course of a typical 24-hour weekday period. Of this total, 466 trips will be associated with refuse delivery, 48 trips with ash residue removal, 130 trips with commuting employees, and 14 trips with routine support activities.

Description of Transportation Impact Area

The principal transportation impact area for this analysis is described in this section. The segments of roadway presented below were selected for analysis because of their close proximity to the project site and the high probability of their use by most of the project-generated traffic. For the purposes of discussion and analysis, the impact area was divided into five (5) segments as shown on Figure 2. The study area was not extended further than this designated limit for the following reasons:



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 2
ROADWAY SEGMENTS
FOR TRANSPORTATION ANALYSIS

- The expected low levels of traffic volume to be generated by this project will be sufficiently dispersed outside of the designated study area.
- There are multiple roadway options for travel by project-generated traffic outside of the designated areas.
- The majority of the project-generated traffic will occur during non-peak traffic hours.
- The resource recovery facility traffic will consume more than five percent of existing capacity only on Faulkenburg Road.

Critical Features of Impact Area

The following sections present an overview of the existing roadway features of the designated impact area.

- o Segment One - This segment includes that portion of State Road (SR) 60 from its intersection with SR 301 to the intersection of Faulkenburg Road. The present average daily traffic (ADT) volume of this roadway segment is 44,540 vpd as reported on the Traffic Count Map prepared by Hillsborough County. SR 60 is a major east-west roadway servicing this area. Through this section it is a four-lane divided roadway with medium openings and turning lanes at most intersections. Lateral restrictions are minimal and no roadway parking is permitted. While there are no breakdown lanes, there is sufficient room for a disabled vehicle to pull off the travelway. The speed limit along SR 60 is posted at 55 mph.
- o Segment Two - This segment includes that portion of SR 60 from its intersection with Faulkenburg Road to that area where the future interchange with Interstate 75 is planned. The present ADT for this segment is 48,900 vpd. The physical features of SR 60 in this segment are the same as described for Segment One.

- o Segment Three - This segment includes that portion of SR 60 from the area of the future interchange with Interstate 75 to the intersection with Providence Road (approximately three-quarters of a mile east of interchange). The present ADT is similar to Segment Two (48,900 vpd) and the roadway's physical features are the same as described for Segment One.
- o Segment Four - This segment includes that portion of Faulkenburg Road from its future intersection with the proposed site entrance north to the intersection with US Route 574. Recent traffic count data from the Hillsborough County Traffic Engineering Department show that the present estimated ADT is 6,060 vpd. Faulkenburg Road is a two-lane roadway with a full 12-foot travel lane in each direction. There are some lateral obstructions within six feet of the pavement surface, e.g., mailboxes, fence posts, ditches, bushes and telephone poles. There is room, however, for a disabled vehicle to maneuver off of the travelway along most of the roadway. There are no turning lanes along this segment of roadway. The speed limit along Faulkenburg Road is posted at 45 MPH.
- o Segment Five - This segment includes that portion of Faulkenburg Road from its future intersection with the proposed site entrance south to the intersection with SR 60. The present ADT from the Traffic Count Map is 5,090 vpd. The physical features of this portion of Faulkenburg Road are similar to those described for Segment Four. An at grade railroad crossing located about one-quarter of a mile south of the proposed site entrance significantly disrupts the carrying capacity of the roadway for short periods of time.
- o Critical Intersection - The intersection which has the greatest potential for impact by this project is the intersection of SR 60 and Faulkenburg Road.

Future Conditions

The region in the vicinity of the transportation study area is presently experiencing major growth in commercial and industrial type activities. This development is certain to have an impact on future traffic conditions. Additionally, there will be three interchanges of Interstate 75 (presently under construction) within the relative vicinity of the project area, one planned for the end of the Crosstown Expressway, another with SR 60 and the third with SR 574. The presence of these interchanges will obviously change the present traffic patterns in the area. The details of some of the major changes planned for the area are discussed in the section on future land use (Section 2.3.3).

Projections for the year 2000 predict a significant increase in ADT for SR 60. It is projected that the ADT for Segment One of SR 60 will increase from a present 44,540 to 68,100 vpd. For Segment Two, the increase in ADT is expected to rise from 48,900 to 58,100 vpd. Presently, two regional shopping centers are planned adjacent to Segment Three which, by 1985, will increase the traffic volume on SR 60 to an estimated 54,000 vpd.

Portions of SR 60 in the vicinity of the interchange with Interstate 75 will be upgraded with road widening and the addition of turning and yield lanes. Additionally, there are various proposals as part of the Tampa Urban Area Transportation Study (TUATS) to improve the traffic conditions on SR 60 by the year 2000. The adopted plan calls for converting SR 60 in this area to a multiple lane (greater than two lanes in each travel direction) expressway.

Buffalo Avenue (SR.574), located north of the proposed site, is scheduled by the Florida Department of Transportation (FDOT) to be widened to a four-lane, divided roadway from Interstate 4 to CR 579 (east of Interstate 75) in 1986.

Time and Roadway Distribution of Project Traffic

An earlier section (Section 4.2.1) presented the results of an analysis on the volume and type of traffic that is expected to be generated as a result of the proposed project. Additionally, a general review was presented on the origin and/or destination of the project-related traffic. Within this section, the results of a more detailed analysis of the time and actual roadway distribution is presented.

While a comparison of a roadway's ADT and total capacity with the expected daily traffic volume generated by a proposed project can provide a general indication of traffic impact, a closer analysis on the time distribution of expected impacts can be even more useful. This is especially true with this type of project where the actual time distribution of the project's traffic is expected to be useful in mitigating project impacts. For example, many developments result in major increases in traffic volume during typical peak traffic periods. This can create major changes in a roadway's level of service during these peak traffic periods. This project has the potential to increase the ADT on local roadways. However, the impact of this traffic increase will be offset since the peaking patterns will be completely different from the present peak traffic hours. During those times of the day when the traffic is highest on the adjacent roadway, the resource recovery facility will generate little or no traffic.

The time distribution of traffic generated by the proposed project was analyzed by a two-step procedure. First, each of the individual categories of traffic was defined and reviewed for its schedule patterns. Second, all of the traffic volume predicted to occur during the same hour period was added together. This resulted in an hourly distribution of expected traffic volume generated by the proposed project.

The individual categories of traffic generated by the operation of the proposed project and used in this transportation analysis are listed below.

- Solid Waste Transfer Trailers
- Ash Residue Trucks
- Solid Waste Packer Trucks
- Administrative and Support Vehicles
- Commuting Employee Vehicles

The principal hours of facility operation associated with the generation of truck traffic will be between 8:00 A.M. and 5:00 P.M. It is possible that the facility may be opened at 7:00 A.M. for receipt of commercial wastes. From 7:00 to 8:00 A.M. it is expected that traffic volume would be relatively minor. During the 8:00 A.M. to 5:00 P.M. period, the volume of solid waste transfer trailer and ash residue trailer traffic should be distributed fairly evenly. Due to the operational features of the transfer stations and the ash handling facility, the traffic volume is expected to be somewhat equally distributed over a long period of time. Additionally, it is easier, from a traffic management perspective, to control the departure times of these vehicles.

The traffic pattern of solid waste packer trucks is, however, different than the other truck types. Based upon observations at other solid waste management facilities and upon a review of the operational features of typical collection activities of packer trucks, a pattern of peak and low traffic volumes can be established. During the first hour of operation, the facility will experience its first minor volume peak as private carters deliver waste from their very early morning hour collection activities (usually from commercial establishments). Then, the facility's major peak volume of packer truck traffic occurs around 10:00 A.M. as most of the packers collecting from residential generators arrive with their first load of the day. The next minor peak occurs about mid-afternoon, around 2:00 P.M., as residential packers begin arriving with their second load.

The distribution of administrative and support vehicles is relatively even throughout the business day of the facility, i.e., 8:00 A.M. to 5:00 P.M.

Since the proposed project includes facilities that will operate 24 hours a day, there will be three shifts of employees. However, most of the management and maintenance staff will work the daytime shift creating a larger shift (with regard to workforce number) than the other two. For planning purposes, the three shift schedules were established as follows:

First Shift - 7:00 A.M. to 4:00 P.M.

Second Shift - 3:00 P.M. to Midnight

Third Shift - 11:00 P.M. to 8:00 A.M.

It is assumed the commuting traffic generated by these shift schedules would occur during the half hour before and after the starting and ending time of each shift.

With this information, it was possible to create a composite hourly distribution of traffic predicted to be generated by the proposed project. The results of this traffic distribution analysis are shown on Table 1. It can be seen from this table that the period of maximum traffic occurs in the morning around 10:00 A.M. with other peaks occurring at 8:00 to 9:00 A.M. and 2:00 to 3:00 P.M.

Once the time distribution of project-related traffic is established, the next step is to review the expected travel patterns of this traffic on local roadways. A general review was presented in an earlier section on the origin and/or destination of the project traffic along with a discussion of the roadways to be utilized. In this section, the project traffic is assigned to specific road segments that have a high probability of utilization by each of the traffic categories. The five roadway segments previously introduced and described were the focus of this analysis. In projecting the expected truck travel patterns, two scenarios have been developed.

Scenario No. 1. This scenario assumes that the County will direct the specific routes to be utilized by the transfer trailers originating from the County's NW Transfer Station. The portion of Faulkenburg Road north of the proposed site (Segment Four) appears to be utilized more extensively by

TABLE 1
HOURLY DISTRIBUTION OF INCREASED TRAFFIC VOLUME.

<u>VEHICLE TRIPS</u>						
<u>Time Period</u>	<u>Administration and Support</u>	<u>Commuting Employees</u>	<u>Transfer Trailers</u>	<u>Residue Trucks</u>	<u>Packer Trucks</u>	<u>Total</u>
0001-0100	0	15	0	0	0	15
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	0	0	0	0	0	0
0600-0700	0	35	0	0	0	35
0700-0800*	0	0	0	0	0	0
0800-0900	1	15	14	6	50	86
0900-1000	2	0	16	6	34	58
1000-1100	2	0	14	6	84	106
1100-1200	1	0	14	4	34	53
1200-1300	1	0	12	4	16	33
1300-1400	2	0	14	6	16	38
1400-1500	2	15	16	6	52	91
1500-1600	1	0	16	6	34	57
1600-1700	2	35	14	4	16	71
1700-1800*	0	0	0	0	0	0
1800-1900	0	0	0	0	0	0
1900-2000	0	0	0	0	0	0
2000-2100	0	0	0	0	0	0
2100-2200	0	0	0	0	0	0
2200-2300	0	15	0	0	0	15
2300-2400	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	14	130	130	48	336	658

*It is possible that some traffic volume would occur during these periods. During the early hour period some traffic could be generated by employees arriving late for the first shift or some private packers arriving before the normal scheduled opening of the facility.

residential traffic that has no alternative route selection other than Faulkenburg Road south of the proposed site (Segment Five). The County could direct transfer trailer traffic associated with the NW Transfer Station to use US 301 to SR 60 to Faulkenburg Road, thus approaching the proposed site from the south. This would reduce the exposure of residential traffic along Faulkenburg Road north of the proposed site to large transfer trailers.

Similarly, Scenario No. 1 assumes that most packer trucks servicing the NE region would approach the proposed site from the south rather than using SR 574 and approaching from the north. This assumption is based on an initial survey of existing roadway conditions which concluded that packer truck operators would choose to minimize travel on secondary roadways by traveling on I-75 to the SR 60 exit. Also, the County could specify use of I-75, SR 60 and/or other roadways in the franchise agreements with the waste handling companies. It should be noted that this scenario creates a "worst-case" condition from a transportation impacts perspective. Most of the traffic is assumed to be concentrated on roadways south of the site.

Scenario No. 2. The second scenario assumes that no traffic routing would be specified for County-operated transfer trailers or within franchise agreements. Scenario No. 2 assumes greater use of Faulkenburg Road to the north of the proposed site (Segment Four) based on the following considerations:

1. Transfer trailers originating from the County's NW Transfer Station assumed to approach the proposed site from the north via I-4, Buffalo Avenue, and Faulkenburg Road. This traffic assignment considers the following:
 - a. Buffalo Avenue (S.R. 574) is scheduled to be widened, by the Florida Department of Transportation (FDOT), to a four-lane, divided roadway from Interstate 4 to C.R. 579 (east of Interstate 75) in 1989. Conceptual plans for this improvement include the addition of left-turn auxiliary lanes on all approaches to the Buffalo Avenue/Faulkenburg Road

intersection. At this time, FDOT has not made any recommendations concerning the type of control needed at this intersection.

- b. The Horizon 2000 Plan, Hillsborough County's adopted land use plan, designates the property fronting on Faulkenburg Road between Buffalo Avenue and S.R. 60 for light industrial development.

- 2. Traffic assignment in the Northeast sector was based on the distribution of population in this sector. Packer trucks serving this area will make their collection runs and deposit refuse at the Resource Recovery Plant. Thus, the traffic will be most heavily distributed in areas of greater population and development intensity. Population data used were obtained from the 1980 census.

As previously described, the use of regional waste generation sheds assisted in the assignment of traffic volume to the various road segments for both scenarios. Additionally, the hourly distribution pattern for the traffic volume of the proposed project was developed for Scenario No. 1 and is presented on Table 2. The assignment of total daily traffic resulting from the proposed project under Scenario No. 2 is summarized on Table 3.

Roadway Capacity Analysis

- o Segments One, Two, and Three - Scenario No. 1 is more conservative for evaluating the potential impacts of SR 60's Level of Service (LOS), especially at its intersection with Faulkenburg Road. Therefore, Scenario No. 1 has been used for the following Roadway Capacity Analysis for segments One, Two and Three.

A recently prepared Application for Development Approval for the proposed Brandon Town Center addressed traffic conditions along SR 60 in the vicinity of this project's impact area. For this transportation analysis the information presented in the above-referenced Application for

TABLE 2
TRAFFIC VOLUME INCREASES ON CRITICAL ROADWAY SEGMENTS
SCENARIO NO. 1

SEGMENT ONE

<u>Time Period</u>	<u>NW Centroid Transfer Trailers</u>	<u>Commuting Employees</u>	<u>Administration and Support</u>	<u>Total Trips</u>
0600-0700	0	14	0	14
0700-0800	0	0	0	0
0800-0900	10	6	1	17
0900-1000	10	0	2	12
1000-1100	10	0	2	12
1100-1200	10	0	1	11
1200-1300	8	0	1	9
1300-1400	10	0	2	12
1400-1500	10	6	2	18
1500-1600	10	0	1	11
1600-1700	10	14	2	26
				<u>142</u>

SEGMENT TWO

<u>Time Period</u>	<u>S Centroid Transfer Trailers</u>	<u>NE Centroid Packer Trucks</u>	<u>Commuting Employees</u>	<u>Residue Trailers</u>	<u>Total Trips</u>
0600-0700	0	0	4		4
0700-0800	0	0	0		0
0800-0900	4	50	1	6	61
0900-1000	6	34	0	6	46
1000-1100	4	84	0	6	94
1100-1200	4	34	0	4	42
1200-1300	4	16	0	4	24
1300-1400	4	16	0	6	26
1400-1500	6	52	1	6	65
1500-1600	6	34	0	6	46
1600-1700	4	16	4	4	28
					<u>434</u>

TABLE 2 (Cont.)

SEGMENT THREE

<u>Time Period</u>	<u>NE Centroid Packer Trucks</u>	<u>Commuting Employees</u>	<u>Total Trips</u>
0600-0700	0	3	3
0700-0800	0	0	0
0800-0900	24	1	25
0900-1000	16	0	16
1000-1100	42	0	42
1100-1200	16	0	16
1200-1300	8	0	8
1300-1400	8	0	8
1400-1500	26	1	27
1500-1600	16	0	16
1600-1700	8	3	11
			<u>172</u>

SEGMENT FOUR

<u>Time Period</u>	<u>Commuting Employees</u>	<u>Total Trips</u>
0600-0700	17	17
0700-0800	0	0
0800-0900	9	9
0900-1000	0	0
1000-1100	0	0
1100-1200	0	0
1200-1300	0	0
1300-1400	0	0
1400-1500	9	9
1500-1600	0	0
1600-1700	17	17
		<u>52</u>

TABLE 2 (Cont.)

SEGMENT FIVE

<u>Time Period</u>	<u>S Centroid Transfer Trailers</u>	<u>NE Centroid Packer Trucks</u>	<u>NW Centroid Transfer Trailers</u>	<u>Residue Trucks</u>	<u>Commuting Employees</u>	<u>Administration and Support</u>	<u>Total Trips</u>
0600-0700	0	0	0	0	18	0	18
0700-0800	0	0	0	0	0	0	0
0800-0900	4	50	10	6	7	1	78
0900-1000	6	34	10	6	0	2	58
1000-1100	4	84	10	6	0	2	106
1100-1200	4	34	10	4	0	1	53
1200-1300	4	16	8	4	0	1	33
1300-1400	4	16	10	6	0	2	38
1400-1500	6	52	10	6	7	2	83
1500-1600	6	34	10	6	0	1	47
1600-1700	4	16	10	4	18	2	54
							576

TOTAL TRAFFIC VOLUME BY ROAD SEGMENT

	<u>ONE</u>	<u>TWO</u>	<u>THREE</u>	<u>FOUR</u>	<u>FIVE</u>
Day-Time Traffic Volume	142	434	172	52	576
Traffic Volume Other Hours	<u>12</u>	<u>6</u>	<u>3</u>	<u>12</u>	<u>18</u>
Total by Road Segment	154	440	175	64	594

SOURCE: CDM

TABLE 3
TRAFFIC VOLUME INCREASES ON
CRITICAL ROADWAY SEGMENTS

SCENARIO NO. 2

	SEGMENTS			
	<u>One</u>	<u>Two</u>	<u>Four</u>	<u>Five</u>
Proposed Project				
Traffic volume (vpd)	40	207	396	263

Development Approval was used as the primary basis for the evaluation of impacts to SR 60.

SR 60 between US Route 301 and Kingsway Road is one of the most heavily traveled roadways in Hillsborough County. The Tampa Urban Area Transportation Study (TUATS) has identified this roadway section as one of the most severely overloaded in the County. Consequently, roadway improvements are scheduled for this section of SR 60 to significantly improve its carrying capacity by the year 2000.

At a level of service (LOS) C, each of these three segments of SR 60 has a daily capacity of 28,800 vehicles. This is based upon a Florida Department of Transportation capacity estimate of 36,000 vpd for LOS-E and an adjustment factor of 0.8 from the Highway Capacity Manual. Under Scenario No. 1, the proposed project will add approximately 142 vehicle trips to Segment One, 388 vehicle trips to Segment Two, and 172 vehicle trips to Segment Three during weekdays between the hours of 6 A.M. and 5 P.M. This represents 0.5 percent, 1.3 percent, and 0.6 percent of SR 60 LOS-C daily capacity for Segments One, Two and Three, respectively.

These roadway segments of SR 60 are presently carrying a daily traffic volume in excess of the LOS-C daily capacity. As a result of existing traffic volumes this roadway is operating at a LOS-F. A summary of the impact the proposed project will have on these segments of SR 60 is presented on Table 4. This comparison shows the relative proportion of the traffic generated by the proposed project to existing ADT and that predicted to occur by the year 2000. It is readily apparent that the proposed project will have a negligible effect on existing or the higher predicted ADT.

While this predicted increase is, from a practical perspective, insignificant, SR 60 traffic volumes presently exceed LOS-C capacity levels. Therefore any increase, however minor, should be reviewed with regard to its potential consequences. As discussed in an earlier section the peaking characteristics of the proposed project's traffic fortunately do not coincide with the peaking patterns of SR 60. As a result, minimal levels of project-related traffic should occur during the periods of maximum traffic

TABLE 4
PREDICTED CHANGES IN ADT VOLUMES ON SR 60

<u>SEGMENT ONE</u>			
	<u>Roadway ADT¹</u>	<u>Proposed Project ADT²</u>	<u>Percent Increase from Project</u>
Present	44,540	142	0.3%
Future	68,100	142	0.2%

<u>SEGMENT TWO</u>			
	<u>Roadway ADT¹</u>	<u>Proposed Project ADT²</u>	<u>Percent Increase from Project</u>
Present	48,900	388	0.8%
Future	58,100	388	0.7%

<u>SEGMENT THREE</u>			
	<u>Roadway ADT³</u>	<u>Proposed Project ADT²</u>	<u>Percent Increase from Project</u>
Present	48,900	172	0.4%
Future	58,100	172	0.3%

SOURCE: 1. Hillsborough County Traffic Count Map, 1982.
2. CDM Estimates.
3. CDM Estimate from Reference 1.

volume on SR 60. Additionally, the peak project-related traffic volume will occur between SR 60's typical A.M. and P.M. peak traffic periods.

The portion of SR 60 expected to experience the greatest volume of project-related traffic on this roadway is also the shortest. This is Segment Two which includes that portion of SR 60 between Faulkenburg Road and the planned interchange of I-75. As previously indicated, most of SR 60 is scheduled for major modifications by the year 2000 and Segment Two will be modified by the construction of the interchange with I-75.

With planned roadway modifications, it is expected that traffic conditions on SR 60 will improve. Additionally, regardless of the influence from the traffic of this proposed project, service levels on SR 60 will stay low without future improvements in roadway conditions.

- o Segments Four and Five - The proposed project's daily traffic volume of 658 vpd is the same for both Scenario Nos. 1 and 2. Under Scenario No. 1, the split of the project's daily traffic between Segments Four and Five is 10 percent and 90 percent, respectively. Under Scenario No. 2, the split is 60 percent and 40 percent for Segments Four and Five, respectively.

The daily capacity of Faulkenburg Road was estimated by Kimley-Horn and Associates, Inc. in the following manner. The roadway capacity during the P.M. peak hour was estimated at the three intersections which will limit roadway capacity: Buffalo Avenue, Broadway Avenue and SR 60. The estimated peak hour capacity was then divided by the percent of daily traffic occurring in that hour to estimate daily capacity. Daily capacities calculated in this manner are an extension of the peak hour operating condition. The estimated daily capacities are 14,600 vpd and 10,950 vpd for Segments Four and Five respectively.

These roadway segments of Faulkenburg Road are presently carrying a daily traffic volume well below their estimated daily capacities. A summary of the impact the proposed project will have on these segments of Faulkenburg Road is presented on Table 5 for both Scenario Nos. 1 and 2. This

comparison shows the relative proportion of the traffic generated by the proposed project to both existing ADT and estimated daily capacity.

The greatest impact on Segment Four occurs under Scenario No. 2 with the proposed project traffic accounting for 2.6 percent of the roadway capacity and the present ADT plus proposed traffic equaling 44.2 percent of the roadway capacity. The greatest impact on Segment Five occurs under Scenario No. 1 with the proposed project traffic accounting for 5.4 percent of the roadway capacity and the present ADT plus proposed traffic equaling 51.9 percent of the roadway capacity. These predicted increases are insignificant from a practical perspective.

A generalized volume of 11,800 vpd is normally considered the maximum for LOS-C operation of a two-lane arterial such as Faulkenburg Road. The proposed project traffic will not increase existing ADT beyond this LOS-C Capacity. As shown on Table 5, the maximum predicted daily traffic volume on Faulkenburg Road, including the proposed project traffic, occurs on Segment Four under Scenario No. 2. The predicted volume of 6,456 vpd represents 55 percent of the roadway's LOS-C capacity.

Faulkenburg Road presently experiences only moderate volumes of traffic as shown on Table 6, exhibiting definite A.M. and P.M. peaking characteristics with moderate traffic volumes between these two periods. The A.M. and P.M. peak traffic hours are 7 A.M. to 8 A.M. and 5 P.M. to 6 P.M., respectively.

The proposed project's impact on the hourly distribution of traffic on Faulkenburg Road was evaluated. The analysis focused on Segment Five and used the more conservative Scenario No. 1 for estimated project traffic on this segment. The hourly distribution of the proposed project's truck traffic on Faulkenburg Road (Table 2) was converted to an equivalent number of automobile trips using a factor of 2.5 from the Highway Capacity Manual (ie: 1 truck trip equals 2.5 auto trips). To this equivalent project auto trips per hour was added the existing traffic volume (Table 6). The results of this analysis are summarized in Table 7 and are shown graphically on Figure 3.

TABLE 5

PREDICTED CHANGES IN ADT VOLUMES
ON FAULKENBURG ROAD

<u>Segment Four</u>	<u>Scenario No. 1</u>		<u>Scenario No. 2</u>	
	<u>Volume (vpd)</u>	<u>Percent of Capacity</u>	<u>Volume (vpd)</u>	<u>Percent of Capacity</u>
Capacity: 14,600 vpd ⁽¹⁾				
Average Daily Traffic ⁽²⁾	6,060	41.5%	6,060	41.5%
Proposed Project Traffic ⁽³⁾	<u>64</u>	<u>0.5%</u>	<u>396</u>	<u>2.7%</u>
TOTAL	6,124	42.0%	6,456	44.2%
 <u>Segment Five</u>				
Capacity: 10,950 vpd ⁽¹⁾				
Average Daily Traffic ⁽²⁾	5,090	46.5%	5,090	46.5%
Proposed Project Traffic ⁽³⁾	<u>594</u>	<u>5.4%</u>	<u>263</u>	<u>2.4%</u>
TOTAL	5,684	51.9%	5,353	48.9%

- (1) Estimated by Kimley-Horn and Associates, Inc.
 (2) Hillsborough County Traffic County Map, 1982.
 (3) CDM Estimates.

TABLE 6
HOURLY DISTRIBUTION OF TRAFFIC ON
FAULKENBURG ROAD

<u>Time Period</u>	<u>Vehicle Count</u>
0001 - 0100	43
0100 - 0200	23
0200 - 0300	19
0300 - 0400	15
0400 - 0500	40
0500 - 0600	115
0600 - 0700	308
0700 - 0800	478
0800 - 0900	342
0900 - 1000	291
1000 - 1100	312
1100 - 1200	354
1200 - 1300	423
1300 - 1400	391
1400 - 1500	389
1500 - 1600	439
1600 - 1700	508
1700 - 1800	557
1800 - 1900	317
1900 - 2000	215
2000 - 2100	140
2100 - 2200	168
2200 - 2300	110
2300 - 2400	69

SOURCE: Hillsborough County Traffic Engineering, Feb. 1983.

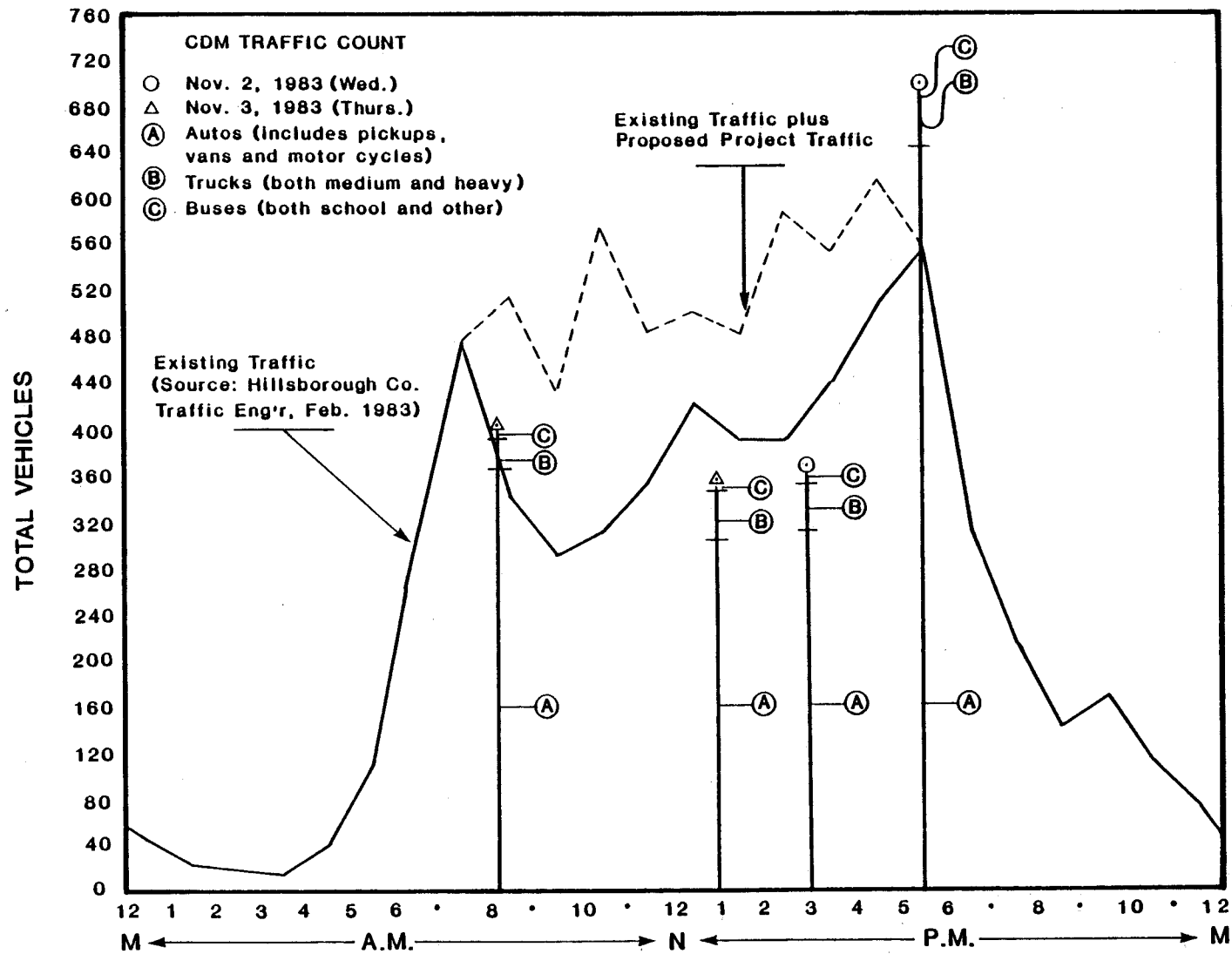
TABLE 7

ANALYSIS OF FAULKENBURG ROAD
HOURLY TRAFFIC DISTRIBUTIONSEGMENT FIVE

Time Period	Actual Traffic Volume from Proposed Project	Equivalent Traffic Volume of Project	Existing Traffic Volume	Total Future Equivalent Volume with Project
0800-0900	80	185	342	517
0900-1000	58	142	291	433
1000-1100	106	262	312	574
1100-1200	53	131	354	485
1200-1300	33	81	423	503
1300-1400	38	92	391	483
1400-1500	85	196	389	585
1500-1600	47	116	439	555
1600-1700	56	107	508	615

1. Each truck trip is equivalent to 2.5 automobile trips

SOURCE: CDM



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

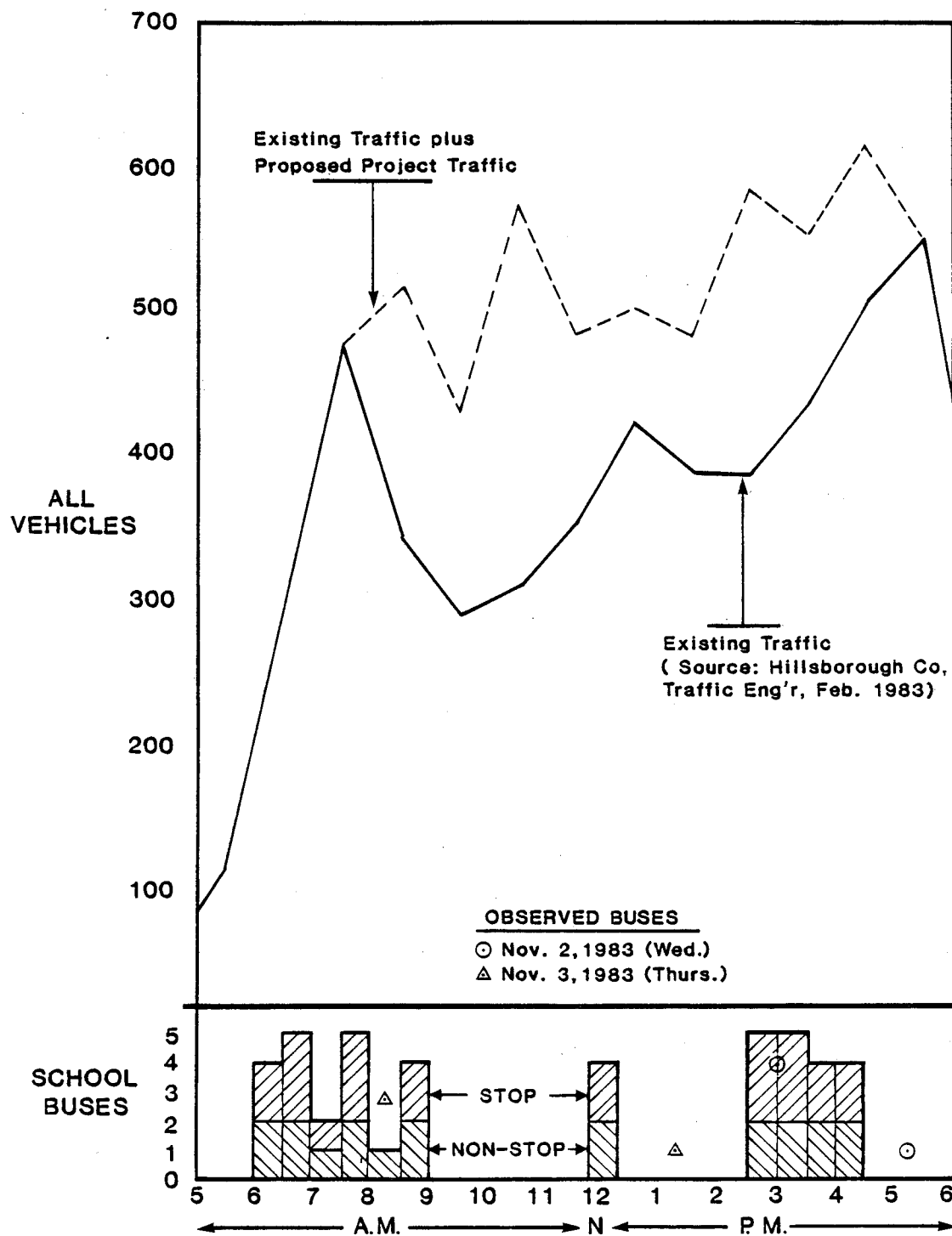
FIGURE 3
HOURLY DISTRIBUTION OF TRAFFIC
ON FAULKENBURG ROAD

Also shown on Figure 3 are the results of traffic counts obtained on November 2 and 3, 1983 for this evaluation. The results of these traffic counts compare well with traffic data obtained from the Hillsborough County Traffic Engineering Department.

Information on the use of Faulkenburg Road by school buses was obtained from the Hillsborough County Public Schools Administration and Operating Budget Transportation Department. The data show that most school bus trips occur between the hours of 6 A.M. and 9 A.M. (21 trips) and 2:30 P.M. and 4:30 P.M. (18 trips) with minimal use between 11 A.M. and 1 P.M. (four trips). Of the 43 total daily school bus trips, approximately half stop to pickup/discharge riders and half are non-stop. The data are presented graphically on Figure 4.

The proposed project should not have any noticeable effect on the carrying capacity and level of service on Faulkenburg Road. Additionally, because SR 60 is presently experiencing heavy traffic volumes, the proposed project's traffic would result in relatively insignificant effects.

It is possible that roadway modification would be required at the intersection of Faulkenburg Road and SR 60 and at the proposed entrance to the site from Faulkenburg Road. The improvements under consideration are reviewed in Section 3.2 "Required Improvements and Services". These modifications would be directed at safety-related issues and maintenance of the present LOS-C capacity levels.



Source: Hillsborough Co. Public Schools Administration and Operations Budget Transportation Department

EXHIBIT A

ADDITIONAL TRANSPORTATION ANALYSIS AND
SUPPLEMENTAL TRAFFIC ANALYSIS BY
KIMLEY-HORN AND ASSOCIATES, INC.

COUNTY OF HILLSBOROUGH



MEMORANDUM

Date 8/22/83

To Gary Englehardt, Zoning Administrator, Dept. of Development Coordination
From Warren N. Smith, Director, Department of Solid Waste
Subject: REZONING APPLICATION #83-274 - TRANSPORTATION ANALYSIS

In response to the comments from the County Road Department concerning the transportation analysis for the County's Resource Recovery Facility and Wastewater Treatment Plant Rezoning Application #83-274, I am transmitting, herewith, the requested additional information.

Included with the response paper is a letter report prepared by traffic consultants, Kimley-Horn and Associates, who performed a supplemental transportation analysis of the project area.

Please provide the appropriate individuals with the additional information so that they may complete their review of the zoning application.

Thank you for your assistance in this matter.

WNS/pd
encl.

cc: Joe Bell, Principal Planner
H.C. City-County Planning Commission

Response to Comments on the Transportation
Analysis Portion of the Rezoning Application
For the Hillsborough County Resource Recovery Facility
And Wastewater Treatment Plant

The comments prepared by Hillsborough County's Road Department* have been reviewed and responses to these comments are presented herein. Three basic approaches have been used in responding to these comments.

1. The assumptions used in the initial transportation analysis are explained or clarified as appropriate;
2. Additional information was obtained and is presented to address a specific issue of concern; and
3. The results of a transportation study recently performed by Kimley-Horn and Associates for this project is referenced, as appropriate.

In some cases responding to a specific comment required using more than one of the approaches described above.

COMMENT 1 (First Part):

"Page 4-6 - Vehicles from the NW are projected to use US 301 to SR 60 then to Faulkenburg and/or the Crosstown Expressway. Vehicles from the NW would probably use Buffalo Ave. (SR 574) rather than SR 60 which requires going south of the facility then back north on Faulkenburg. Many of these trucks would probably use I-75/I-4 and would exit onto SR 574, go east to Faulkenburg and then south. Use of the Crosstown Expressway is unlikely."

RESPONSE:

The transfer trailers originating from the County's NW Transfer Station will be operated by the County. As a result, the County will be able to direct the specific routes to be utilized by these vehicles.

Segment Four, which is that portion of Faulkenburg Road north of the site, appears to be utilized more extensively by residential traffic that has no alternative route selection than the portion of Faulkenburg Road south of the site, i.e., Segment Five. The County could direct transfer trailer traffic associated with the NW transfer Station away from Segment Four. This would reduce the exposure of residential traffic along Segment Five to large transfer trailers.

*Memorandum from Ed Melchen to Ethel Hammer dated July 7, 1983.

As indicated in the above comment it is unlikely that the Crosstown Expressway would be utilized, even if transfer trailer traffic were directed to use Segment Five.

COMMENT 1 (Second Part):

"Vehicles from the NE region would probably use SR 574 also. The only vehicles which might approach from the south would be packer trucks serving the area south of SR 60."

RESPONSE:

It is probable that some packer truck traffic will utilize Segment Four and SR 574. However, after an initial survey of existing roadway conditions and a review of planned modifications, it was felt that most packer trucks utilizing Interstate 75 would utilize the interchange with SR 60 rather than with SR 574.

While exiting on SR 60 rather than onto SR 574 would result in an additional 1.5 miles of one-way travel, it would significantly reduce the travel on secondary roads. The use of the SR 60 exit reduces the one-way travel on secondary roads by 1.25 miles when compared to using the SR 574 exit. It was felt that many packer truck drivers would travel an additional 1.5 miles of interstate roadway to minimize their travel on secondary roads. Also, the County can specify use of I-75, SR 60 and/or other roadways in the franchise agreements with the waste handling companies.

In summarizing the basis for the initial transportation analysis, it is possible that some packer truck traffic from the County's NE region would utilize SR 574 and the northern portion of Faulkenburg Road. However, many packer trucks would probably utilize the southern approach in order to minimize the use of secondary roads. Additionally, performing this preliminary transportation analysis without splitting the traffic volume from the NE region between Segments Four and Five adds a certain degree of conservatism in evaluating the potential impacts to Faulkenburg Road's L O S, especially with the intersection of SR 60 which appears more critical than the intersection with SR 574.

The recent transportation work performed by Kimley-Horn and Associates was based upon a modified distribution of traffic from that presented in the rezoning application. This modified distribution assumed no traffic routing would be specified for County operated transfer trailers or within franchise agreements. The basis for this modified approach and results of the analysis are presented in the attached copy of the Letter Report by Kimley-Horn Associates.

COMMENT 2:

"Have intersection analyses been performed for the intersections of Faulkenburg and SR 60 and Faulkenburg and SR 574? Will intersection improvements such as turn lanes, signals, larger radii be needed?"

RESPONSE:

In light of the assumptions presented above in response to the first comment, the preliminary transportation analysis focused principally on Segment Five of Faulkenburg Road which does intersect with SR 60. In Section 3.2.1 of the Rezoning Application, it was indicated that various improvements to this intersection were being considered, such as improving visibility, widening the turning radius, providing or improving turning and storage lanes, and installing various types of warning devices. At the present time planned modifications to this intersection and to SR 60 by interchange with Interstate 75 are being reviewed and any recommendations for additional modifications will be reviewed with County and State transportation officials.

With regard to the revised traffic distribution scenario, intersection modifications have been recommended by Kimley-Horn and Associates.

The extent of roadway and intersection improvements are discussed at the end of this review of comments. However, the actual improvements implemented shall be defined at future meetings with County and State transportation officials.

COMMENT 3:

"The traffic generation estimates contained in the transportation analysis are acceptable."

RESPONSE:

None required.

COMMENT 4:

"Has any study been conducted to determine if Faulkenburg Rd. is structurally capable of accommodating the increased heavy vehicular traffic?"

RESPONSE:

No detailed engineering analysis was performed to determine if Faulkenburg Road is structurally capable of handling increased heavy vehicle traffic. However, observations of existing traffic mix revealed that the roadway is frequently used by heavy truck traffic up to and including an HS-20 type vehicle (large tractor trailer combination). Based upon these observations, it was assumed that this roadway routinely handles, with no observed physical problem, truck traffic with a gross weight approaching the states legal limit. Additionally, there are no posted weight limits along the length of Faulkenburg Road between SR 574 and SR 60.

After receiving this comment, the County's Road Department was contacted to determine if Faulkenburg Road had any load classification and weight restrictions or design information detailed enough to analyze these issues. It was indicated that there was no design information on the pavement or base coarse materials. However, the principal issue of concern was with the capability of drainage structures to support truck traffic. After consulting the structural group in the Road Department it was found that there were no structural limitations along Faulkenburg Road due to restrictive load classifications over drainage structures.

COMMENT 5:

"Because of the slow acceleration characteristics of these large vehicles, consideration should be given to providing a LT storage lane for the NB vehicles turning left into the facility."

RESPONSE:

As indicated in Section 3.2.1 "Improvements," turning lanes at the entrance of the proposed facility are being investigated as a mitigative measure for Faulkenburg Road. Information on the right-of-way of Faulkenburg Road will be reviewed to determine if adequate land is available for turning/storage lanes. If not, land acquisition parallel to the road may be required.

COMMENT 6:

"Roadway segments #2 and #3 are being widened by FDOT as part of the I-75 By-Pass interchange construction. Two regional shopping centers are planned adjacent to segment #3 which by 1985 will increase the traffic volume on SR 60 to an estimated 54,000 vpd. Therefore, even with the widening, this segment is expected to be

at LOS "E" before the Resource Recovery Facility is in operation. (One of these shopping centers is now under construction and the other is undergoing DRI review.)"

RESPONSE:

Future traffic predictions for the rezoning application were based upon information presented in the DRI for Brandon Town Center (FSR Inc., Sept. 1983) and the 1982 Hillsborough County Traffic County Map. As indicated in the above referenced comment, future traffic volume along SR 60 even after scheduled improvements will equal or exceed capacity. However, this condition will occur with or without this proposed project. Under the worst case condition, i.e. traffic distribution presented in the Rezoning Application, the daily increase from the proposed resource recovery facility will represent one percent or less of the future daily LOS-E roadway capacity of SR 60 depending upon the specific segment affected.

While this impact to SR 60 is somewhat unavoidable, its relative significance is considered minor for the following reasons:

- The segment (Segment Two) of SR 60 expected to experience the greatest increase from the project is also the shortest (about 3,000 feet).
- The peak project related traffic volume will occur between and not during SR 60's typical A.M. and P.M. peak traffic periods.
- The assumptions made for the preliminary transportation analysis were based upon "worst-case" impacts to SR 60. If more vehicles from the NE region use the north approach to the site (i.e. via SR 574) the impact to SR 60 will be less.
- An increase of one percent or less of the roadway's capacity volume should be below the detectable limits from a users perspective.
- When compared to other projects in the area the predicted increase from this project is relatively minor. For example, the Brandon Town Center development will increase daily traffic volumes along Segments Two and Three by 1,760 and 9,140 vehicle trips as compared to 440 and 175 vehicle trips, respectively, from the proposed resource recovery project.

COMMENT 7:

"At the bottom of Table 4-2 where traffic volume by road segment is shown, it appears to me that the sum of traffic on segments 1, 2 and 3 should equal the traffic on segment 5 since all the traffic from SR 60 must use Faulkenburg to get to the facility. The column titled 'Total by Time Period' is also misleading in that it counts each vehicle trip twice (once on Faulkenburg and once on SR 60) making it appear that there are more trips than there actually are (i.e. section 4.2.1.1 indicates that there are 558 vehicle trips per day while Table 4-2 shows a 'Total by Time Period' of 1,378)."

RESPONSE:

Table 4-2 has been modified as attached and replaces the table presented in the Rezoning Application. The sum of traffic on Segments 1 and 2 equals the traffic on Segment 5.

COMMENT 8:

"Page 4-13 - The 20,400 vpd LOS "C" capacity for a two-lane roadway is incorrect. A generalized volume of 11,800 vpd is normally considered the maximum for LOS "C" operation of a two-lane arterial."

RESPONSE:

The LOS "C" capacity volume developed for the preliminary transportation evaluation presented in the Rezoning Application was based upon analysis which assumed relatively ideal conditions for a rural road. The generalized LOS "C" number presented by the County was taken from the Generalized Highway Capacities data presented in the Pinellas Area Transportation Study. In order to more accurately define the LOS "C" capacity volume, Kimley-Horn and Associates was requested to perform a capacity analysis of Faulkenburg Road. The results of their transportation analysis, including roadway capacity volumes, is presented in the Letter Report attached to this document.

SUMMARY

The additional analyses performed in response to the comments generated by the County's Road Department provided additional insight into the transportation issues of this project. The results of the analyses performed by Kimley-Horn and Associates along with followup meetings and discussions with County transportation officials further substantiate the conclusions of the preliminary transportation analysis, i.e. the proposed project will not result in adverse impacts to the existing or future transportation conditions.

The exact roadway modifications proposed to help support the traffic generated by this project depend on the assumed split in traffic distribution and the extent of roadway modifications currently planned that are unrelated to this project. The initial transportation analysis placed heavier emphasis on truck traffic routinely using roadways principally to the south of the site. The recent analysis performed by Kimley-Horn and Associates assumes a more routine use of roadways north of the site. The latter scenario is likely if the County does not specifically dictate truck traffic routes from the NW transfer station and/or the NE region to the site.

If the County decides not to direct specific traffic routes for trucks traveling to and from the facility, the recommendations presented within the attached Kimley-Horn and Associates Letter Report should be considered for implementation. The County may, however, at some future time decide to direct all or portions of the facility traffic generated in the NW and NE regions to roadways south of the site. In order to accommodate this possibility, it appears that a slight modification to the recommendations presented by Kimley-Horn and Associates would be appropriate. This modification to their recommendations would be an extension (50 to 100 ft) of the north bound left turn lane on Faulkenburg into the site. No other modifications appear necessary.

TABLE 4-2 (Revised 8/17/83)
TRAFFIC VOLUME INCREASES ON CRITICAL ROADWAY SEGMENTS

SEGMENT ONE

<u>Time Period</u>	<u>NW Centroid Transfer Trailers</u>	<u>Commuting Employees</u>	<u>Administration and Support</u>	<u>Total Trips</u>
0600-0700	0	14	0	14
0700-0800	0	0	0	0
0800-0900	10	6	1	17
0900-1000	10	0	2	12
1000-1100	10	0	2	12
1100-1200	10	0	1	11
1200-1300	8	0	1	9
1300-1400	10	0	2	12
1400-1500	10	6	2	18
1500-1600	10	0	1	11
1600-1700	10	14	2	26
				<u>142</u>

SEGMENT TWO

<u>Time Period</u>	<u>S Centroid Transfer Trailers</u>	<u>NE Centroid Packer Trucks</u>	<u>Commuting Employees</u>	<u>Residue Trailers</u>	<u>Total Trips</u>
0600-0700	0	0	4		4
0700-0800	0	0	0		0
0800-0900	4	50	1	6	61
0900-1000	6	34	0	6	46
1000-1100	4	84	0	6	94
1100-1200	4	34	0	4	42
1200-1300	4	16	0	4	24
1300-1400	4	16	0	6	26
1400-1500	6	52	1	6	65
1500-1600	6	34	0	6	46
1600-1700	4	16	4	4	28
					<u>434</u>

TABLE 4-2 (Revised 8/17/83) (Cont.)

SEGMENT THREE

<u>Time Period</u>	<u>NE Centroid Packer Trucks</u>	<u>Commuting Employees</u>	<u>Total Trips</u>
0600-0700	0	3	3
0700-0800	0	0	0
0800-0900	24	1	25
0900-1000	16	0	16
1000-1100	42	0	42
1100-1200	16	0	16
1200-1300	8	0	8
1300-1400	8	0	8
1400-1500	26	1	27
1500-1600	16	0	16
1600-1700	8	3	11
			<u>172</u>

SEGMENT FOUR

<u>Time Period</u>	<u>Commuting Employees</u>	<u>Total Trips</u>
0600-0700	17	17
0700-0800	0	0
0800-0900	9	9
0900-1000	0	0
1000-1100	0	0
1100-1200	0	0
1200-1300	0	0
1300-1400	0	0
1400-1500	9	9
1500-1600	0	0
1600-1700	17	17
		<u>52</u>

TABLE 4-2 (Revised 8/17/83) (Cont.)

SEGMENT FIVE

<u>Time Period</u>	<u>S Centroid Transfer Trailers</u>	<u>NE Centroid Packer Trucks</u>	<u>NW Centroid Transfer Trailers</u>	<u>Residue Trucks</u>	<u>Commuting Employees</u>	<u>Administration and Support</u>	<u>Total Trips</u>
0600-0700	0	0	0	0	18	0	18
0700-0800	0	0	0	0	0	0	0
0800-0900	4	50	10	6	7	1	78
0900-1000	6	34	10	6	0	2	58
1000-1100	4	84	10	6	0	2	106
1100-1200	4	34	10	4	0	1	53
1200-1300	4	16	8	4	0	1	33
1300-1400	4	16	10	6	0	2	38
1400-1500	6	52	10	6	7	2	83
1500-1600	6	34	10	6	0	1	47
1600-1700	4	16	10	4	18	2	54
							<u>576</u>

TOTAL TRAFFIC VOLUME BY ROAD SEGMENT

	<u>ONE</u>	<u>TWO</u>	<u>THREE</u>	<u>FOUR</u>	<u>FIVE</u>
Day-Time Traffic Volume	142	434	172	52	576
Traffic Volume Other Hours	<u>12</u>	<u>6</u>	<u>3</u>	<u>12</u>	<u>18</u>
Total by Road Segment	154	440	175	64	594

SOURCE: CDM

August 16, 1983
6544.01

Mr. Ed Kunce
Camp, Dresser & McKee, Inc.
1 Center Plaza
Boston, Massachusetts 02108

SUBJECT: Hillsborough County
Resource Recovery Plant,
Traffic Analysis

Dear Mr. Kunce:

At your request, we have reviewed the traffic analysis undertaken by Camp, Dresser & McKee, Inc., submitted in support of the Hillsborough County Resource Recovery Plant zoning petition. In addition, we have met with County Public Works' staff to discuss concerns raised by Mr. Ed Melchen, Hillsborough County Traffic Engineer, in his memorandum of July 7, 1983 to Ms. Ethel Hammer of the Hillsborough County Office of Development Coordination. We then conducted supplemental analyses to address these issues. Our comments, methods, findings, and recommendations are presented in the following sections.

In our analysis, we have utilized traffic generation estimates prepared by Camp, Dresser & McKee, Inc. and have noted the improvement to the S.R. 60/Faulkenburg Road intersection, which is a part of the S.R. 60/Interstate 75 interchange construction project. We have also conducted manual intersection turning movement counts and machine traffic volume counts in the field to support our analyses.

TRAFFIC ASSIGNMENT

In the initial meeting with Hillsborough County Public Works Department staff, assignment of Resource Recovery Plant traffic was discussed. Upon reviewing the major street network providing access to the site, and roadway improvements scheduled by 1987, we have modified the assignment presented in the initial submittal to reflect more use of Faulkenburg Road to the north of the Resource Recovery Plant site. The modified assignment is summarized in Figure 1. Specific issues which influenced these modifications to the assignment are:

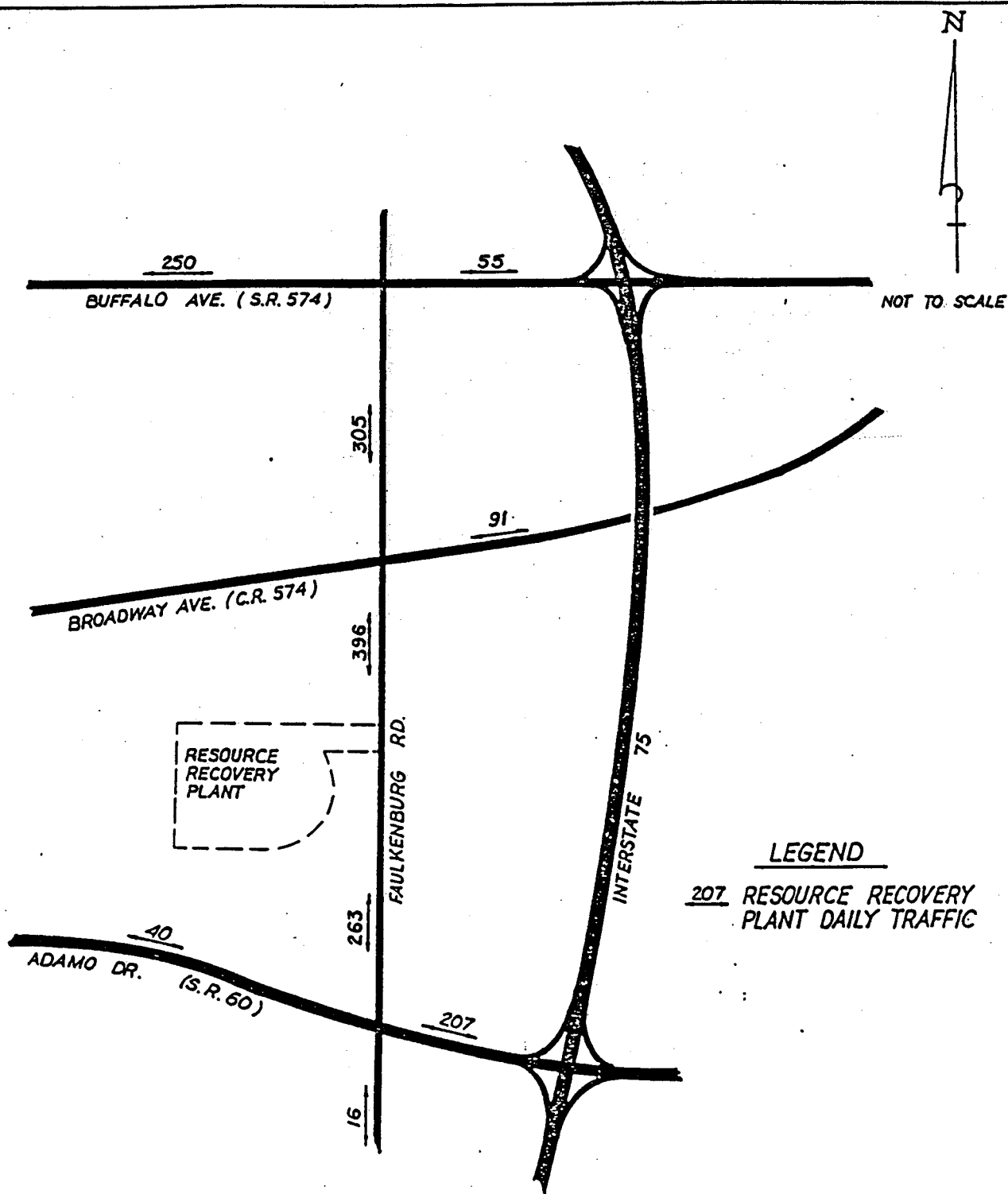


FIGURE 1
HILLSBOROUGH COUNTY
RESOURCE RECOVERY PLANT
DAILY TRAFFIC ASSIGNMENT

Kimley-Horn

Mr. Ed Kunce
Camp, Dresser & McKee, Inc.
August 16, 1983
Page Two

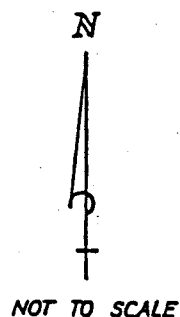
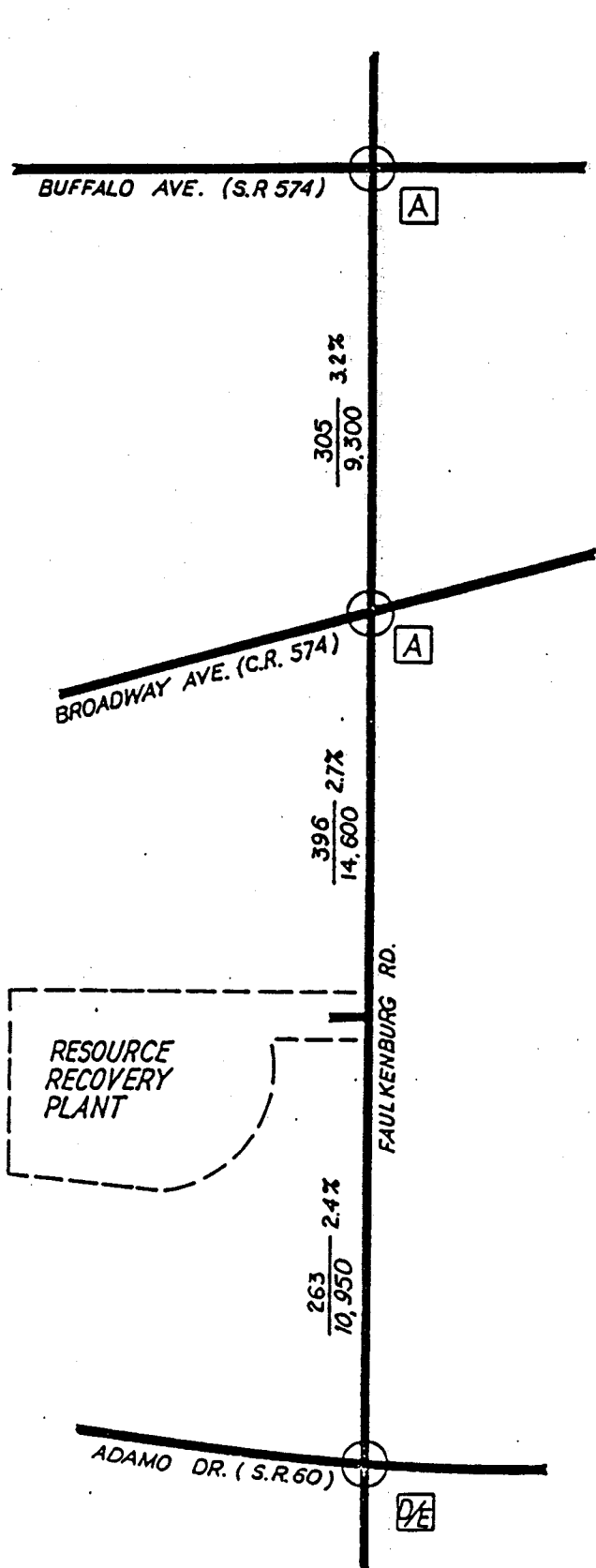
1. Buffalo Avenue (S.R. 574) is scheduled to be widened to a four-lane, divided roadway from Interstate 4 to C.R. 579 (east of Interstate 75) in 1986 by the Florida Department of Transportation (FDOT). Conceptual plans for this improvement include the addition of left-turn auxiliary lanes on all approaches to the Buffalo Avenue/Faulkenburg Road intersection. At this time, FDOT has not made any recommendations concerning the type of control needed at this intersection.
2. The Horizon 2000 plan, Hillsborough County's adopted land use plan, designates the property fronting on Faulkenburg Road between Buffalo Avenue and S.R. 60 for light industrial development.

Based on this information, traffic originating at the Northwest sector transfer point was reassigned to access the site via Interstate 4, Buffalo Avenue, and Faulkenburg Road. This is the most direct route to the Resource Recovery Plant from the Northwest transfer point.

Traffic assignment in the Northeast sector was based on the distribution of population in the Northeast sector. Garbage trucks serving this area will make their collection runs and deposit refuse at the Resource Recovery Plant. Thus, the traffic will be most heavily distributed to areas of greater population and development intensity. Population data used was obtained from the 1980 census.

CAPACITY ANALYSIS

The daily capacity of Faulkenburg Road was estimated by first estimating roadway capacity during the p.m. peak hour at three intersections which will limit roadway capacity: Buffalo Avenue, Broadway Avenue, and S.R. 60. The peak hour capacity was then divided by the percent of daily traffic occurring in that hour to estimate daily capacity. Daily capacities calculated in this manner are an extension of the peak hour operating condition. Because level of service D is considered acceptable during the peak hour in an urban street system, roadway capacities reported in Figure 2 are the capacities which will result in level of service D operation at intersections in the peak hour. Better levels of service will be provided throughout the remainder of the day.



LEGEND

$\frac{263}{10,950}$ 2.4% — RESOURCE RECOVERY PLANT DAILY TRAFFIC
 — PERCENT OF CAPACITY USED
 — ROADWAY DAILY CAPACITY

A

1987 P.M. PEAK HOUR
INTERSECTION LEVEL
OF SERVICE



SIGNALIZED INTERSECTION

FIGURE 2
HILLSBOROUGH COUNTY
RESOURCE RECOVERY PLANT
1987 ESTIMATED ROADWAY CAPACITY
AND OPERATING CONDITIONS

Mr. Ed Kunce
Camp, Dresser & McKee, Inc.
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Page Three

Peak hour roadway capacity was estimated using the operations and design method of Critical Movement Summation. Traffic volume estimates for the p.m. peak hour in 1987 were used in the analysis. These were developed by interpolating between current traffic volumes and 2000 traffic volume estimates developed by the Tampa Urban Area Transportation Study. This procedure yielded 1987 volume estimates which were from 11 percent to 36 percent higher than current traffic volumes.

Lane configurations and traffic controls used in the analysis corresponded to planned roadway improvements on Buffalo Avenue and S.R. 60. No decision has been made yet by FDOT whether or not to signalize the Buffalo Avenue/Faulkenburg Road intersection as a part of the planned improvement there. Based on estimated traffic growth, signalization will be warranted under Warrant Two, Interruption of Continuous Traffic, as presented in the Manual on Uniform Traffic Control Devices by 1987. This warrant for signalization will be met whether or not the Resource Recovery Plant is in operation. Therefore, signalized operation was assumed at this intersection. The S.R. 60/Faulkenburg Road intersection will be widened and signalized by 1987 as a part of the Interstate 75 construction. No improvements are planned at the Broadway Avenue/Faulkenburg Road intersection.

Estimated daily roadway capacities, and 1987 p.m. peak hour levels of service at the three signalized intersections on Faulkenburg Road, are reported in Figure 2.

INTERSECTION GEOMETRICS

The design of two of the three critical intersections were reviewed to determine if the turning radii and turn lanes which will be affected by Resource Recovery Plant traffic are suitable for truck traffic. The third intersection, Buffalo Avenue at Faulkenburg Road, is to be improved by FDOT, however, no design has yet been prepared. Recommendations are made in this report for this intersection. If implementation of the Resource Recovery Plant is approved, Hillsborough County should forward these recommendations to FDOT.

Mr. Ed Kunce
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FINDINGS AND RECOMMENDATIONS

Based on the analyses described in this report, the following findings are summarized.

- By 1987 signalization will be needed at the Buffalo Avenue/Faulkenburg Road intersection whether or not the Resource Recovery Plant is in operation.
- Level of service A will be provided on Faulkenburg Road during the p.m. peak hour in 1987, except at its intersection with S.R. 60. At this location, level of service near the D/E borderline will occur. Better levels of service will be provided throughout the remainder of the day.
- Resource Recovery Plant traffic will use no more than 3.2 percent of the carrying capacity of Faulkenburg Road on a daily basis, and will not generate any truck traffic during the p.m. peak hour of traffic on adjacent streets. Thus, no significant impact on roadway operating conditions will result from operation of the Resource Recovery Plant.
- Corner radii and left-turn lane lengths at the existing Broadway Avenue/Faulkenburg Road intersection are adequate to serve traffic generated by the Resource Recovery Plant.

The following recommendations are made to preserve the quality of traffic circulation on Faulkenburg Road between S.R. 60 and Buffalo Avenue:

- Improvements currently scheduled by FDOT to S.R. 60, Buffalo Avenue, and Faulkenburg Road should be implemented by 1987.
- Hillsborough County should monitor the need for a traffic signal at the Buffalo Avenue/Faulkenburg Road intersection.
- As a part of the Buffalo Avenue widening project, FDOT should give consideration to constructing an east to south right-turn lane at Faulkenburg Road. This will promote efficient traffic flow on Buffalo Avenue by allowing trucks to decelerate in an auxiliary lane. In addition the westbound and northbound left-turn storage lanes at the Buffalo Avenue/Faulkenburg Road intersection should be at least 75 feet in length.

Mr. Ed Kunce
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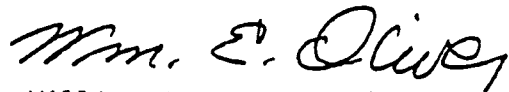
- At the site entrance, a northbound left-turn lane should be constructed. This lane should be at least 150 feet long. The site driveway should be controlled by a STOP sign in accordance with the requirements of the MUTCD.
- As a part of the planned improvements to the S.R. 60/Faulkenburg Road intersection, FDOT should give consideration to increasing the paved shoulder on the northeast corner to provide a 75 foot radius. This will enable a WB-50 design vehicle (i.e., a transfer tractor-trailer) to stay on paved surfaces as it turns right from S.R. 60 onto Faulkenburg Road.

Traffic generated by the plant will consume less roadway capacity than the County's policies have established for determining significant transportation impact. In light of the foregoing findings and recommendations, operation of the Resource Recovery Plant will not have significant impact on roadway operating conditions.

Thank you very much for the opportunity to assist Hillsborough County with the Resource Recovery Plant. If you have any questions regarding our analyses, please do not hesitate to contact me.

Very truly yours,

KIMLEY-HORN AND ASSOCIATES, INC.



William E. Oliver, P.E.
Transportation Engineer

WEO/jam

Appendix 10.14

APPENDIX 10.14

HYDROLOGIC CALCULATIONS FOR
STORMWATER BASIN DESIGN

APPENDIX 10.14

HYDROLOGIC CALCULATIONS FOR STORMWATER BASIN DESIGN

Introduction

The design of the stormwater detention/retention basins for the Hillsborough County Resource Recovery facility is based on the criteria that: (1) the post-development peak flow rate from the project site in a 25-year storm of critical duration must not exceed the pre-development peak flow rate in a 10-year storm of critical duration; (2) the post-development runoff volume discharged during a 25-year 24-hour rainfall will not be increased beyond the pre-developed volume naturally running off during that same rainfall and (3) the facility must retain and discharge by infiltration a volume equivalent to the first one-half inch of runoff.

The Stormwater Management and Design Aid (SMADA) Model developed at the University of Central Florida was used to simulate outflow hydrographs from the drainage areas. The model uses the Soil Conservation Service curve number method to compute runoff.

Application of Design Criteria

The site drains to two receiving waters:

- (1) A drainage ditch running east-west along the northern boundary of the site.
- (2) A channel flowing in a northwesterly direction from the western boundary of the site.

The drainage ditch is a fairly large channel estimated from site inspection to be about 10 feet deep and six to seven feet wide. Table 1 summarizes the capacity of the ditch for various depths of flow. Capacity estimates

TABLE 1
NORTHERN DRAINAGE DITCH CAPACITY ESTIMATION

<u>Flow Depth, ft</u>	<u>Channel Cross-sectional Area, ft²</u>	<u>Hydraulic Radius, ft</u>	<u>Channel Capacity, cfs</u>
1	7	0.78	14
3	21	1.62	69
5	35	2.06	135
7	49	2.33	205
9	63	2.52	278

were made using the Manning equation. A rectangular channel cross-section was used. Channel bottom slope was estimated at 0.2% and a roughness coefficient of 0.028 was used in the calculations.

The channel running along the western boundary of the site is shallower and wider than the drainage ditch. Site inspection revealed that portions of the channel were obstructed by heavy vegetation. Channel capacity is approximately 65 cfs as obtained by estimating the combined capacity of twin 30-inch diameter culverts located just to the north of the Seaboard Coastline Railroad track.

Eventually the ditch and the channel intersect and flow southwestward toward the Tampa Bypass Canal.

For both the pre-development and post-development site conditions, the site was divided into drainage areas as shown on Figures 1 and 2. A summary of the drainage areas that are to be compared using the above-mentioned design criteria follows:

<u>Pre-Development</u>		<u>Post-Development</u>		
<u>Area</u>	<u>Discharge Point</u>	<u>Area</u>	<u>Basin</u>	<u>Discharge Point</u>
North	Drainage Ditch	North	1	Drainage Ditch
West	Western Channel		2	Drainage Ditch
		West	3	Western Channel
			4	Western Channel
			5	Western Channel

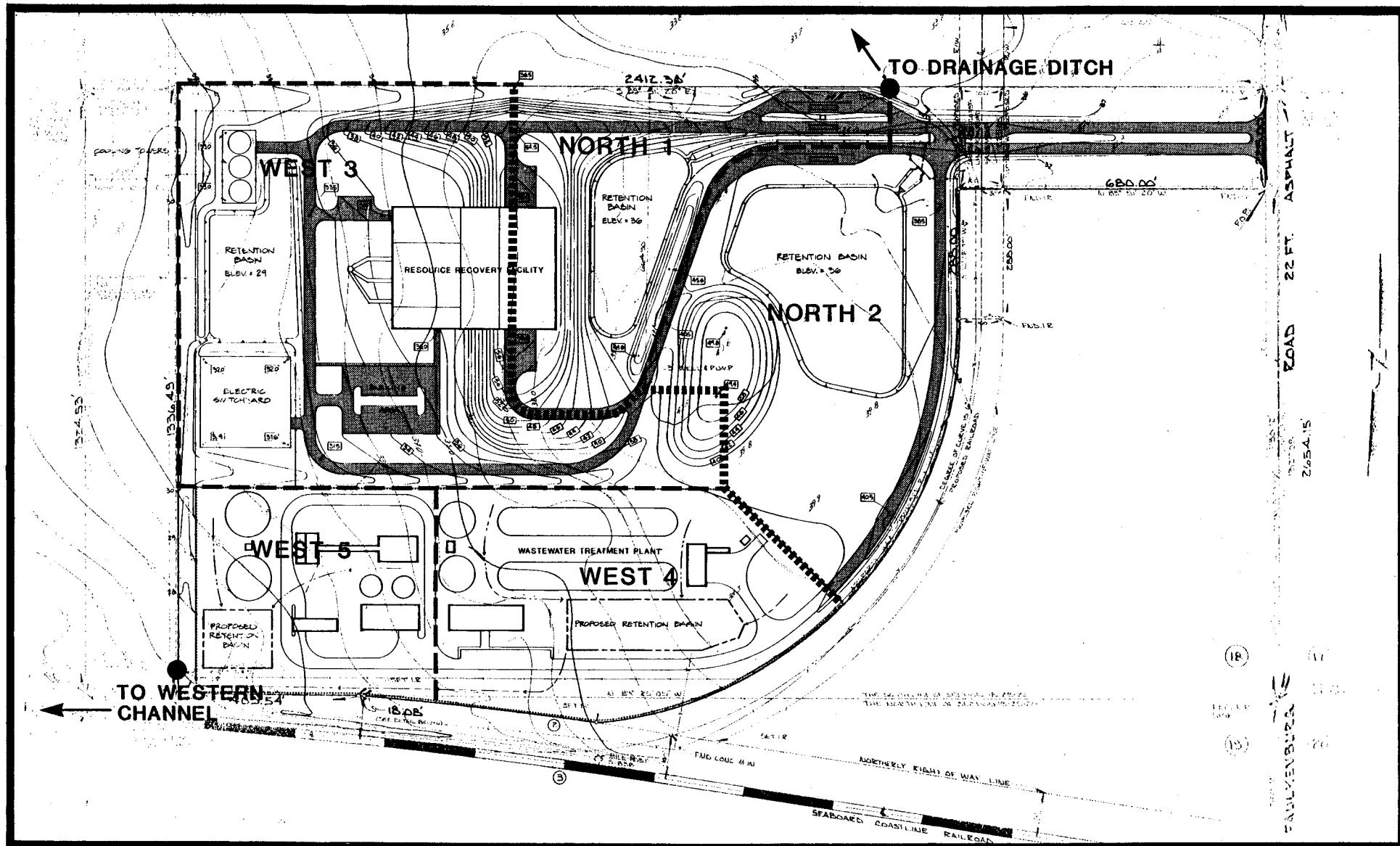
The peak outflow rate from each drainage area for the pre-development and post-development cases was analyzed independently. Stormwater basins were sized to assure compliance with the peak discharge design criterion for each drainage area.

Pre-Development Conditions

To determine the peak flows for the pre-development site conditions, the site was divided into two areas that correspond with the discharge points

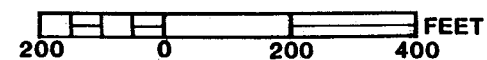
Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 2
POST-DEVELOPMENT
DRAINAGE AREAS



of the post-development drainage areas. The acreages of the pre-development drainage areas are listed below:

<u>Pre-Development Drainage Area</u>	<u>Acreage</u>
North	19.4
West	31.0

Several alternate flow paths to the discharge point of each drainage area were outlined and a time of concentration analysis performed for each path. The results of that analysis are shown on Table 2. Representative time of concentration values for the north and west drainage areas are 60 and 90 minutes, respectively.

Using the Rational Method a peak discharge rate was calculated for each drainage area during both a 25-year and a 10-year storm of critical duration. For the pre-developed condition a runoff coefficient equal to 0.45 describes a rural area pasture with a shallow impeding horizon (i.e. the groundwater table). Because this value is only applicable to storms with return periods of five to ten years, the indicated runoff coefficient was increased to 0.70 for the 25-year storm under the assumption that nearly all of the rainfall in excess of that expected from the 10-year recurrence interval would become runoff.

Rainfall intensity was obtained from Figure 3 of the Stormwater Management Manual. Figure 3, shown in Exhibit A, was constructed from data compiled by the Florida Department of Transportation for Zone 6 (West Central Florida).

Table 3 summarizes the results of the pre-development peak discharge analysis. In order to meet the criterion regarding peak discharge from the project site following development, flow going to the northern drainage ditch must be limited to 25 cfs and flow to the western channel must be held at 35 cfs.

TABLE 2
TIME OF CONCENTRATION ANALYSIS
PRE-DEVELOPMENT CASE

<u>Drainage Area</u>	<u>Path</u>	<u>Slope, %</u>	<u>Length, ft</u>	<u>Time of Concentration, min⁽¹⁾</u>
West	1A	0.8	1,180	45
	2A	1.1	620	32
	2B	0.5	190	22
	2C	0.9	230	22
	2D	1.1	280	<u>22</u>
				98
	3A	1.2	900	37
	3B	0.5	610	<u>39</u>
				76
North	4A	0.7	685	37
	4B	0.4	220	<u>24</u>
				61

(1) Times established using Figure 2-4 in Drainage, Engineering Subcourse 359-3, U.S. Army Engineer School, Fort Belvoir, Virginia, July 1973. Assumed average turf conditions.

TABLE 3

PRE-DEVELOPMENT PEAK DISCHARGE

<u>Storm</u>	<u>Drainage Area</u>	<u>Acreage</u>	<u>Time of Concentration, min</u>	<u>Rainfall Intensity, in./hr</u>	<u>Runoff Coefficient</u>	<u>Peak Discharge, cfs</u>
25-year	West	31.0	90	2.9	0.70	62.9
	North	19.4	60	3.7	0.70	50.2
10-year	West	31.0	90	2.5	0.45	34.9
	North	19.4	60	3.2	0.45	27.9

SMADA was utilized to obtain the total runoff volume discharged from the pre-developed site during a 25-year 24-hour storm. For each land area to be evaluated SMADA requires the following data:

- o drainage area (acres)
- o time of concentration (minutes)
- o percent impervious
- o percentage of impervious that is directly drained
- o initial obstruction for impervious area (inches)
- o initial abstraction for pervious area (inches)
- o curve number for pervious area

Runoff from the entire 50.4 acre site was computed from the following model inputs:

Curve number = 80
Time of Concentration = 90 minutes
Percent Impervious = 0%
Initial Abstraction = 2.5 inches

The total runoff volume was 6.6 inches.

Post-Development Conditions

To determine the peak flows for the post-development site conditions, the site was again divided into two drainage areas. The acreages of the post-development drainage areas are listed below:

<u>Post-Development Drainage Area</u>	<u>Acreage</u>
North	22.2
West	28.2

To account for the addition of nearly 20 percent of impervious surfaces in each drainage area, the times of concentration were decreased to 45 minutes for the north drainage area and 70 minutes for the west drainage area.

Using the Rational Method a peak discharge rate was calculated for each drainage area during both a 25-year and a 10-year storm of critical duration. A composite runoff coefficient was computed for each drainage area utilizing the percentages of impervious and pervious acreage in each area. For both the North and West drainage areas the runoff coefficient computed for the 10-year storm was 0.55. This value was increased to 0.80 for the 25-year storm.

Table 4 summarizes the results of the post-development peak discharge analysis. Rainfall intensity values were obtained from Figure 3 of the Stormwater Management Manual.

SMADA was utilized to obtain the total runoff volume discharged from the post-developed site during a 25-year 24-hour storm. Runoff from the entire, 50.4 acre site was computed from the following model inputs:

Time of Concentration = 70 minutes
Percent Impervious = 20%
Percent of Impervious that is Directly Drained = 0%
Initial Abstraction for Impervious Area = 0.04 inches
Initial Abstraction for Pervious Area = 2.5 inches
Curve Number for Pervious Area = 80

The total volume of runoff from the site was 6.9 inches. This is an increase of less than five percent over the volume naturally running off the predeveloped site and is considered to be an acceptable increase relative to the second design criterion.

Basin Design

The basin design described below will be operational following the final grading of the site. Drainage during the construction period will be

TABLE 4

POST-DEVELOPMENT PEAK DISCHARGE

<u>Storm</u>	<u>Drainage Area</u>	<u>Acreage</u>	<u>Time of Concentration, min</u>	<u>Rainfall Intensity, in./hr</u>	<u>Runoff Coefficient</u>	<u>Peak Discharge, cfs</u>
25-year	West	28.2	70	3.3	0.80	74.4
	North	22.2	45	4.4	0.80	78.1
10-year	West	28.2	70	2.8	0.55	43.4
	North	22.2	45	3.8	0.55	46.4

managed in a slightly different fashion and is discussed in a subsequent section.

The initial step in the basin design process was an allocation of limiting discharge rates to the individual basins located within each drainage area so that the total discharge from a drainage area was within the limits set earlier of 25 cfs to the northern ditch and 35 cfs to the western channel. The allocation was based on the percentage of the acreage in a drainage area that drained to a given basin and is shown below:

<u>Basin</u>	<u>Discharge Location</u>	<u>Acreage Drained</u>	Percent of		<u>Limiting Discharge, cfs</u>
			<u>Total Acreage to Discharge</u>	<u>Location</u>	
1	North Ditch	8.3	37		10
2	North Ditch	13.9	63		15
3	West Channel	13.8	49		15
4	West Channel	8.3	29		10
5	West Channel	6.1	22		10

Utilizing these limiting discharge values and the peak discharge values calculated for the post-developed site during a 25-year storm of critical duration, figure 7-2 in the Soil Conservation Service publication "Urban Hydrology for Small Watersheds - Technical Release No. 55" was employed to determine the storage volume required for attenuation of peak discharge. Figure 7-2 is included in Exhibit A to this appendix.

Next the storage volume required for retention of the first one-half inch of runoff from the area draining to each basin was calculated.

Table 5 summarizes the storage volumes required for each basin to achieve attenuation of peak discharge and retention of the first one-half inch of runoff. Locations were selected for the basins and an initial assignment of surface area for the basins was made. Assuming rectangular basins, limited to two feet in depth, an analysis was conducted to size and position an overflow discharge structure to convey the limiting discharge from each basin. Table 6 contains the results of the analysis.

TABLE 5
BASIN STORAGE VOLUME REQUIREMENTS

<u>Basin</u>	<u>Storage Required for Peak Attenuation, ft³</u>	<u>Storage Required for Retention, ft³</u>	<u>Total Storage Required, ft³</u>
1	32,000	15,000	47,000
2	92,000	25,000	117,000
3	63,000	25,000	88,000
4	23,000	15,000	38,000
5	7,000	11,000	18,000

TABLE 6
PRELIMINARY ANALYSIS - OVERFLOW DISCHARGE STRUCTURES

<u>Basin</u>	<u>Storage Provided, ft³</u>	<u>Storage Required, ft³</u>	<u>Depth of Discharge Structure Bottom to Achieve Required Storage Volume, ft</u>	<u>Length of Weir to Maintain Limiting Discharge in 2-foot Deep Basin, ft</u>
1	50,000	47,000	0.10	94
2	240,000	117,000	0.98	6
3	100,000	88,000	0.24	38
4	56,000	38,000	0.64	6
5	40,000	18,000	1.00	3

The large length of weir required for basins #1 and #3 can be reduced by building up the sides of the basin allowing the head over the weir to increase. If the weir length is limited to 10 feet the storage volume required in both basins #1 and #3 can be accommodated in a basin that is 2.5 feet deep. A minimum freeboard of 0.5 feet will be provided on all basins.

The final step in the basin design process was a check on the ability to discharge by infiltration and percolation within a 72 hour period the volume equivalent to the first half inch of runoff from the basin's drainage area. Three percolation rates representative of slow, moderate, and rapid movement of water through saturated soil in a vertical direction were assumed. Although it is likely that the direction of percolation from the basins will be horizontal rather than vertical the range of percolation rates examined is consistent with the horizontal hydraulic conductivity values assumed for use in the model developed in this appendix to simulate groundwater movement in the project area soils during the dewatering operations. The values assumed were 7.0 in/hr for the upper 10-foot thick sand layer and 3.5 in/hr for the lower 4.5-foot thick layer of laminated clay and sand. As Table 7 shows the volume needed for retention will be regained in all basins in less than a 72 hour period even under the slowest percolation conditions. As a further assurance against the occurrence of standing water in the basins that would reduce basin storage capacity and provide conditions conducive to mosquito breeding, it is recommended that the basins be constructed with a 6-inch bottom layer of gravel. The gravel will serve to expedite the flow of water from the basins and prevent the development of vegetative growth and could produce stagnant water conditions attractive to mosquito breeding. Provision for draining the basins will be made.

It should be noted that the storage volume provided at the site is almost two-thirds greater than that required to retain the first half inch of runoff and attenuate the peak discharge (Table 6). Thus additional storage capacity is available should the duration between storms be less than 72 hours.

TABLE 7
PERCOLATION RATES OF RETAINED STORMWATER

Percolation Rate, in./hr		Time for Retained Volume to Completely Infiltrate (hours)				
		Basin # 1	Basin # 2	Basin # 3	Basin # 4	Basin # 5
Slow	0.13	55	19	46	50	51
Moderate	1.3	5.5	1.9	4.6	5.0	5.1
Rapid	13.0	0.55	0.19	0.46	0.50	0.51

On-Site Transport of Stormwater

The flow of stormwater to the basins will occur overland or be directed by vegetated drainage swales. The swales will have a trapezoidal cross-section and are sized to limit the velocity flowing in the channel.

Water discharging from the basins will also be channeled towards either the northern or western discharge point in a trapezoidal vegetated swale. Water flowing under the on-site road to the northern discharge point will pass through twin 24-inch diameter elliptical culverts. Similarly, water flowing under the road from basin #1 to basin #2 will pass through a culvert. All discharge points will be stabilized using riprap to prevent erosion.

Stormwater Management During Construction

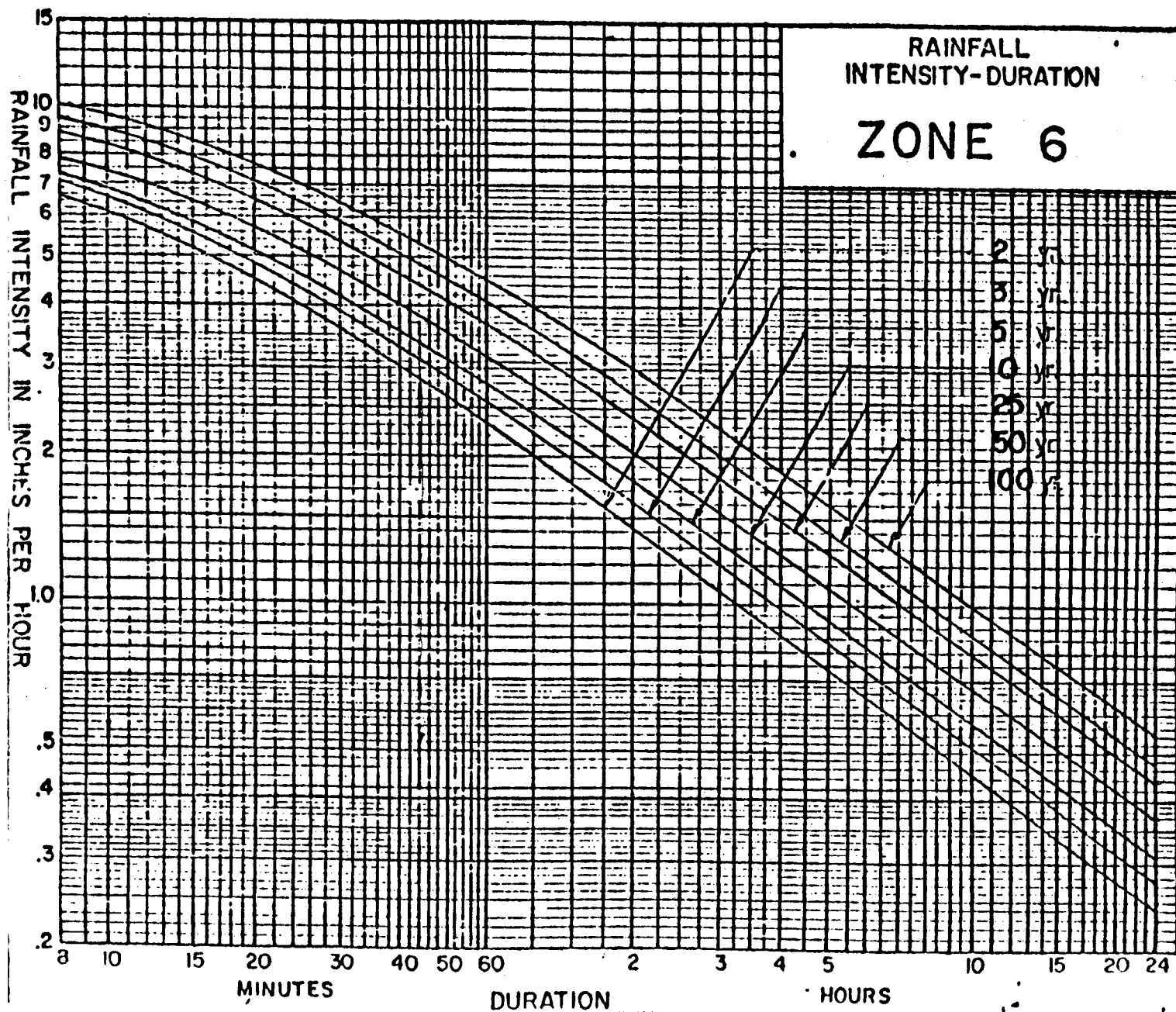
The scheduled construction of the retention basins is such that initially stormwater will be directed utilizing the existing grade and drainage pattern either to a large basin at the site of basin #3 or to the site of basin #2. The reason for the initial construction of a large western retention basin is to provide treatment capacity for the volume of water to be removed from the site during the dewatering operation described in Appendix 10.15. The basin will be sized to assure adequate detention in order to meet the requirement of Section 18, Chapter 67-1504 of the Hillsborough County Environmental Protection Act that the turbidity of all discharges from the site be less than 50 Jackson Turbidity units (JTU).

Following the completion of the dewatering operation the basin will be reduced in surface area to match the size of basin #1 as shown on the final grading plan in Chapter 3 of the Application.

In a letter dated September 26, 1983 from Gary W. Kuhl, P.E. Executive Director of the Southwest Florida Water Management District (SWFWMD) to Mr. Hamilton Oven of the Power Plant Siting Section of DER, Mr. Kuhl noted that, "a permit for temporary discharge into the ditch that leads to the Bypass Canal will not be required. This was discussed in an earlier meeting with the consultant". The full text of the letter is included as Exhibit B to this appendix.

EXHIBIT A

SOURCE: Figure 3 - Stormwater Management Manual.



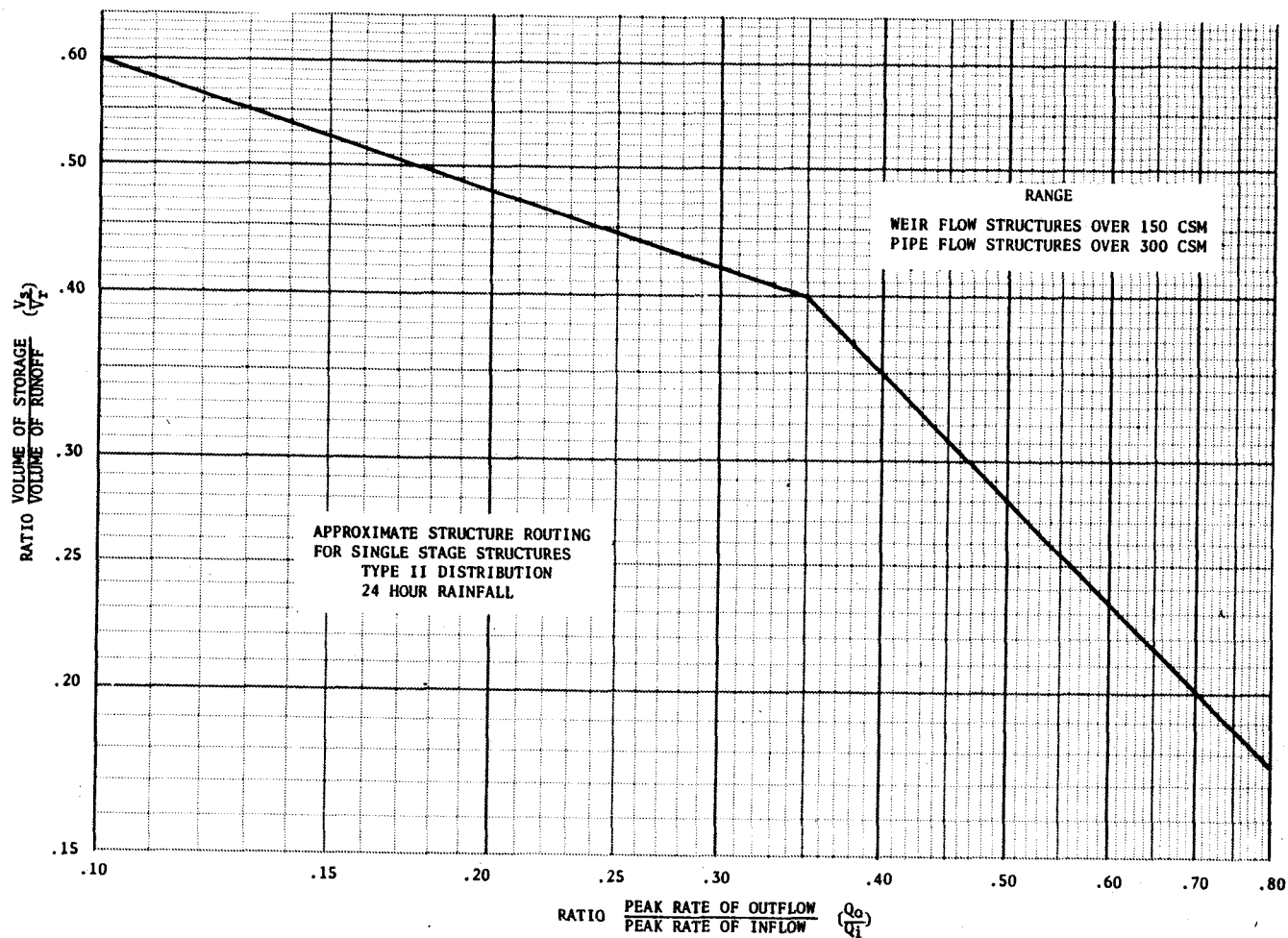


Figure 7-2.--Approximate single-stage structure routing for weir flow structures over 150 csm release rate and pipe flow structures over 300 csm release rate.

SOURCE: Soil Conservation Service - "Urban Hydrology for Small Watersheds - Technical Release No. 55."

EXHIBIT B

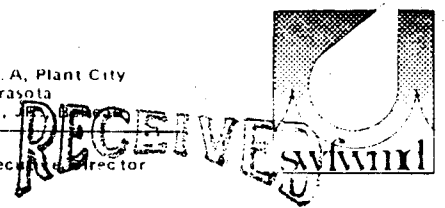
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT



2379 BROAD STREET, BROOKSVILLE, FLORIDA 33512-9712
PHONE (904) 796-7211 SUNCOM 684-1011

BRUCE A. SAMSON, Chairman, Tampa
Wm. O. STUBBS, JR., Vice Chairman, Dade City
JIM KIMBROUGH, Secretary, Brooksville
RONALD B. LAMBERT, Treasurer, Wauchula
DON CRANE, Assistant Secretary, St. Petersburg
ARCH UPDIKE, JR., Assistant Treasurer, Lake Wales

WALTER H. HARKALA, Plant City
MARY A. KUMPE, Sarasota
MICHAEL ZAGORAC, J.
GARY W. KUHL, Executive Director



September 26, 1983

DEPARTMENT OF SOLID WASTE

Mr. Hamilton Oven
Department of Environmental Regulation
Power Plant Siting Section
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: Comments on Plan of Study for Hillsborough County's Resource Recovery Project

Dear Mr. Oven:

Listed below are District staff's comments on the above referenced plan.

1. A permit for temporary discharge into the ditch that leads to the Bypass Canal will not be required. This was discussed in an earlier meeting with the consultant.

Any information the District could receive on the dewatering model used would be of benefit for our records.

2. It would be advisable to have the consultant contact Resource Management and Field Operations prior to dewatering to see if they may have any concerns.

If you have any further questions, please contact District staff.

Sincerely,

GARY W. KUHL, P.E.
Executive Director

GWK:RRB:eab

cc: S. A. Walker
J. E. Curren

Received DER

SEP 28 1983

P P S

Appendix 10.15

APPENDIX 10.15

ANALYSIS OF CONSTRUCTION DEWATERING
EFFECTS UPON GROUNDWATER LEVELS AT
THE FAULKENBURG ROAD SITE

APPENDIX 10.15

ANALYSIS OF CONSTRUCTION DEWATERING EFFECTS UPON GROUNDWATER LEVELS AT THE FAULKENBURG ROAD SITE

Introduction

This appendix provides the results of an evaluation of construction dewatering for the Hillsborough County Solid Waste Facility. This evaluation was performed to determine the following with respect to the construction dewatering of a waste storage bunker:

1. How much water will be pumped from the ground during construction of the bunker and what will be the timing of the pumping?
2. What drawdowns will occur near the property boundaries of the site?
3. What measures might be required to mitigate the drawdown near the boundaries?

A numerical analysis of the groundwater flow system and the dewatering facilities was adopted as the most expeditious method of determining answers to the above questions.

Basic Data

The basic data and information on which this analysis was based follows:

1. Williams and Associates, March 1983, Preliminary Subsurface Exploration, Faulkenburg Road Site, Hillsborough County, Florida. Provided site specific subsurface stratigraphy, water level information and other soil data.
2. U.S.G.S., May 1977, Experimental Study of Artificial Recharge Alternatives in Northwest Hillsborough County, Florida, W.R.I. 77-13. Provided information regarding hydraulic conductivity of surficial geologic deposits.
3. CDM internal discussions. Provided bunker size and depth, construction period and water level data.
4. Other data reports for documentation of other off-site conditions.

A review and analysis of the above data led to the following construction considerations and conceptual model of the groundwater system.

Construction Considerations

The following construction considerations formed the basis for the analysis. These considerations were determined from internal CDM discussions and decisions and are based on a 1600-tpd facility.

1. The outside dimensions of the refuse bunker were approximated to be seven feet in depth, 264 feet in length and 63 feet in width.
Excavation for the depth bunker will be 10 feet.
2. Construction dewatering will be required for an estimated two to three months.
3. Dewatering well spacings will be at intervals typically employed by foundation contractors, assumed to be five feet for this analysis.
4. Unless otherwise noted, water pumped from the dewatering system will be discharged offsite to prevent return groundwater flow into the dewatering system.
5. Sheet piling will be used to open and shore up the excavation such that the walls of the excavation remain vertical during construction.

Groundwater Conceptual Model

The geologic stratigraphy of this site generally consists of sand, silt and clay layers 30 to 40 feet thick (total of all layers) overlying the limestones of the Floridan Aquifer. Dewatering for construction purposes (10 foot excavation depth) will involve only the upper sand and clayey sand layers; consequently, the characteristics of the lower aquifers have not been included in this analysis except as noted below. Based upon data

provided in the Williams and Associates geotechnical report, the depth sequence of geologic deposits in the dewatering area is as follows:

1. A fine sand occurs from ground surface to between seven and 14 feet below the surface.
2. A clayey sand (described as laminated sand and clay layers in the U.S.G.S. report) occurs below the surficial sand and ranges in thickness from five to 14 feet.
3. A clay occurs below the above-described units and ranges from five to 10 feet in thickness.

Variations in the lithology and in the elevation of the top and bottom of each of these units occur throughout the project area in a random pattern. Consequently, the conceptual model of the groundwater system considered the average thickness of each unit, which is 10 feet for the sand and 4.6 feet for the laminated clayey sand. The underlying clay was determined to have such low hydraulic conductivity (5×10^{-4} ft/d) that it was considered essentially impermeable.

The two sand layers described above (the fine sand and the clayey sand) appear to represent two subunits of the "surficial aquifer" (as described in the references). It must be noted, however, that these units do not represent a significant aquifer with respect to water withdrawal. Generally the units do not have sufficient hydraulic conductivity or thickness to be used as a supply for any but an extremely marginal domestic

well. Both units are assumed to have similar static water levels. However, additional field data will be required to confirm this.

The third unit (a clay) described above represents the confining layer (or part of it) for the Floridan aquifer. Water above this unit will be under unconfined or phreatic conditions and water levels below in the Floridan aquifer will be under confined conditions.

Water level data collected from the field studies and the various geologic reports indicate that water levels in the upper phreatic flow system (the sands and clayey sands) were at ground surface (approximately 36 feet MSL) during at least part of the year. Water levels in the Floridan aquifer (limestones below the clay) are at 10 feet to 15 feet MSL (20 feet to 25 feet below ground surface). Due to the fact that water levels in the upper phreatic aquifer would not be lowered to below the Floridan aquifer levels (and thus create an upward flow situation) the clay unit was conceptualized and modeled as an impermeable no-flow boundary.

As in most regions of the country, groundwater recharge is highly variable from the "wet" to the "dry" seasons and is dependent on other factors such as topography and surficial aquifer conditions. Recharge rates were conceived as varying from 0.4 to 2.5 inches per month depending on the season during which construction occurred. This recharge would have to be pumped out of the ground by a dewatering system during the period of construction.

Groundwater Model and Input Parameters

The computer code chosen for the dewatering evaluation is called DYNFLO. It is a three-dimensional finite element flow simulation program. The program relies on a subdivision of the aquifer system into multiple layers in the vertical dimension and triangular elements in the horizontal plane. The dividing lines between layers are called levels, with each layer representing a distinct geologic unit based on the conceptual model. The horizontal grid arrangement remains the same throughout the vertical dimension.

In solving the mathematical equation for groundwater flow, piezometric heads and flows are computed within the groundwater system. The input parameters are estimates of actual site characteristics and include:

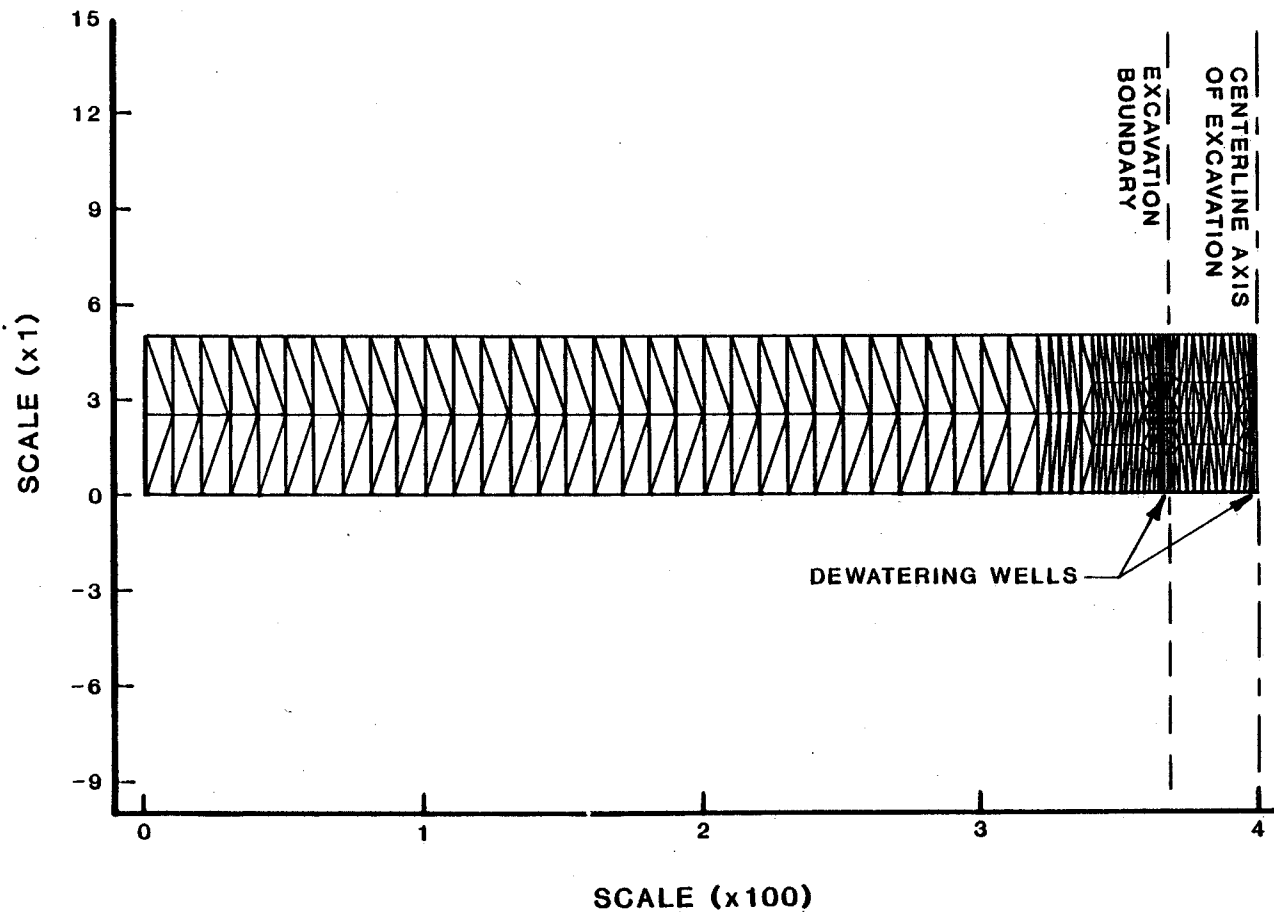
- o Specified water levels, at places where surface water bodies are hydraulically connected to the aquifer.
- o Specified flows, at pumping wells.
- o Aquifer hydraulic properties: hydraulic conductivity and confined and unconfined storage coefficients.

Steady-state (equilibrium) or transient (time-varying) conditions can be simulated. For transient simulations, the simulation time period is broken into several smaller pieces called time steps. Exhibit A includes the mathematical formulation used by the computer code to determine the parameters of interest.

The aquifer characteristics and simulation conditions used for this analysis are as follows:

1. In plan view, a single aquifer strip from the center of the excavation out to a distance of 400 feet from the excavation center was simulated. The aquifer strip modeled was perpendicular to the long axis of the excavation and divided the excavation down the middle into two equal mirror images. The modeled aquifer strip width was made equal to the dewatering well spacing (five feet) with the wells centered in the strip. Similar aquifer strips on either side of the modeled strip provided boundary conditions for the model strip. As a result, the parallel aquifer strips next to the modeled strip would demonstrate equal water levels and pumpage amounts as long as other input variables were the same. The boundaries of the strip were taken as "no-flow" boundaries thereby creating an infinite number of mirror images in either direction from the centerline of the strip. The modeled strip thus becomes one well in an infinite series of wells at a spacing equal to the width of the strip. Total pumpage was derived by multiplying the discharge from the modeled strip by the total number of strips required to cover the entire excavation plus a factor for end effects (132). Figures 1 and 2 show the (distorted) horizontal finite element grid used in the simulation, including the wells and a portion of the excavation.

PLAN VIEW



PLOT DATE: 24-AUG-83 10:12

HILLSBOROUGH COUNTY SOLID WASTE
ENERGY RECOVERY FACILITY

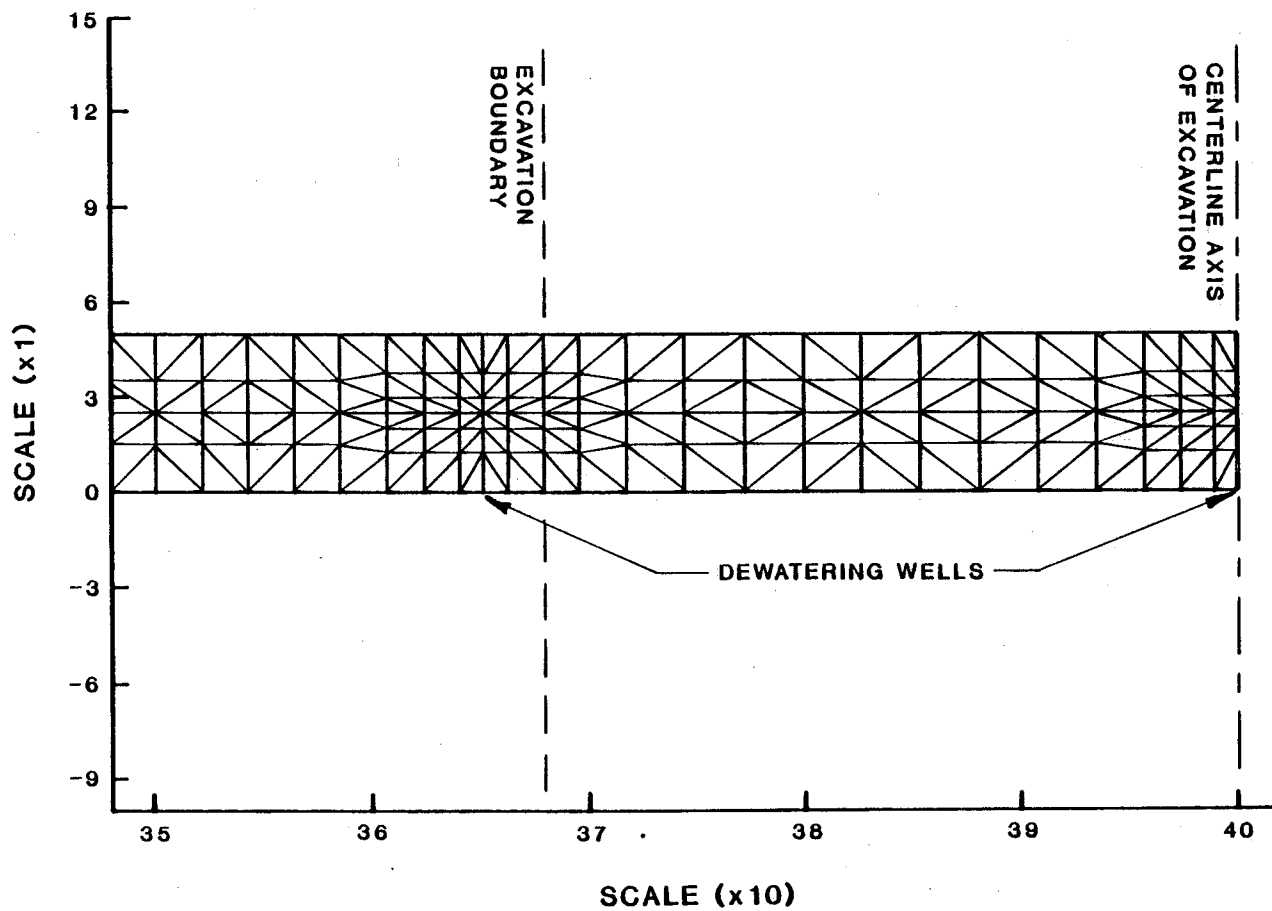
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FIGURE 1

DEWATERING STUDIES
FINITE ELEMENT GRID (DISTORTED)

PLAN VIEW



PLOT DATE: 24-AUG-83 10:16

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FIGURE 2
ENLARGEMENT OF FINITE ELEMENT GRID
IN AREA OF WELLS (DISTORTED)

2. In the vertical, two layers were simulated. The upper layer included the sand modeled as a uniform thickness (10 feet) and having a horizontal hydraulic conductivity (K_h) of 14 ft/d and a vertical hydraulic conductivity (K_v) of 1.4 ft/d. Starting water levels were assumed to be 35 feet MSL (one foot below ground).

The lower layer of laminated clay and sand was modeled as 4.5 feet thick with a K_h of 7.0 ft/d and a K_v of .001 ft/d. Starting water levels were assumed to be 35 feet MSL. The horizontal hydraulic conductivity is the weighted arithmetic average of the sand permeability (14 ft/d) and clay permeability (5×10^{-9} ft/d) assuming each material comprises 50 percent of the total. The vertical permeability is the harmonic mean under the same assumptions. The clay below the bottom of the lower layer was modeled as an impermeable barrier.

3. The dewatering wells used (across the long axis of the excavation) consisted of one well at each side of the excavation and one well, operated on a temporary basis, on the centerline of the excavation. The sideline wells were pumped for the full duration of the construction period (90 days assumed) while the centerline wells were operated for an assumed seven day initial dewatering period. The wells were pumped at rates which insured that the excavation area and depth were fully dewatered in one week (seven days) and continuously after that to maintain groundwater levels below the bottom of the excavation. The wells were assumed to be 14.5 feet deep with two feet long screens. Complete dewatering of the 10-foot thick upper sand

layer required the installation into and pumping of wells from the lower layer. Given the actual site-specific variation in thickness of the upper and lower layers, pumpage will ultimately be distributed between these layers.

4. Groundwater recharge was input to the entire upper level plan area of the grid at a rate between 0.4 inch/month and 2.5 inches/month to "bracket" the unknown seasonal construction period recharge rates.
5. The dewatering simulations performed to evaluate the drawdowns and discharge amounts are as follows:
 - a. A transient (short-time step) analysis for 90 days with 0.4 inch/month recharge. Pumped water will be discharged off site.
 - b. A transient analysis for 90 days with 2.5 inches/month recharge. Pumped water will be discharged off site.
 - c. A transient analysis for 90 days with 0.4 inches/month recharge, returning to the aquifer, 400 feet from the excavation, as much of the water pumped from the dewatering system as possible.
 - d. Two steady-state (e.g., wells pumped until the cone of depression stops declining) analyses were performed under high (2.5 inches/month) and low (0.4 inches/month with recharge at the boundary) recharge conditions.

- e. A transient analysis for 90 days with 2.5 inches/month recharge where well discharge was fixed at 100,000 gpd and water level declines were evaluated.

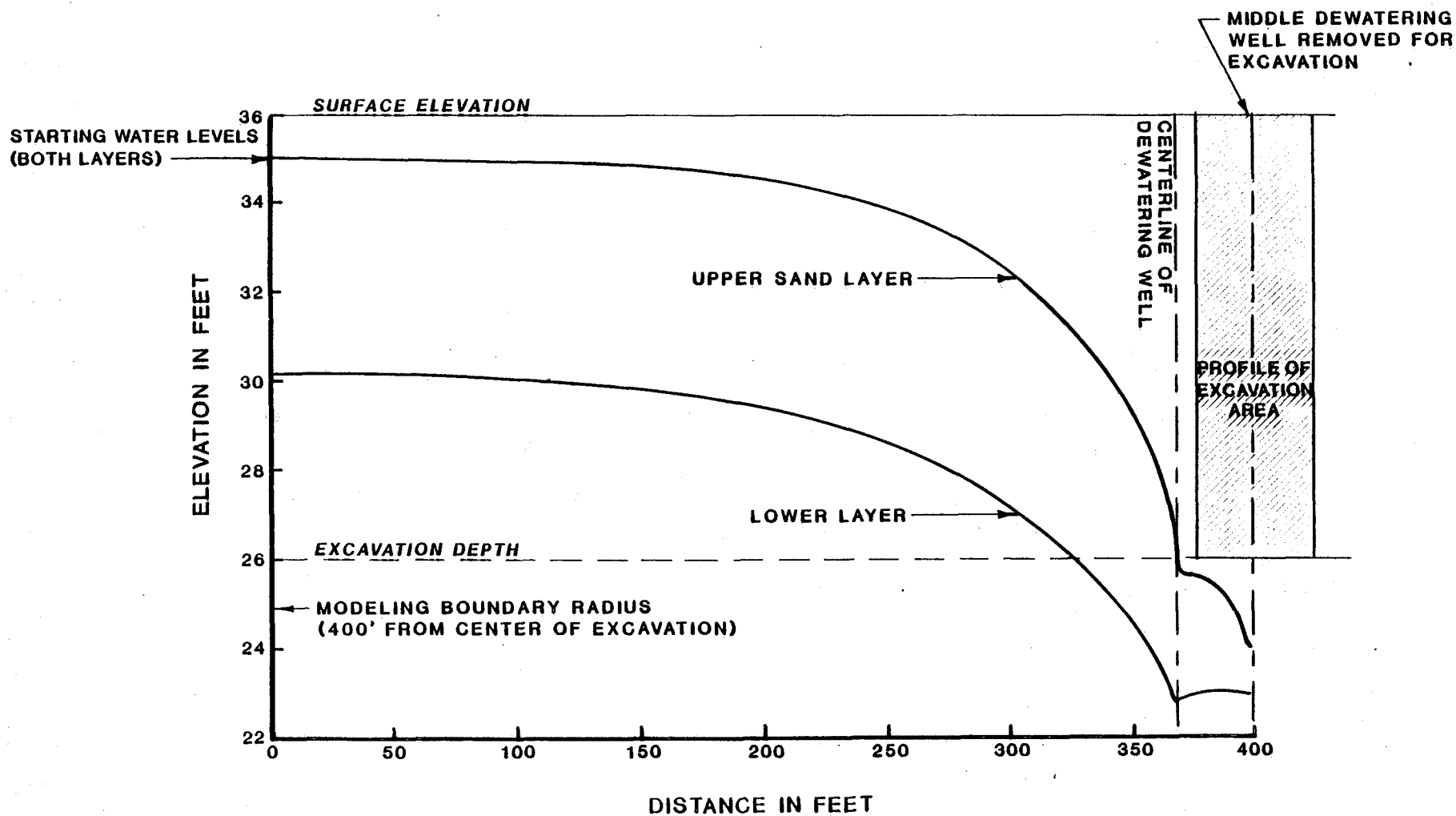
Results of the Analysis

Analysis of the simulations provide information regarding average water levels and pumping rates for the time periods and recharge conditions simulated. The simulation results are graphically summarized on the attached figures and discussed below.

Drawdowns

Figures 3 and 4 are cross-sectional drawdown profiles from the long axis centerline of the excavation to the 400-foot presumed property boundary. The drawdown profiles (represented on the figures as water level elevations, with starting water levels for both layers set at 35 feet MSL) are along the mid-point between dewatering wells. Drawdown along a centerline through the dewatering wells would be slightly greater closer to the dewatering system. Figures 3 and 4 represent both "dry" conditions (Figure 3) and "wet" conditions (Figure A-4) after seven days of pumping. Note that excavation depth is 26 feet MSL.

Figures 5 and 6 are drawdown profiles similar to Figures 3 and 4 except that the drawdowns shown are for the presumed end of the construction period (90 days). Figures 5 and 6 are also mid-point profiles, however, very



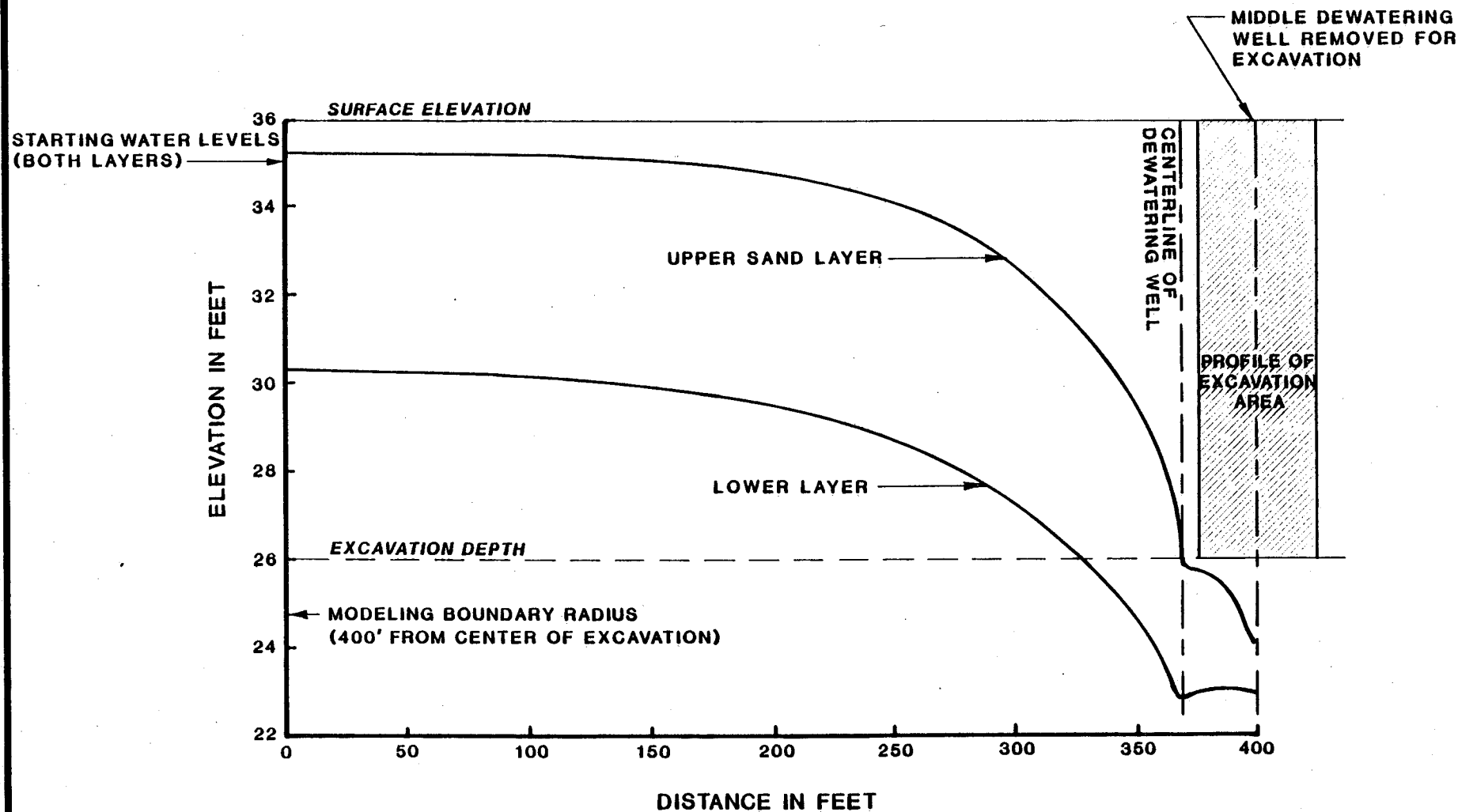
NOTE: Assumes 0.4in/mo recharge

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FIGURE 3
DRAWDOWN PROFILE AT 7 DAYS
(DRY CONDITIONS)

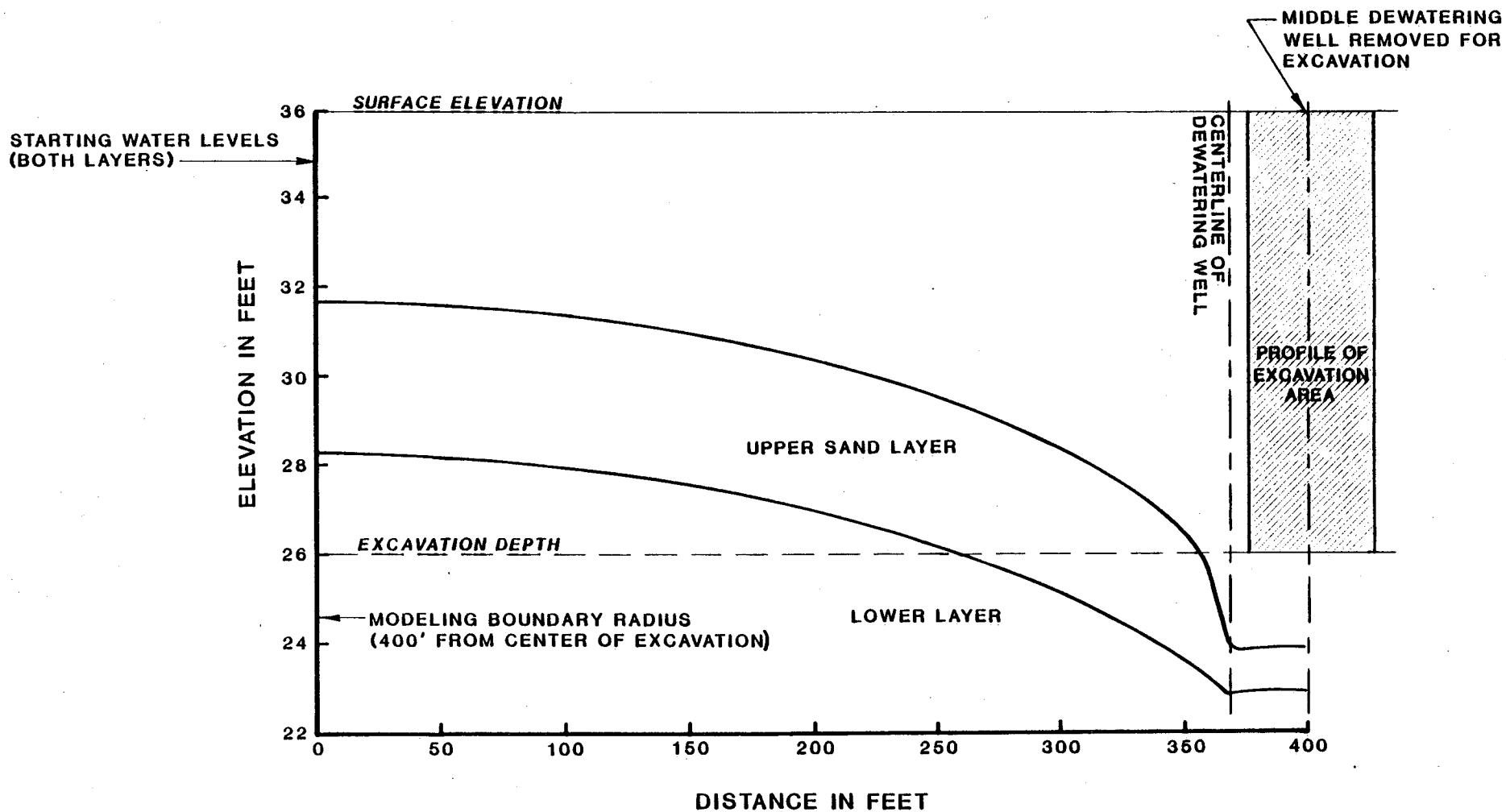


NOTE: Assumes 2.5in/mo recharge

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FIGURE 4
DRAWDOWN PROFILE AT 7 DAYS
(WET CONDITIONS)



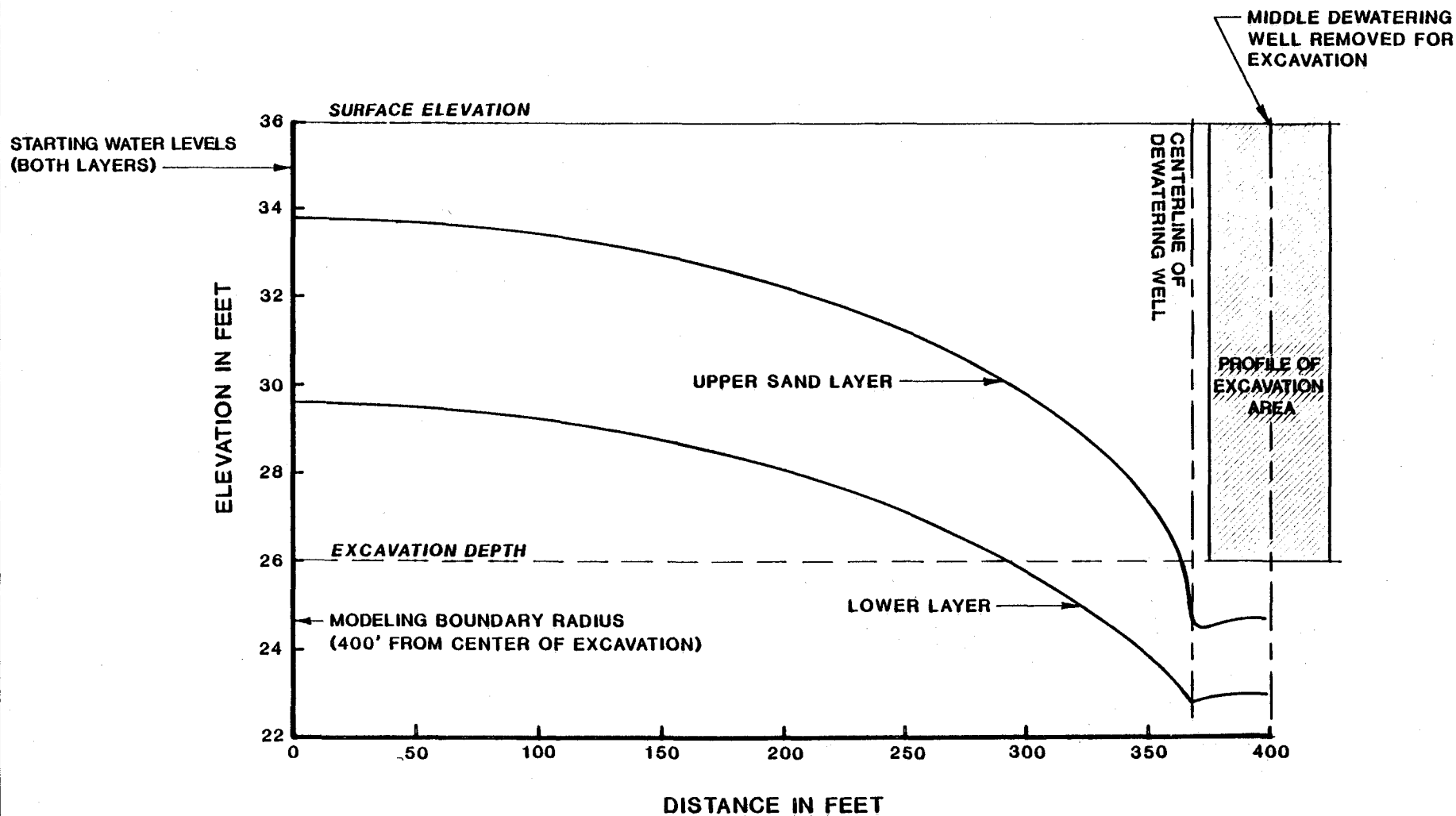
NOTE: Assumes 0.4in/mo recharge

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FIGURE 5
DRAWDOWN PROFILE AT 90 DAYS
(DRY CONDITIONS)



NOTE: Assumes 2.5in/mo recharge

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FIGURE 6
DRAWDOWN PROFILE AT 90 DAYS
(WET CONDITIONS)

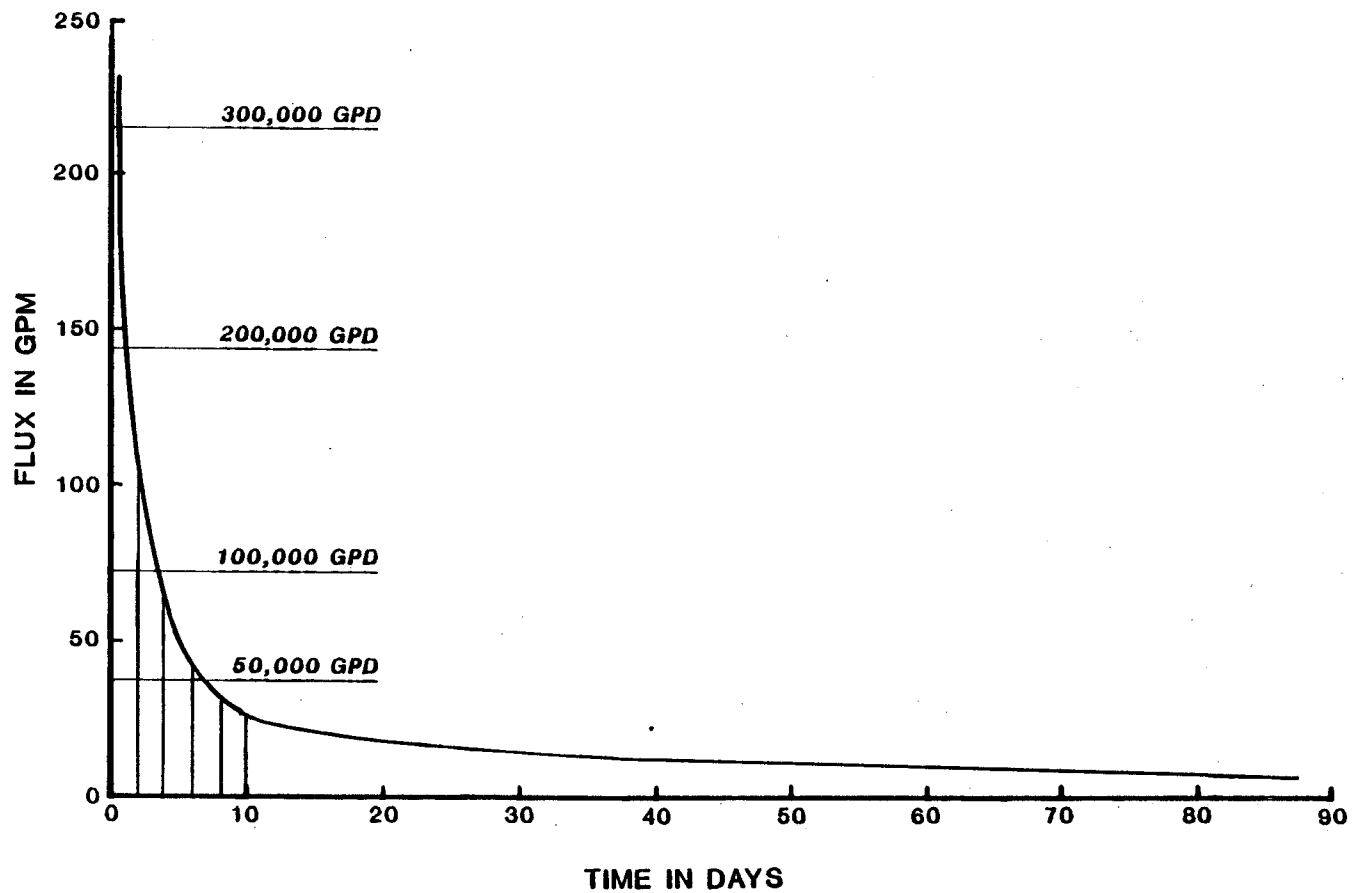
little water difference occurs at the property boundary particularly from mid-point to the centerline drawdown. Steady-state simulations indicate that, under high recharge conditions, the water levels in the upper sand layer will not experience drawdown at all, and that the lower layer will experience only about 4.0 foot of drawdown.

Pumping Rates

Figures 7 and 8 represent pumping rate (in gpm and gpd) vs. time from start for both dry and wet conditions for the 90-day construction period. The pumping rates at the start of the dewatering period represent the instantaneous pumping rates necessary to completely dewater the excavation within seven days. Steady-state analyses indicate that the 90-day rates presented in these figures are very close to the long-term rates if construction dewatering continues beyond 90 days.

Comparison of Figures 7 and 8 indicate that although the recharge rates used for these simulations are quite different, the actual pumpage amount to maintain the water levels below the excavation does not change appreciably. Therefore, the actual amount of recharge which takes place during the simulation period is of little significance to the total dewatering pumpage.

Figure 9 represents pumping for 90 days under "dry" conditions with recirculation of some of the pumped water back to the aquifer, 400 feet from the center of the excavation. Figure 10 represents the rate of water

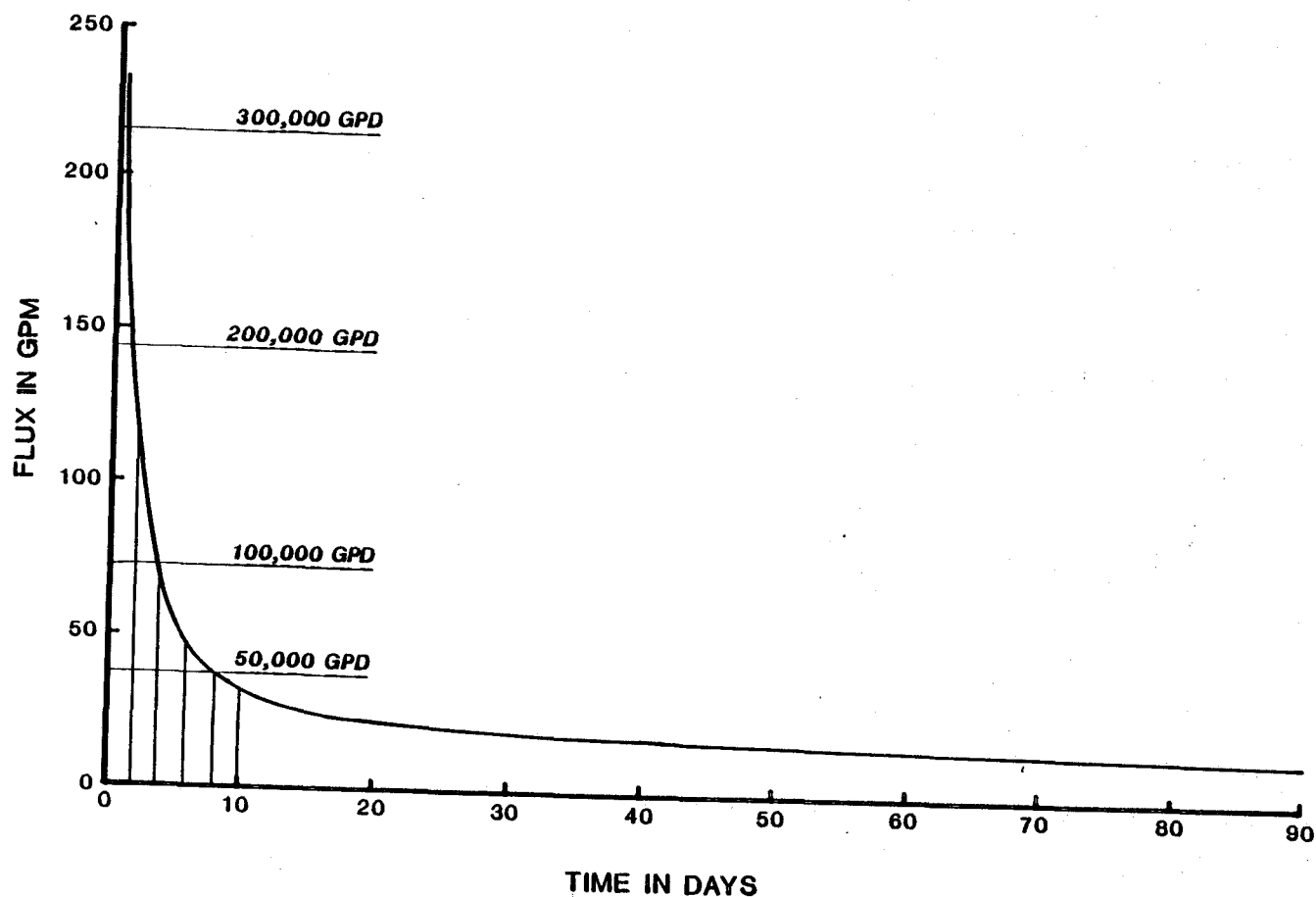


NOTE: Assumes 0.4in/mo recharge

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FIGURE 7
WATER WITHDRAWAL RATE
(DRY CONDITIONS)

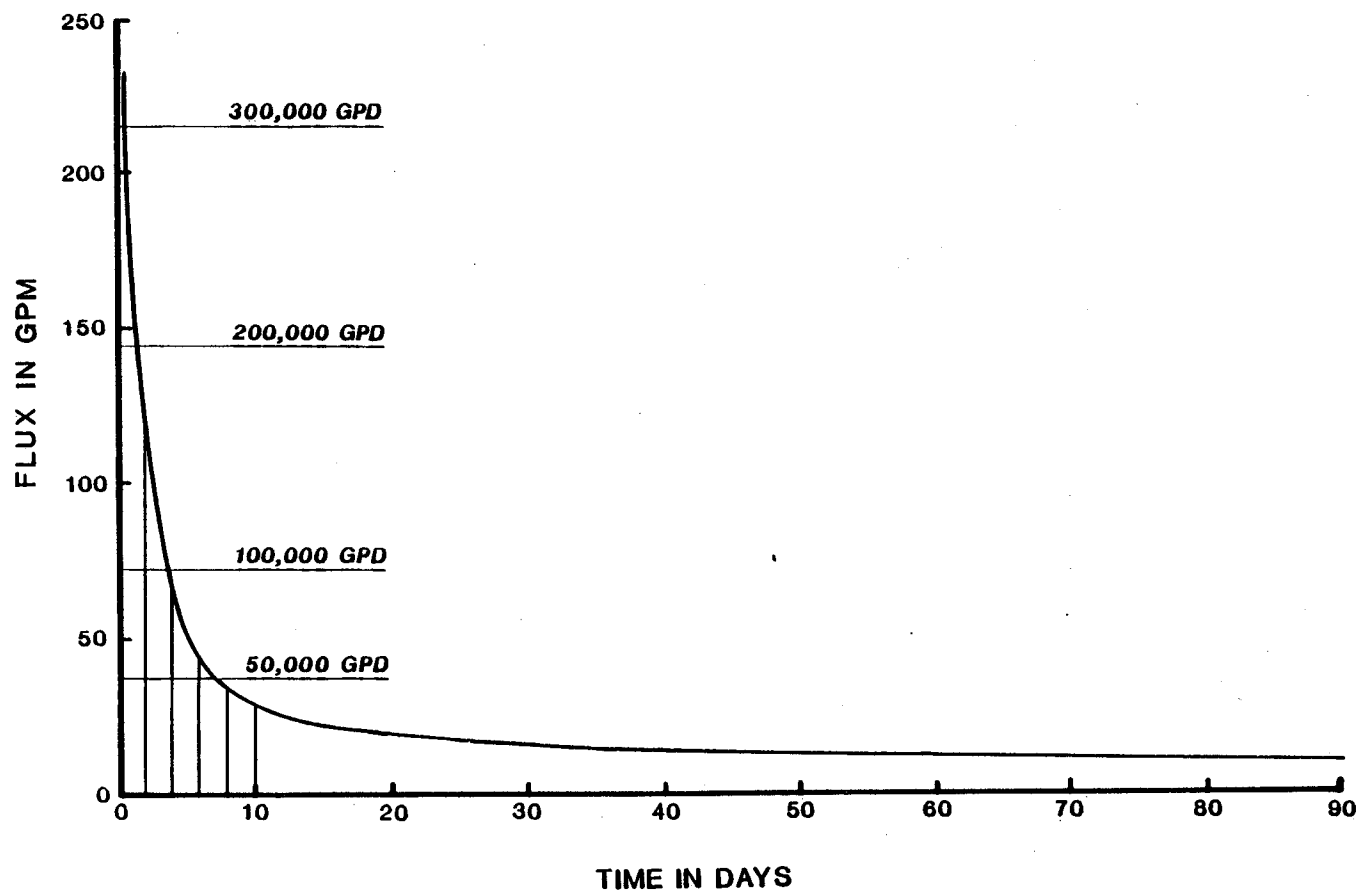


NOTE: Assumes 2.5in/mo recharge

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FIGURE 8
WATER WITHDRAWAL RATE
(WET CONDITIONS)



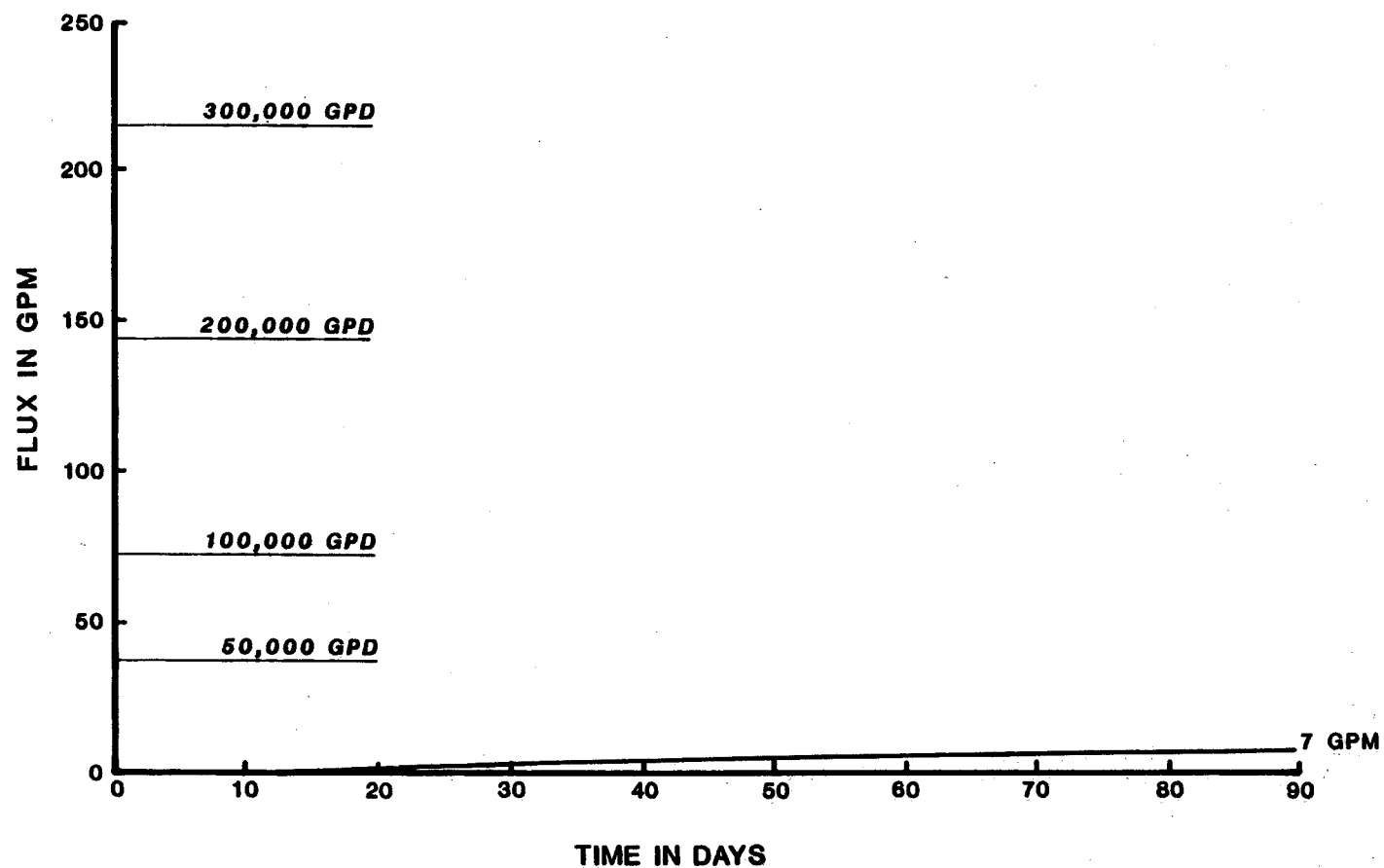
NOTE: Assumes 0.4in/mo recharge

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FIGURE 9
WATER WITHDRAWAL RATE
WITH ON-SITE RECHARGE
(DRY CONDITIONS)

CAMP DRESSER & MCKEE



NOTE: Assumes 0.4in/mo recharge

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FIGURE 10
ON-SITE RECHARGE RATE
OF WATER WITHDRAWN
(DRY CONDITIONS)

injection vs. time which can be returned to the aquifer at this injection distance. Due to drawdown time lag at the property boundary, reinjection cannot begin until 10 to 15 days after the dewatering has begun (see Figure 10). After 80 to 90 days, all of the water pumped from the dewatering system may be reinjected at the 400-foot radius used during the simulation. During the "wet" season, water levels in the upper layer do not decline sufficiently at the 400-foot boundary to permit any reinjection of the water pumped by the dewatering system.

One anticipated modification to the dewatering program is to limit the initial quantity pumped from the dewatering wells. This change was anticipated for the purpose of sizing any needed sedimentation control facilities and necessitated one additional simulation where the discharge rate was fixed at 100,000 gpd until dewatering occurred. Water level changes were monitored in the excavation area to determine the time required to completely dewater the excavation. Instead of the five to seven days required to dewater under optimum pumping conditions, this last simulation indicates that 10-14 days of pumping (at 100,000 gpd) would be required for excavation dewatering depending on the seasonal rainfall conditions.

Discussion of the Results

The above analysis represents the best current estimate of the site and construction conditions which will be encountered. Actual work at this site may indicate differences in the hydrogeologic or construction considerations which will in turn cause variations in either the pumping

rate or water levels predicted. However, it is felt that substantial changes in the water level or pumping rates will occur only if major changes are made in the size or depth of the dewatering system.

The one potentially substantial difference between the simulated versus the possible actual conditions at the site is to the water level declines in the "upper" and "lower" layers. The simulated water levels indicate that there will be a substantial water level difference between the upper and lower layers with the lower layer consistently having lower water levels. The reason for this is that the lower layer has lower hydraulic conductivity than the upper layer and is highly anisotropic (e.g., exhibiting a large difference between the horizontal and vertical hydraulic conductivity). If in fact the actual site conditions are different (i.e., the system has a higher hydraulic conductivity than modeled and/or the lower layer is not as anisotropic as modeled), then the upper and lower water level differences may not be as drastic as simulated. Although the water level declines predicted are reasonably conservative, additional field data will be required before any substantial modifications to the modeling effort are made.

Water level declines in the lower layer may be sufficient to cause some consolidation of the clays and consequent settling of foundations near the site which are supported by this layer. The estimated range of consolidation is 1.5 to 4.0 inches with 2.0 to 2.5 inches the probable amount. If it is determined that shallow structures exist within 1000 to 1500 feet of the excavation when bunker dewatering is anticipated, then additional soil sampling and analysis may be necessary to confirm the

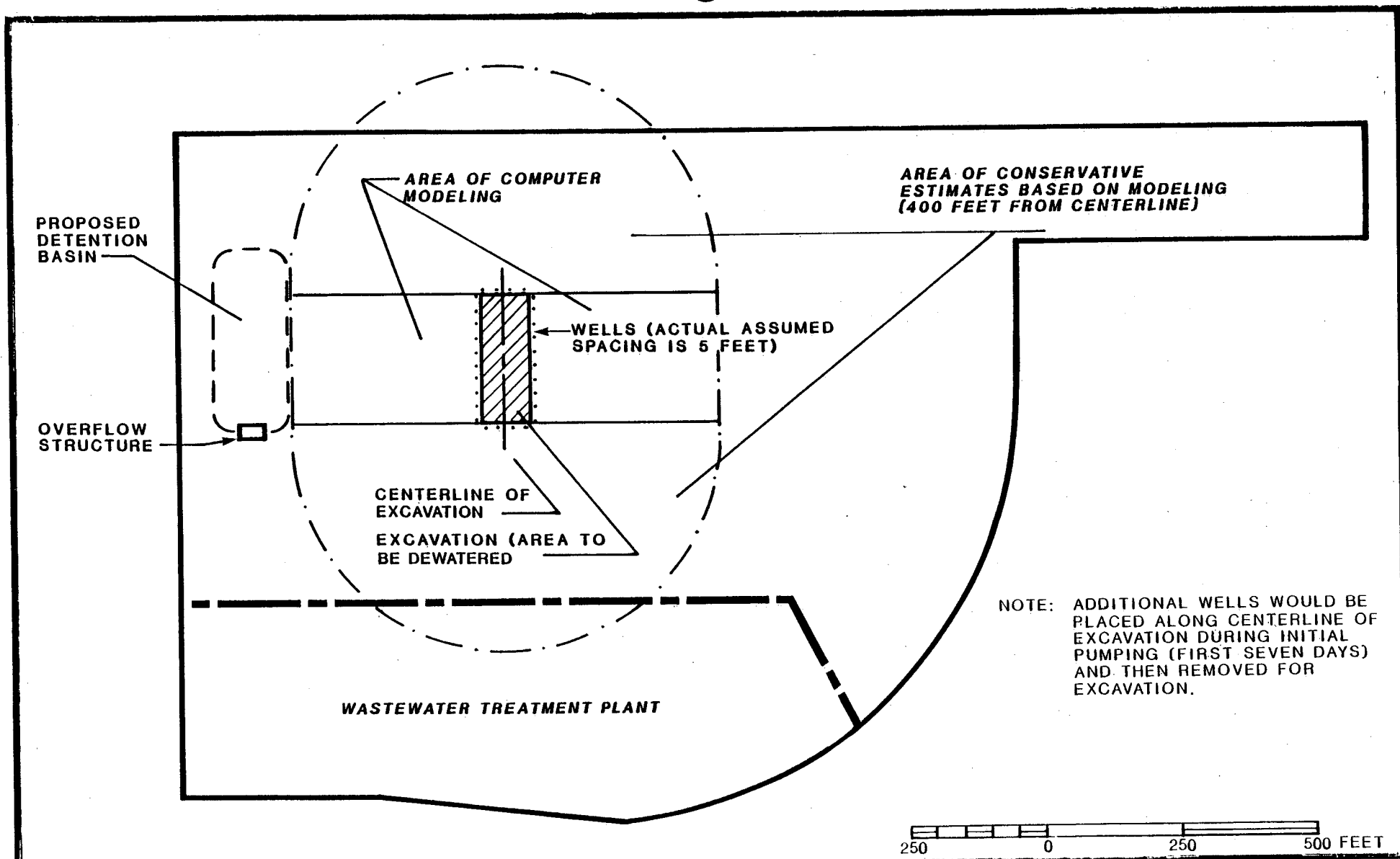
conceptual model of the soils presented in this report. Should the soil samples and analysis indicate potential consolidation problems, mitigative measures will be required prior to the start of the dewatering.

Consequently, it may be necessary to provide additional reinjection of the pumped water closer to the bunker excavation (and into the lower layer) to provide stabilized water levels between the excavation and any surrounding structures which exist at the time of construction.

Conclusions

Figure 11 illustrates the area modeled with respect to the Faulkenburg Road site. This figure places the finite element grid strip, shown on Figure 1, in the context of its relationship to existing property boundaries and assumed locations of site features such as the areas of excavation of the refuse storage bunker, the proposed retention basin areas and the wastewater treatment plant. The extent of modeling is delineated with respect to the location of the centerline of the proposed excavation. The outer boundary of the modeled area is determined by a 400-foot radius around the area proposed for excavation.

Groundwater drawdown profiles at seven and 90 days, shown on Figures 3 through 6 were developed based upon specific assumptions contained within the model. These assumptions include generalized aquifer characteristics and pumping rates under both wet (high recharge) and dry (low recharge) conditions.



NOTE: ADDITIONAL WELLS WOULD BE PLACED ALONG CENTERLINE OF EXCAVATION DURING INITIAL PUMPING (FIRST SEVEN DAYS) AND THEN REMOVED FOR EXCAVATION.

250 0 250 500 FEET

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ENERGY RECOVERY PROJECT

FIGURE 11
NUMERICAL ANALYSIS ASSUMPTIONS
WITH RESPECT TO FACILITY LOCATION

Figure 5 represents the circumstances having the greatest potential effect upon groundwater levels e.g. the drawdown profile at 90 days under dry (low recharge) conditions. Under this scenario, the water level in the upper sand layer would be lowered by an estimated 3.5 feet at the 400-foot radius. However, it is important to note, that under actual field conditions, these drawdowns will be somewhat mitigated west of the excavation under actual field conditions by utilization of a proposed basin for dewatering pumpage detention which would provide some recharge to the system. Table 1 summarizes the anticipated estimated drawdowns under the four scenarios.

It should be noted that Section 40D-6.051(3) of the SWFWMD rules states that a permit shall not be required to "temporarily dewater an area within the limits of a work of the District for construction, alteration, or repair of buildings, or other foundations and roadways, or during installation, alteration, or repair of utility pipelines, cables, culverts, and catch basins, when such temporary dewatering will be for a period not exceeding six (6) months; provided however, that the District shall be advised in writing prior to commencing such activity. A permit shall be required prior to continuation of dewatering activities beyond the initial six (6) months period."

Finally, correspondence with SWFWMD has indicated that a permit would not be required because the duration of dewatering would be less than six months, and exceeding their drawdown criteria would have no measurable effect upon private wells in the area.

TABLE 1

PROJECTED DRAWDOWN LEVELS AT FAULKENBURG ROAD SITE

<u>Scenario</u>	Upper Level Drawdown <u>at 400 feet</u>
7 days (dry)	0.0 feet
7 days (wet)	-0.25 feet
90 days (dry)	3.5 feet
90 days (wet)	1.5 feet

Source: CDM

SWFWMD officials have also indicated that the agency is interested in providing support for a network of monitoring wells which could provide to the district valuable data on surficial aquifer characteristics as part of a broader, separate region-wide program to gather site-specific pump test data on the surficial aquifer.

Table 2 shows the anticipated estimated pumping rates at various time intervals up to 90 days, the assumed maximum dewatering period. These figures represent the various instantaneous rates of discharge to onsite detention ponds or directly offsite. Discharges are greatest during the first seven days of pumping because the wells were pumped at rates to insure that the excavation area and depth were fully dewatered in one week.

TABLE 2

ESTIMATED INSTANTANEOUS GROUNDWATER DISCHARGE RATES UNDER
"DRY" AND "WET" CONDITIONS AT THE FAULKENBURG ROAD SITE

Estimated Pumping Rates (in gallons per minute) at end of

	<u>Initial</u>	<u>1 Day</u>	<u>7 Days</u>	<u>30 Days</u>	<u>90 Days</u>
Dry condition	230	150	35	16	6
Wet condition	235	150	40	20	15

Source: CDM

EXHIBIT A
GROUNDWATER FLOW SIMULATION CODE - DYNFLO

This exhibit provides a brief description of groundwater flow theory and how it is implemented in and used by the DYNFLOW program to simulate groundwater flow fields.

Theory

Groundwater flow theory is based on the combination of two relationships; Darcy's Law, and the Conservation of Mass Law. Darcy's Law states that the rate of groundwater flow through a given cross-sectional area is directly proportional to the hydraulic gradient, which is a measure of energy dissipation. Mathematically, Darcy's Law can be stated as:

$$q = -k \nabla h \quad (A.1)$$

where:

q = specific discharge, or flow rate through a unit area L/T

k = hydraulic conductivity, the proportionality constant L/T

∇ = gradient operator 1/L

h = piezometric head L

L = length units (e.g., "feet")

T = time units (e.g., "days")

Expanding the gradient operator and assuming that anisotropy in the hydraulic conductivity is orthogonal, as is usually the case, Darcy's Law can be expressed as:

$$q = -k_i \frac{\partial h}{\partial x_i} \quad (i=1,2,3) \quad (A.2)$$

where x takes on values for each of the three orthogonal axis directions.

The Conservation of Mass Law requires that:

$$\begin{array}{c} \text{INFLOW} \\ \text{RATE} \end{array} - \begin{array}{c} \text{OUTFLOW} \\ \text{RATE} \end{array} = \begin{array}{c} \text{RATE OF} \\ \text{CHANGE IN} \\ \text{STORAGE} \end{array} \quad (\text{A.3})$$

By combining Darcy's Law with the above stated relationship, the following equation results (see, for example, Bear, 1979):

$$S_0 \frac{\partial h}{\partial t} = \frac{\partial}{\partial x_i} \left(k_{x_i} \frac{\partial h}{\partial x_i} \right) + Q \delta \quad (\text{A.4})$$

$$(i=1,2,3)$$

where:

S_0 = specific storativity 1/L

t = time T

Q = flux at a point L^3/T

δ = Dirac delta function

Equation A.4 is the governing equation in DYNFLO for three-dimensional flow in an aquifer system.

Appendix 10.16

APPENDIX 10.16
STACK HEIGHT ANALYSIS AND
RECOMMENDATIONS

Information pertaining to facility stack height is included in "Volume III-Air Quality" of this Application for Power Plant Site Certification.

Hillsborough
County,
Florida

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

Volume III —
Air Quality

Hillsborough County, Florida

Solid Waste Energy Recovery Facility — Application for Power Plant Site Certification Volume III — Air Quality

Submitted By
The Hillsborough County
Board of County Commissioners



Rodney Colson, Chairman
Matt Jetton, Vice Chairman
E. L. Bing
John Paulk
Jan K. Platt

Norman W. Hickey,
County Administrator

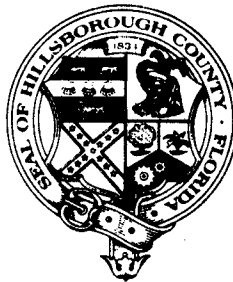
August, 1984

Prepared by
Camp Dresser & McKee Inc.

Hillsborough County, Florida

Solid Waste Energy Recovery Facility — Application for Power Plant Site Certification Volume III — Air Quality

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Hillsborough County, Florida
Resource Recovery Program
Application for Certification of Resource
Recovery - Electrical Generating Facility

VOLUME III - AIR QUALITY

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DER Form 17-1.202(1)

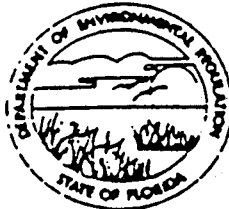
Application to Operate/Construct
Air Pollution Sources

DER FORM 17-1.202 (1)

APPLICATION TO OPERATE/CONSTRUCT
AIR POLLUTION SOURCES

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2800 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

Solid Waste

SOURCE TYPE: Energy Recovery Facility ☒ New¹ ☐ Existing¹

APPLICATION TYPE: ☒ Construction ☐ Operation ☐ Modification

COMPANY NAME: County of Hillsborough, Florida COUNTY: Hillsborough

Identify the specific emission point source(s) addressed in this application (i.e. line
Solid Waste Energy Recovery Facility
Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) w/Electrostatic Precipitator
Nearest Incorporated City

SOURCE LOCATION: Street Faulkenburg Rd. City Tampa

UTM: East 03/68/220 M.E. North 30/92/700 M.N.

Latitude 27 ° 57 ' ____ "N Longitude 82 ° 40 ' 22 "W

APPLICANT NAME AND TITLE: Warren N. Smith, Director

APPLICANT ADDRESS: Dept. of Solid Waste, P.O. Box 1110, 925 East Twiggs Street,
Tampa Florida 33601

SECTION II: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Hillsborough County

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: Warren N. Smith
Warren N. Smith, Director, Dept. of Solid Waste
Name and Title (Please Type)

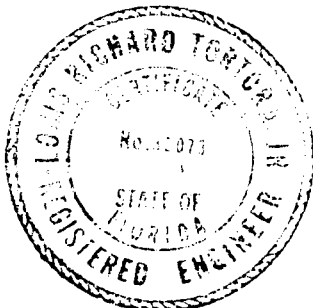
Date: 7-23-84 Telephone No. (813) 272-6674

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 designed/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

Louis Tortora, Jr. PE

Name (Please Type)

Camp Dresser & McKee, Inc.

Company Name (Please Type)

1321 U.S. 19 South, Suite 601, Clearwater, Fl. 33546

Mailing Address (Please Type)

Florida Registration No. 32073 Date: 7/24/84 Telephone No. (813) 530-9984

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.

Project is a solid waste energy recovery facility which shall generate electrical

power from combustion of municipal refuse. Pollution control device shall be an
electrostatic precipitator with an outlet loading of 0.025 grains/dscf corrected to
12% CO₂. Project will be in full compliance with all existing state and federal

- B. Schedule of project covered in this application (Construction Permit Application Only) pollutants.

Start of Construction January 1985 Completion of Construction January 1988

- 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 Precipitators (4) \$4,500,000 total

- D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

Not Applicable

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;
if power plant, hrs/yr _____ ; if seasonal, describe: _____

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? Will seek offsets
 - b. If yes, has "Lowest Achievable Emission Rate" been applied? Yes
 - c. If yes, list non-attainment pollutants. Ozone and particulate matter
2. Does best available control technology (BACT) apply to this source? Yes
If yes, see Section VI.
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 justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		

B. Process Rate, if applicable: (See Section V, Item 1)

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 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	

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).

J. 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)

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ BTU/gal

Other Fuel Contaminants (which may cause air pollution): _____

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average _____ Maximum _____

G. Indicate liquid or solid wastes generated and method of disposal.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: _____ ft. Stack Diameter: _____ ft.
 Gas Flow Rate: _____ ACFM _____ DSCFM Gas Exit Temperature: _____ °F.
 Water Vapor Content: _____ % Velocity: _____ FPS

SECTION IV: INCINERATOR INFORMATION

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	Vendor supplied information						
Uncontrolled (lbs/hr)	Vendor supplied information.						

Description of Waste Municipal solid waste
 Total Weight Incinerated (lbs/hr) 133,333 Design Capacity (lbs/hr) 133,333 (name plate rating)
 Approximate Number of Hours of Operation per day _____ day/wk _____ wks/yr.
 Manufacturer Vendor not selected yet.
 Date Constructed _____ Model No. _____

	Volume (ft) ³	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber	Vendor specific information				
Secondary Chamber					

Stack Height: 220 ft. Stack Diameter: 5'-9" Diam. Stack Temp. 430°F
140,070 @ 50%
 Gas Flow Rate: 342.000 ACFM Ex. Air DSCFM* Velocity: 55 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. 0.027 gr/dscf @ 50% Ex. Air

Type of pollution control devices: ☐ Cyclone ☐ Wet Scrubber ☐ Afterburner
☐ Other (specify) Electrostatic Precipitator

Brief description of operating characteristics of control devices: Electrostatic
precipitator collects particulate matter in flue gas stream by producing an electrical
charge on the particles and then attracting them to surfaces of opposite polarity.

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

Hillsborough County's co-located wastewater treatment plant will accept the cooling
tower blowdown and ash will be disposed of at Hillsborough county's Southeast
County Landfill.

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)]
2. 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.

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

Contaminant	Rate or Concentration
Particulate matter	0.08 gr/dscf (grains per dry standard cubic
	foot) corrected to 12% CO ₂

- B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

☒ Yes ☐ No

Contaminant	Rate or Concentration
Various	See Table 6-2 in the PSD permit application

- C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration
Carbon monoxide, nitrogen oxides, sulfur dioxide, lead, beryllium, mercury, fluorides, and sulfuric acid mist	See PSD permit application Section 6.0

- D. Describe the existing control and treatment technology (if any).

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).

1.

Dry collection of

a. Control Device: electrostatic precipitator (ESP)

b. Operating Principles: charged particles on oppositely charged surfaces.

c. Efficiency:¹ Outlet Loading 0.025 gr/dscf Corr. to 12% CO₂

d. Capital Cost: \$4,500,000

e. Useful Life: 20 yrs.

f. Operating Cost: \$556,999./yr

g. Energy:² 770 KW

h. Maintenance Cost: \$90,000/yr

i. Availability of construction materials and process chemicals: Readily available

j. Applicability to manufacturing processes: Not applicable

k. Ability to construct with control device, install in available space, and operate within proposed levels: ESP has by far the longest history of operation within emission standards on solid waste resource recovery facilities (hundreds of units worldwide).

2.

Dry collection of

a. Control Device: fabric filter

b. Operating Principles: particles by filtration through fabrics.

c. Efficiency:¹ Outlet loading 0.025 gr/dscf Corr. to 12% CO₂

d. Capital Cost: \$3,694,000

e. Useful Life: 20 yrs. complete² bag replacement every 2 years.

f. Operating Cost: \$859,000./yr

g. Energy:²

h. Maintenance Cost: \$112,000./yr

218 KW

i. Availability of construction materials and process chemicals: Readily available

¹ Explain method of determining efficiency.

² Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels: Limited operating experience with fabric filters on solid waste resource recovery facilities (only 3 units on large scale, mass-burn facilities

- 3.
- | | |
|--|---|
| a. Control Device: Dry Scrubber & ESP
Outlet loading 0.025gr/dscf | b. Operating Principles: neutralizes SO ₂ & acid
Alkaline spray |
| c. Efficiency: ¹ 65% removal eff. for SO ₂
& 80% for acid gases | d. Capital Cost:
\$12,831,000 |
| e. Useful Life: 20 Yr. | f. Operating Cost: \$1,387,000/vr. |
| g. Energy: ² 1397 KW | h. Maintenance Cost: \$336,000/vr |

i. Availability of construction materials and process chemicals: Readily available

j. Applicability to manufacturing processes: Not Applicable

k. Ability to construct with control device, install in available space, and operate within proposed levels: Very limited operating experience (only one unit in operation in USA on solid waste service).

- 4.
- | | |
|--|--|
| a. Control Device: ESP & Wet Scrubber
Outlet loading 0.025 gr/dscf | b. Operating Principles: of particulate and
alkaline scrubbing for SO ₂ & acid gas contr |
| c. Efficiency: ¹ 75% removal eff.
for SO ₂ and 90% for acid gases | d. Capital Costs:
\$7,810,000. |
| e. Useful Life:
20 yrs. ² | f. Operating Cost: \$3,310,000/vr |
| g. Energy: ² | h. Maintenance Cost: \$189,000/vr |

i. Availability of construction materials and process chemicals: Expensive corrosion-resistant metals required for quencher and scrubber.

j. Applicability to manufacturing processes:
Not Applicable

k. Ability to construct with control device, install in available space, and operate within proposed levels: Very limited operating experience. Problem areas include necessity for stack gas reheat, corrosion of scrubber, and wastewater treatment.

F. Describe the control technology selected:

- | | |
|----------------------------------|--|
| 1. Control Device: ESP | 2. Efficiency: ¹ Outlet loading controlled to
0.025 gr/dscf corr. to 12% CO ₂ |
| 3. Capital Cost: \$4,500,000 | 4. Useful Life:
20 yrs. |
| 5. Operating Cost: \$556,000/yr | 6. Energy: ² 770 KW |
| 7. Maintenance Cost: \$90,000/yr | 8. Manufacturer: Not selected yet. |

9. Other locations where employed on similar processes: Braintree, MA; Harrisburg, PA; Chicago, NW. IL; Nashville, TN; Norfolk, VA; Saugus, MA; Montreal (Des Carriers),

a. (1) Company: Quebec, and Pinellas County, FL.

Not selected yet.
(2) Mailing Address:

(3) City:

(4) State:

¹ Explain method of determining efficiency.

² Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:¹

Contaminant	Rate or Concentration
Various	See Table 6-2 in PSD permit application

(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: See Section 6.0 of PSD Permit Application

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

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

3. Meteorological Data Used for Air Quality Modeling

1. 5 Year(s) of data from 1 / 1 / 70 to 12 / 3 / 74
month day year month day year
2. Surface data obtained from (location) Tampa International Airport
3. Upper air (mixing height) data obtained from (location) Tampa International
4. Stability wind rose (STAR) data obtained from (location) Not Used

C. Computer Models Used

1. Industrial Source Complex (ISC), Short-term Modified? If yes, attach description.
2. _____ 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>4.46</u>	grams/sec
SO ₂	<u>23.1</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.

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION
Application To Operate/Construct Air Pollutant Sources
Supplemental Information

Section V: Supplemental Requirements

1. Total process input rate at design capacity (i.e. name-plate rating) is 1600 TPD, 4 units each at 400 TPD. Residue amount will be 29,000. lb/hr (dry basis) and is derived as follows:

$$\begin{aligned} \text{Inert Material} &= (133,333 \frac{\text{wet lb feed}}{\text{hr}}) (0.7265 \frac{\text{dry lb}}{\text{wet lb}}) (0.289 \frac{\text{lb inert}}{\text{dry lb}}) = \\ &28,100 \frac{\text{dry lb inert}}{\text{hr}} \end{aligned}$$

$$\begin{aligned} \text{Unburned Carbon:} &= (133,333 \frac{\text{wet lb feed}}{\text{hr}}) (0.7265 \frac{\text{dry lb}}{\text{wet lb}}) (0.3567 \frac{\text{lb. Carbon}}{\text{dry lb}}) \\ &= 900. \frac{\text{dry lb carbon}}{\text{hr}} \\ &29,000. \frac{\text{dry lb residue}}{\text{hr}} \end{aligned}$$

2. Emission estimates are contained in the Prevention of Significant Deterioration (PSD) Permit Application.
3. Emission factors were derived from AP-42 and from data from recent large-scale, mass burn resource recovery facilities. See PSD Permit Applications.
- 4-8. These items are not available at this time since a system supplier has not been selected. Once these items have been provided by the vendor they will be transmitted to DER for inclusion in this application.

Prevention of Significant
Deterioration

APPENDIX 10.1.5

PREVENTION OF SIGNIFICANT DETERIORATION

Hillsborough County, Florida
Energy Recovery Project
Application for Certification of Resource
Recovery - Electrical Generating Facility

APPENDIX 10.1.5 PREVENTION OF SIGNIFICANT DETERIORATION

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SECTION 1.0
EXECUTIVE SUMMARY

1.0 EXECUTIVE SUMMARY

In recognition of their growing need for solid waste disposal, the Hillsborough County Board of Commissioners has decided to construct a mass-burn solid waste energy recovery facility. In support of this effort, Camp Dresser and McKee Inc. (CDM) has prepared the Prevention of Significant Deterioration (PSD) application and related air quality analyses to meet the requirements of the Clean Air Act. The facility will be constructed and operated by a full service vendor under contract to the County.

This permit application, submitted to the Florida Department of Environmental Regulation (FDER), addresses the specific requirements of the PSD review as well as the new source review for nonattainment areas. The principle components of this review include: projecting facility emissions; performing a Best Available Control Technology (BACT) and Lowest Achievable Emission Rate (LAER) analyses; and an air quality impact analysis. The results of the PSD permitting analysis indicated:

- BACT/LAER for the proposed source is the use of combustion controls inherent to the system design with an ESP designed to meet an outlet grain loading of 0.025 gr/dscf @ 12% CO₂.
- the facility will operate in compliance with the PSD increments and NAAQS for all subject pollutants; and
- the facility is not expected to significantly affect surrounding soils, vegetation or visibility.

This PSD application is comprised of nine major sections. Each of these sections is summarized below.

Section 1.0 - Executive Summary. This section presents the conclusions of the report and provides a description of the report format.

Section 2.0 - Regulatory Overview. This section outlines the PSD process and reviews applicable state and federal regulations. The Prevention of Significant Deterioration and the Non-Attainment Area New Source Review provisions as defined by the Florida Department of Environmental Regulation Air Pollution Administrative Code are the principal regulations which are applicable to this facility.

Section 3.0 - Project Description. Within this section the basic features of the proposed project are described. The proposed facility will incorporate a mass-burn technology with an ultimate generating capacity of approximately 39 megawatts, using 1600 tons per day of solid waste with a heating value of 4000 Btu per pound. Each of the four boilers would be able to handle 400 tons of refuse per day. Each boiler will have an Electrostatic Precipitator (ESP) to remove small particles from the flue gas. The flues from each unit would be encased in a single 67 meter (220 foot) stack.

Section 4.0 - Air Pollutant Emission Projections. Estimates of the facility's emissions are presented in this section. Emission estimates from previously accepted PSD applications and stack test results from mass-burn facilities in Florida and across the country are included. Documentation of all data is provided.

Section 5.0 - Source and Pollutant Applicability. Source applicability under PSD is based on a through-put of over 250 tons of refuse per day and has the potential to emit more than 100 tons per year of certain pollutants. Pollutant applicability is evaluated for each pollutant regulated under PSD. Total Suspended Particulates (TSP) and Ozone (O₃) are not subject to PSD review since the site is located in a non-attainment area but is subject to review under the Non-Attainment area New Source Review provisions.

Section 6.0 BACT/LAER Analysis. This section discusses the application of Best Available Control Technologies (BACT) and Lowest Achievable Emission Rate (LAER) for all applicable pollutants. Each alternative control technology is evaluated with regard to energy, economic, environmental and

other issues associated with its implementation. This analysis established that an ESP operating at 0.025 grains per dry standard cubic foot corrected to 12% CO₂ for particulate matter meets the LAER for TSP and, along with other design specifications, is BACT for the other regulated pollutants.

Section 7.0 - Ambient Air Quality PSD Analysis. This section presents the air quality analysis for each subject pollutant demonstrating that its addition to the ambient environment will not violate either applicable National Ambient Air Quality Standards (NAAQS) or the available PSD increment. This analysis included the use of the Industrial Source Complex (ISC) dispersion model and five years of Tampa International Airport data as well as ambient monitoring data from the Hillsborough County Environmental Protection Commission.

Section 8.0 - Additional Air Quality Impact Analysis. This section evaluates the potential impacts on visibility, soils and vegetation and considers any induced growth potential as a result of the proposed facility. No impairment of visibility is predicted with respect to the Chassahowitzka National Wilderness Area, the only Class I area within 100 km. The facility will utilize the local work force so no induced growth is expected. The small contribution the facility may make to the background air quality has no anticipated adverse impact on soils or vegetation.

Section 9.0 - Emission Offsets. The proposed facility's best effort to obtain emission offsets for total suspended particulate matter from existing major facilities is outlined in this section.

SECTION 2.0
REGULATORY REVIEW

2.0 REGULATORY REVIEW

This section summarizes the air quality regulations promulgated by the U.S. Environmental Protection Agency (EPA) and the Florida Department of Environmental Regulation (DER) that define ambient air quality standards and regulate the sources of air contaminants in order to achieve and maintain these ambient standards. The proposed resource recovery facility is subject to the following rules and regulations:

- National Ambient Air Quality Standards (NAAQS)
- Prevention of Significant Deterioration (PSD)
- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- Non Attainment Area New Source Review Requirements
- Florida DER Air Pollution Administrative Code

In many cases the Florida DER Air Pollution Administrative Code reflects the standards maintained by the EPA. For those cases where the Florida code represents a more restrictive ambient impact requirement, the Florida regulation has been applied.

2.1 NATIONAL AMBIENT AIR QUALITY STANDARDS

The EPA has established ambient ceilings for certain criteria pollutants as mandated by the Clean Air Amendments of 1970 (P.L. 91-604). These standards, known as the National Ambient Air Quality Standards (NAAQS), were set at two levels. The primary standards define levels which are necessary to protect the public health. The secondary standards define levels which protect the public welfare. The criteria pollutants regulated under NAAQS are sulfur dioxide (SO_2), total suspended particulates (TSP), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2) and lead (Pb). Further amendments to the Clean Air Act have rescinded the hydrocarbon (HC) standard and revised the standard for O_3 . The NAAQS and the corresponding Florida Ambient Air Quality Standards (FAAQS) as adopted by the DER are presented in Table 2-1.

TABLE 2-1

SUMMARY OF AMBIENT AIR STANDARDS -
FEDERAL (40 CFR 50) AND FLORIDA STATE (17-2.300)

Contaminant ⁽¹⁾	Averaging Period	Florida			Corresponding Federal Standards					
		Conc.	Units	Statistic ⁽²⁾	Primary			Secondary		
					Conc.	Units ⁽²⁾	Stat.	Conc.	Units ⁽²⁾	Stat.
SULFUR DIOXIDE (SO ₂)	12 Consecutive Mos.	60 (0.02)	ug/m ³ (PPM)	A.M. (Arith. Mean of 24 hr. avg. concern)	80 (0.03)	ug/m ³ (PPM)	A.M.			
	24-HR.	260 (0.1)	ug/m ³ (PPM)	MAX.	365 (0.14)	ug/m ³ (PPM)	MAX.			
	3-HR.	1300 (0.5)	ug/m ³ (PPM)	MAX.				1300 (0.5)	ug/m ³ (PPM)	MAX.
	8-HR.	10 (9)	mg/m ³ (PPM)	MAX.	10 (a)	mg/m ³ (PPM)	MAX.			
CARBON MONOXIDE (CO)	1-HR.	40 (35)	mg/m ³ (PPM)	MAX.	40 (35)	mg/m ³ (PPM)	MAX.			
OZONE (PHOTOCHEMICAL OXIDANTS)	1-HR.	0.12 (235)	PPM (ug/m ³)	MAX.	0.12 (235)	PPM (ug/m ³)	MAX.	235	ug/m ³	MAX.
NITROGEN DIOXIDE (NO ₂)	12-Consecutive Mos.	100 (0.05)	ug/m ³ (PPM)	A.M.	100 (0.05)	ug/m ³ (PPM)	A.M.	100	ug/m ³	A.M.
TOTAL SUSPENDED PARTICULATES	12 Consecutive Mos.	60	ug/m ³	G.M. (Geometric mean of 24 hr. average concentrations)	75	ug/m ³	G.M.	60 ⁽⁴⁾	ug/m ³	G.M.
	24-HR.	150	ug/m ³	Maximum	260	ug/m ³	MAX.	150	ug/m ³	MAX.
Lead	Maximum Calendar	1.5	ug/m ³	A.M.	1.5	ug/m ³	MAX.			

- (1) Gaseous concentrations are corrected to a reference temperature of 25°C and to a reference pressure of 760 millimeters of Mercury.
- (2) All maximum values are values not to be exceeded more than once a year (Ozone Std. not to be exceeded more than one day per year).
- (4) To be used as a guide in assessing implementation plans to achieve 24-hour standard.

Each state was given the primary responsibility for assuring air quality by submitting a State Implementation Plan (SIP). The state then defined all geographic areas as attainment or non-attainment depending on whether the NAAQS were met. Areas which could not be so defined due to the lack of ambient air data were defined as unclassifiable. Areas designated unclassifiable may be treated as attainment until further information becomes available.

2.2 PREVENTION OF SIGNIFICANT DETERIORATION

A new resource recovery facility which locates in an attainment or unclassified area and emits 250 tons per year or more of a particular pollutant is considered to be major stationary source and therefore subject to a PSD review (17-2.500) before a permit to construct can be issued. The applicability of the specific requirements of PSD to the proposed Hillsborough County resource recovery facility is contained in Section 5.0.

In general, a PSD permit application must contain the following basic components:

- A Best Available Control Technology (BACT) review and application
- An analysis of existing ambient air quality
- An impact assessment demonstrating that emissions from the new source will not cause a violation of ambient air quality standards or PSD increments.
- An assessment of the source's impact on air quality related values including soils, vegetation, and visibility
- A complete description of the nature and operation of the source.

Best Available Control Technology

The control technology review is required for new sources to evaluate and apply BACT, defined as follows:

" An emission limitation, including a visible emission standard, based on the maximum degree of reduction of each pollutant emitted which the Department, on a case-by-case basis, taking into account energy, environment, and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques for control of each pollutant." (17-2.100(22)).

According to the FDER, BACT should be applied for each pollutant subject to New Source Review (NSR) requirements. Pollutants subject to (NSR) are those that are designated attainment or unclassified for the area of construction proposed by the new facility and would have potential emissions equal to or greater than those defined by the de minimis emission rates listed in Table 2-2.

The application of BACT may result in emission rates equal to or less than the New Source Performance Standards (NSPS). In establishing BACT the emission limiting standards proposed by other states shall be considered. All scientific, engineering, and technical material and the social and economic impact of the application of such technology must be included in a BACT evaluation.

Existing Air Quality Analysis

Sources subject to NSR requirements must provide an analysis of ambient air quality in the vicinity of the proposed facility. Pollutants that do not have established ambient air quality standards are subject to monitoring sufficient to determine ambient levels. Pollutants with established state or national ambient air quality standards (FAAQS or NAAQS) are subject to monitoring to determine whether emissions would violate those standards or any PSD increment. The monitoring data is usually gathered over a twelve month period but shorter periods of no less than four months may be allowed. Sources may be exempt from the monitoring requirements if representative data exist or ambient impacts are below de minimis monitoring concentrations listed in Table 2-3. Typically, existing air quality monitoring data may be used instead of preconstruction monitoring if:

TABLE 2-2
SIGNIFICANT (De Minimis) EMISSION RATES

Pollutant	Emission Rate (tons/year)
Carbon monoxide	100
Nitrogen oxides	40
Sulfur dioxide	40
Total suspended particulate	25
Ozone (volatile organic compounds)	40
Lead	0.6
Beryllium	0.004
Mercury	0.1
Vinyl chloride	1
Fluorides	3
Sulfuric acid mist	7
Total reduced sulfur (including H ₂ S)	10
Reduced sulfur (including H ₂ S)	10
Hydrogen sulfide	10

SOURCE: Table 500-2 in Florida's Air Pollution Administrative Code

TABLE 2-3
SIGNIFICANT (De Minimis) MONITORING CONCENTRATIONS

Pollutant	Air Quality Concentrations (ug/m ³) and Averaging Time
Carbon Monoxide	575 (eight-hour)
Nitrogen dioxide	14 (annual)
Sulfur dioxide	13 (24-hour)
Total Suspended Particulates	10 (24-hour)
Ozone	**
Lead	0.1 (24-hour)
Beryllium	0.0005 (24-hour)
Mercury	0.25 (24-hour)
Vinyl Chloride	15 (24-hour)
Fluorides	0.25 (24-hour)
Total reduced sulfur (including H ₂ S)	10.0 (one-hour)
Reduced sulfur (including H ₂ S)	10.0 (one-hour)
Hydrogen sulfide	0.04 (one-hour)

** No specific air quality concentration for ozone is prescribed. Exemptions are granted when a source's VOC emissions are <100 tons/year.

SOURCE: Table 500-3 in Florida's Air Pollution Administrative Code

- the data are representative of the impact from the proposed facility;
- the data would meet PSD quality assurance requirements; and
- the data are current

Air Quality Impact Analysis

The source must demonstrate that the proposed emissions will not violate Florida or National standards or PSD maximum allowable increases (increments). The estimates of ambient air quality impact from the proposed source must be based on the models and meteorological data acceptable to the DER and EPA.

The PSD regulations set maximum allowable increases above ambient concentrations for SO₂ and TSP (Table 2-4). These incremental concentrations are categorized depending on the degree of industrial development desired. Class I areas have the smallest increments and include international parks, national wilderness areas, national parks, and other areas where air quality deterioration is undesirable. Class II areas allow for moderate industrial development. Class III areas allow for substantial industrial development. The increments associated with each class are listed in Table 2-4. No Class III areas currently exist in Florida. The nearest Class I area to the proposed facility is the Chassahowitzka Wilderness Area located approximately 45 miles to the northeast. A source impact analysis must show that the PSD increments are not violated. This is done by modeling the potential emissions from the proposed facility along with the actual emissions from those sources which have:

- Emission increases and decreases at major stationary sources resulting from construction that began after January 6, 1975; and
- Emission increases and decreases at all stationary sources occurring after the baseline data.

The baseline date is the earliest date after August 7, 1977 on which a complete application under PSD requirements was submitted.

TABLE 2-4
PSD AIR QUALITY INCREMENTS

Class I*

<u>Pollutant</u>	<u>Maximum Allowable Increase (micrograms per cubic meter)</u>
Particulate Matter:	
Annual Geometric mean	5
24-hour maximum	10
Sulfur Dioxide:	
Annual arithmetic mean	2
24-hour maximum	5
Three-hour maximum	25

Class II**

<u>Pollutant</u>	<u>Maximum Allowable Increase (micrograms per cubic meter)</u>
Particulate Matter:	
Annual Geometric mean	19
24-hour maximum	37
Sulfur Dioxide:	
Annual arithmetic mean	20
24-hour maximum	91
Three-hour maximum	512

Class III***

<u>Pollutant</u>	<u>Maximum Allowable Increase (micrograms per cubic meter)</u>
Particulate Matter:	
Annual Geometric mean	37
24-hour maximum	75
Sulfur Dioxide:	
Annual arithmetic mean	40
24-hour maximum	182
Three-hour maximum	700

* Nearest Class I area is the Chassahowitzka National Wilderness Area located approximately 45 miles NE of the facility.

** Hillsborough County is designated as Class II.

*** No Class III areas currently exist in Florida.

The PSD regulations also provide for an ambient ceiling concentration which cannot be exceeded as defined by the FAAQS and NAAQS. An impact analysis of the proposed source is done by modeling. Resulting air quality levels are then determined by adding the facility's impacts to background pollutant levels. Background pollutant levels are established by monitoring data, modeling existing sources, or a combination of both.

The reviewing agency may request additional impact estimates such as the impact on Class I areas, or the impact on neighboring attainment and non-attainment areas. In some cases, special receptor locations may be specified but in general an impact analysis does not extend beyond the point where concentrations fall below the significance limits listed in Table 2-5.

2.3 NEW SOURCE PERFORMANCE STANDARDS

The EPA under the New Source Performance Standards (NSPS) listed in Section 40 CFR Part 60 and Florida under Section 17-2 Part VI have promulgated source specific and general emissions limitations applicable to new and modified sources. These NSPS represent the maximum degree of emission control using available technology.

For new incinerators with a charging rate of greater than 50 tons per day of refuse, a limit for particulate matter of 0.08 gr/dscf corrected to 12% CO₂ is established. This is almost identical to the Florida particulate matter limit of 0.08 gr/dscf corrected to 50% excess air. Florida further sets a specific limitation that incinerators emit no objectionable odor. The general opacity rule found in Florida. Administrative Code (FAC) rule 17-2.610 does not apply to a source for which either a specific particulate standard or specific opacity standard is provided elsewhere in the rules. Because the resource recovery facility is subject to the specific particulate standard in Rule 17-2.600(1)(c), the general opacity standard does not apply.

TABLE 2-5
SIGNIFICANCE LEVELS

<u>Pollutant</u>	<u>Averaging Time</u>				
	<u>Annual</u>	<u>24-Hour</u>	<u>8-Hour</u>	<u>3-Hour</u>	<u>1-Hour</u>
SO ₂	1.0 ug/m ³	5 ug/m ³		25 ug/m ³	
TSP	1.0 ug/m ³	5 ug/m ³			
NO ₂	1.0 ug/m ³				
CO			0.5 mg/m ³		2 mg/m ³

[FAC 17-2.100(147)]

2.4 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

The EPA has promulgated standards for certain hazardous air pollutants in 40 CFR Part 61. These pollutants currently listed are asbestos, beryllium, mercury and vinyl chloride. Currently the National Emission Standards for Hazardous Air Pollutants (NESHAP) do not effect the design or operation of a resource recovery facility which utilizes municipal solid waste.

2.5 NON ATTAINMENT NEW SOURCE REVIEW REQUIREMENTS

A proposed facility locating in a non-attainment area and emitting more than 100 tons per year of the affected pollutant is subject to the review requirements contained in 17-2.510(4) of the Florida Administrative Code. For that pollutant designated as non-attainment, the source must show that the proposed emissions plus existing emissions plus any required emission offsets do not interfere with reasonable further progress toward achieving compliance with ambient air quality standards. Sources outside a non-attainment area but within the area of influence must show a less than significant impact within the non-attainment area without the use of offsets. The preconstruction review requirements include the application and employment of Lowest Achievable Emission Rate (LAER) emission control technology, the acquisition of a sufficient new source allowance or emission offset, and the demonstration of a net air quality improvement.

LAER is defined in the DER nonattainment regulations as "the most stringent limitation which is contained in the implementation plan of any state for such class or category of source or the most stringent emission limitation which is achieved in practice, whichever is more stringent". In support of a LAER determination all scientific, engineering, and technical material must be made available. In no case shall a LAER determination result in an emission rate greater than the NSPS.

For non-attainment areas with an approved SIP the source must either obtain a new source allowance or offsets greater than the proposed emissions or

demonstrate a net air quality improvement. New source allowance is available for VOC but not for other pollutants. A resource recovery facility is exempt from securing all the necessary offsets prior to issuance of an operating permit if 1) the best efforts to obtain such offsets were unsuccessful, 2) emission offsets will be sought and applied as they become available, and 3) all available offsets have been secured.

2.6 FDER AIR POLLUTION CONTROL REGULATIONS

The Florida Administrative Code, Chapter 17-2, for the most part has incorporated the federal code for each of the air programs previously discussed. Some slight differences do exist, however, which are important to this study.

Ambient Air Quality Standards

Unlike the NAAQS for the criteria pollutants, Florida has adopted a single set of standards which incorporates both primary and secondary standards. This is the case for the 24-hour and annual TSP standards as well as the 3-hour SO_2 standard. For the 24-hour and annual SO_2 standards, Florida has adopted values which are lower than the NAAQS. Thus, references to the impact of the facility on ambient air quality are made relative to the Florida standards since they are the most restrictive set of ambient standards.

Emission Limitations

The DER emission limitations that apply to this mass-burn facility are contained in FAC 17.2.600(1)(c) for sources with a charging rate equal to or greater than 50 tons per day. This regulation restricts particulate matter emissions to 0.08 grains per dry standard cubic foot of exhaust gas corrected to 50 percent of excess air. This is very nearly identical to the NSPS found in the federal code. In developing BACT or LAER, however, emission limitations more restrictive than this may be required. The Florida regulation further requires that no objectionable odors be emitted from the facility.

Permit Requirements

Any source which emits air pollutants must obtain an Application to Operate/Construct Air Pollution Sources, as specified by 17-2.210(1). This permit requires such information necessary to meet the requirements of the appropriate regulations. Florida has been delegated complete authority for sources subject to a PSD review, except for the way increment consumption is calculated. EPA's review authority extends only to that area where the calculation of increment differs from EPA's approach.

SECTION 3.0
PROJECT OVERVIEW

3.0 PROJECT OVERVIEW

3.1 OBJECTIVES

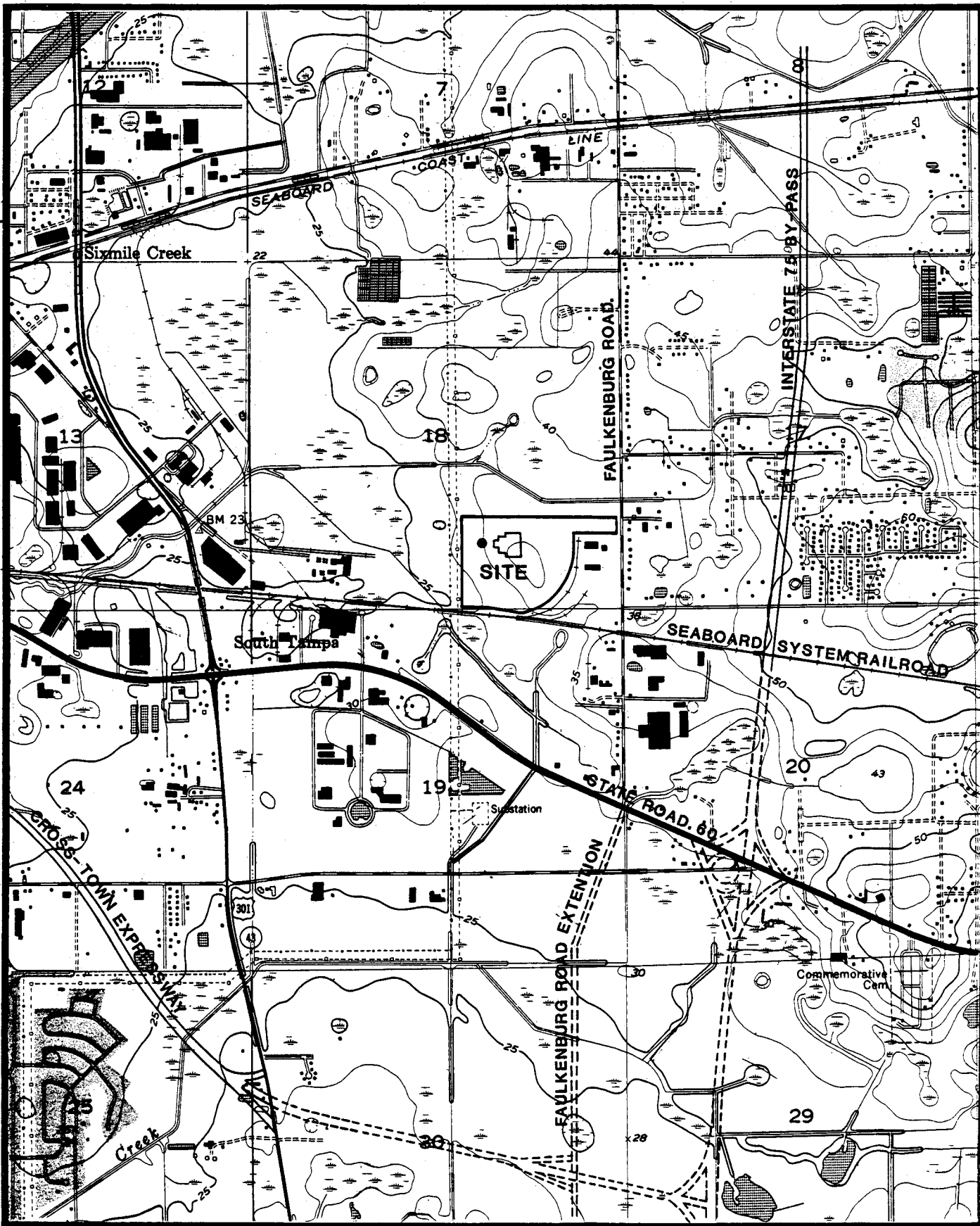
In Hillsborough County, there is an increasing interest in solid waste disposal and in the concept of resource recovery from solid wastes. Interest has been stimulated by an increased awareness associated with landfill disposal methods and of the value of energy and recyclable materials. The solid waste generated in Hillsborough County is currently disposed of in the Hillsborough Heights Landfill. Because of landfill capacity limitations and legal restrictions concerning the Hillsborough Heights Landfill, it is mandated to close by 31 October 1984.

On 15 April 1982, the Hillsborough County Board of County Commissioners authorized establishment of the County Resource Recovery Program. The purpose of this program is to evaluate, plan, and implement a resource recovery facility to serve the unincorporated areas of the County. The project is based on combusting the refuse using mass-burn technology, recovering the heat energy, and converting the energy to electricity for sale. The design, construction, and operation of the facility will be by a full-service contractor under a long-term contract with the County. The contractor will be selected through a Request for Proposal (RFP) procurement process.

The facility will be located on a 50.4 acre site located on Faulkenburg Road. The location of this site is identified in Figure 3-1.

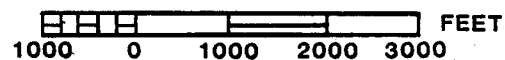
3.2 FACILITY DESCRIPTION

After evaluating several technologies, the County has found that the proposed resource recovery facility incorporating a mass-burn technology, operated by a full-service vendor under contract to the County (the owner of the plant would be the County), would best fit its present and foreseeable needs. The energy recovery facility is anticipated to have a



**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 3-1
LOCATION OF SITE**

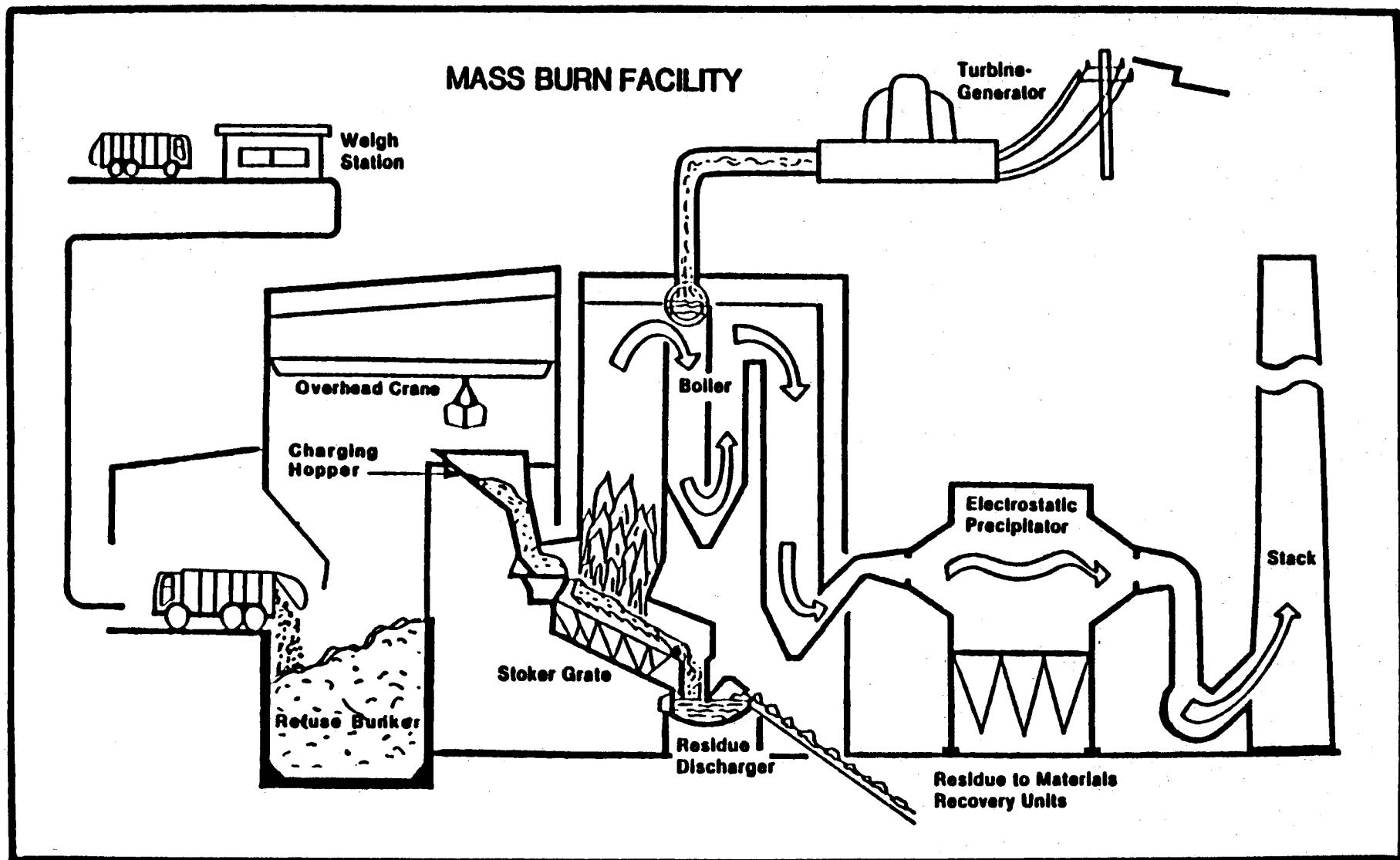


nameplate generating capacity of approximately 29 megawatts, using 1,200 tons per day (tpd) of solid waste as fuel. However, certification for an ultimate site capacity of about 39 megawatts, capable of processing 1,600 tons of solid waste per day, is being sought in anticipation of future solid waste disposal requirements. The energy produced would be used to satisfy internal power demands and the surplus would be sold directly to the Tampa Electric Company (TECO).

Since the proposed facility will utilize mass-burn technology, there will be no complex preprocessing of wastes at the facility prior to combustion. However, identifiable quantities of sludge from wastewater treatment plants, asbestos containing construction waste, or other hazardous waste will not be accepted at the facility. Oversized items would be separated from the incoming refuse by an overhead crane. A roto-shear (shredder) may be utilized to reduce the size of this material. After size reduction, this material would either be landfilled, sold as scrap, or charged into the furnace.

A conceptual schematic diagram of the recovery facility is presented in Figure 3-2. Truck transport will be used to deliver MSW to the facility and to remove ash residue from the facility. Under a 1600 tpd configuration, four 400-tpd units would be used in the facility. MSW would be dumped into the refuse bunker directly from packer trucks inside the building. All waste will be stored inside the building and kept under negative pressure, so no waste will be visible from the outside and odors and fugitive emission will be controlled. The overhead cranes mix MSW in the bunker and load the four charging hoppers as required.

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 electrically charged collecting plates. The dust is then removed mechanically from these plates. The efficiency of the ESP has been established as achieving an emission limitation for particulate matter of 0.025 gr/dscf corrected to 12% CO₂. A complete analysis, demonstrating



**HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT**

**FIGURE 3-2
SCHEMATIC OF TYPICAL RESOURCE
RECOVERY FACILITY**

the ESP as LAER for particulate matter and BACT for the other criteria pollutants is contained in Chapter 6.0. The flue gas will be drawn through the ESPs by an induced draft fan which would be 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. Ash will comprise 10 percent of the volume and 25 percent of the weight of the MSW processed by the facility. The ash will be quenched with water to about 30 percent moisture prior to transport to a landfill.

As noted above, while the proposed facility will have a maximum design rated capacity of 1600 tpd, its initial throughput will be about 1200 tpd (comprised of three 400 tpd units). Each boiler unit operates independently from the others. It would, therefore, be possible to routinely shut down one unit for periods of maintenance and inspection.

3.3 GOOD ENGINEERING PRACTICE STACK HEIGHT EVALUATION

The 1977 Clean Air Act Amendments sought to require that emission limitations used for control of any pollutant were not affected by the stack height which exceeds good engineering practice (GEP), or any other dispersion technique. The GEP stack height was that "height necessary to insure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, and wakes which may be created by the source itself, nearby structures, or nearby terrain obstacles." The Act did not seek to restrict the actual height of any stack, only to limit the theoretical stack height used in determining a source's allowable emission rate. This section of the Clean Air Act does not apply to stacks in existence before December 31, 1970.

The EPA proposed regulations to implement Section 123 on January 12, 1979 (44 FR 2608). Based on the responses received during the extended period for public comments, the EPA issued a final rulemaking regarding stack

height regulations on February 8, 1982 (47 FR 5864). This final version incorporated many changes received during the comment period. The stack height regulations became effective March 10, 1982. On October 11, 1983, the EPA was ordered by the U.S. Court of Appeals (Sierra Club and NRDC versus EPA, et al.) to review and revise certain sections of their stack height regulations. However, none of the contested sections is expected to affect the determination of the GEP stack height for the proposed facility.

The GEP stack height is the greater of 65 meters or the height calculated from:

$$H_G = H + 1.5L$$

where:

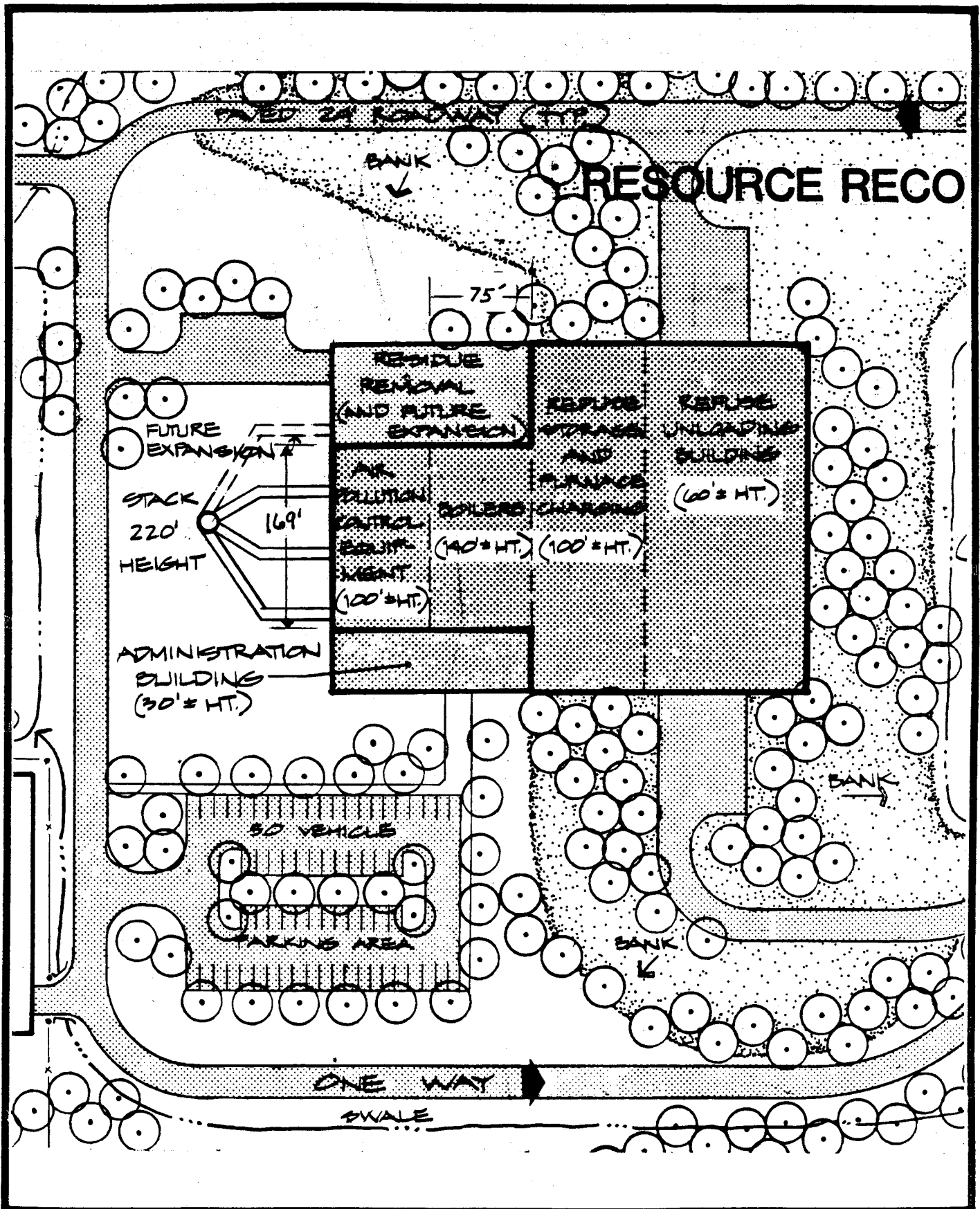
H_G = the maximum GEP stack height

H = the height of the structure

L = the lesser dimension (height or width) of the structure.

This formula is applicable to any structure located within five times dimension "L" but not exceeding 0.8 km of the proposed stack. The height and width of a structure is based on the frontal area of the structure projected onto a plane perpendicular to a line originating from the stack and following the direction of the wind. The stack height may be less than the maximum GEP if excess concentrations do not result due to aerodynamic downwash.

The dimensions of the powerhouse and ancillary structures are shown in Figure 3-3. The proposed facility is located in relatively flat rural environment; thus the powerhouse structure is within the area of influence of the plume. The projected area dimensions of the powerhouse for use in the maximum GEP stack height calculation are listed in Table 3-1. Based on these dimensions the building height is a lesser dimension than the building width. The equation is then simplified to two and one half times the building height and the maximum GEP stack height is calculated to be



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE 3-3
STACK AND BUILDING
CONFIGURATION

TABLE 3-1

PROJECTED AREA DIMENSIONS OF POWER HOUSE

Building Height	42.7 meters
Building Width	51.5 meters
Building Length	22.9 meters
Max. Projected Width	56.4 meters

106.8m. Since the proposed stack height of 67m is less than the maximum GEP stack height, the effects of downwash must be considered in predicting ground level concentrations. For a further discussion regarding the proposed stack height, see Appendix 10.16 "Stack Height Analysis and Recommendations".

3.4 BOILER OPERATING CONDITIONS

The resource recovery facility will consist of four boilers each capable of firing 400 tpd of reference waste (see Section 3.3 of Volume I) at its maximum continuous rating (MCR). This firing rate will be adjusted as the waste quality changes, i.e. changes in the higher heating value (HHV). This is because one of the objectives of plant operation is to maintain the heat load to the boiler by maintaining the heat release on the grate. When the HHV is low (higher moisture and ash fractions, lower combustibles fraction) more waste will be processed, up to 440 tpd per boiler. Likewise, when the HHV is high, less waste will be processed.

A screening analysis was run to assess the potential air quality impact of various operating loads. A total of four different operating load extremes were selected for review. The boiler operating conditions selected for modeling were based on identifying minimum, maximum, and typical load conditions as well as identifying high and low values of the HHV. The boiler conditions associated with each case are listed in Table 3-2.

The maximum load condition with a heating value of 4,000 Btu/lb resulted in the highest pollutant impacts and therefore this condition is used throughout the modeling assessment (see Section 7.1). This provides for a conservative analysis as the facility is expected to operate, over the long-term, at its maximum continuous rating (MCR) of 400 TPD of reference solid waste subject to an availability of 85 percent. A detailed discussion of the modeling methodology and results of the screening analysis are described in Exhibit A.

TABLE 3-2
BOILER OPERATING CONDITIONS

Boiler Exit		Refuse Fired		Flue Exit (from all 4 boilers)		
°F	ACFM*	Heat Content Btu/lb	Rate* (TPD)	Temp. °F (°K)	Flow Rt ACFM	Exit Vel. fps (mps)**
450	87,840	4,000	440	430 (494)	343,600	55.2 (16.82)
475	89,675	4,500	400	455 (508)	351,000	56.4 (17.19)
450	39,925	4,000	200	430 (494)	156,200	25.1 (7.65)
450	79,855	4,000	400	430 (494)	312,400	50.3 (15.32)

* Per boiler (4 boilers total).

** Flue diameter = 5'9" (1.75 m) for an effective diameter of 3.5m.

SECTION 4.0
AIR POLLUTANT EMISSIONS

4.0 AIR POLLUTANT EMISSIONS

The combustion of refuse to produce energy in the boilers of resource recovery facilities results in the emission of various air pollutants through several formation mechanisms. The generation of pollutants at the furnaces, eventually delivered to an air pollution control device are of two types: those over which the system operator has control through the technology utilized, and those which are a function of the composition of the waste stream, hence, essentially uncontrollable in a mass-burn system.

Emissions of particulate matter is primarily a function of the efficiency of the control device(s) to provide for compliance with required emission limitations. Emissions of pollutants such as carbon monoxide, oxides of nitrogen, hydrocarbons, and hydrogen sulfide are principally influenced by the quality of combustion.

Emissions of other pollutants such as fluorides, hydrogen chloride, sulfur dioxide, mercury, lead, beryllium, and asbestos, are principally influenced by the composition of the as-received waste stream, over which there is normally only limited operator control. Identifiable contaminants such as those found in sludge from wastewater treatment plants, asbestos containing construction material, and other hazardous waste are not accepted at the facility. Some control of those composition-dependent pollutants such as lead, beryllium, asbestos, and other trace metals which adhere to particles is provided by the electrostatic precipitator, a post-furnace pollution control device which traps and removes these pollutants.

The emission factors for all these pollutants are summarized on Table 4-1, and discussed individually below. Projected emission estimates are based on preliminary combustion calculations using waste characterization data and preliminary design information along with stack test data from other operating mass-burn facilities as compared with recent EPA-approved emission levels for the PSD permits of proposed similar units. Also, listed on this table are emission factors for the major mass-burn resource recovery facilities in the west central Florida area.

TABLE 4-1
EMISSION FACTORS FOR FLORIDA RESOURCE RECOVERY FACILITIES
(pounds per ton of MSW)

<u>Hydrocarbons</u>	<u>Hillsborough (proposed)</u>	<u>Pinellas 1 & 2¹</u>	<u>Pinellas 3²</u>	<u>McKay Bay³</u>
Particular matter	0.48*	1.6	0.5	0.67*
Sulfur dioxide	2.5	3.0	1.9	4.1
Nitrogen oxides	3.0	---	3.0	7.2
Carbon monoxide	1.8	---	1.5	0.4
Hydrocarbons	0.2	---	0.3	0.2
Lead	0.048	---	0.03	0.074
Mercury	0.0052	---	0.01	0.0996
Beryllium	13.1×10^{-6}	---	1.3×10^{-6}	6.2×10^{-6}
Fluorides	0.06	---	0.1	0.10
Sulfuric acid	7.68×10^{-2}	---	---	---
Hydrogen chloride	4.0	---	4.0	4.51

* Required LAER due to non-attainment area

Source: 1) HDR, 1978
2) HDR, 1983
3) Florida Permit AC 29-47277

Particulate Matter. The particulate emission limit being proposed to meet LAER is 0.025 grains per dry standard cubic foot adjusted to 12% CO₂ (0.025 gr/dscf @ 12% CO₂).

Based on preliminary design data, a particulate emission factor can be developed as follows:

$$135,270 \frac{\text{dscf @ 12\% CO}_2}{\text{ton refuse}} \times 0.025 \frac{\text{gr PM}}{\text{dscf @ 12\% CO}_2} \times \frac{1 \text{ lb}}{7000 \text{ gr}} =$$

$$0.48 \frac{\text{lb PM}}{\text{ton refuse}}$$

Carbon Monoxide. Carbon monoxide (CO) emission is primarily a function of combustion conditions, rather than solid waste composition as it is a product of incomplete combustion. The quantity of CO produced is dependent upon the design and operation of the furnace. Historically, there has been a downward trend in CO emissions as advancements in combustion technology have been realized.

Formation of CO in the furnace results from failure of the combustion system to complete the burnout of the combustible gases rising from the burning refuse bed. The injection of sufficient air and its proper mixing with the combustible gases are critical factors in reducing CO emission. Even when operated at high excess air levels, unburned CO can be generated from local areas of the burning refuse bed due to solid waste heterogeneity or grate overloading which creates deficiencies in available oxygen necessary for proper combustion.

Modern furnaces are designed to maximize air and fuel mixing effectiveness and combustion completion through proper grate design and the ability to control refuse feed. Optimization of the fuel mixing and the fuel feed rate through the system is done by controlling the grate speed which determines the rate at which refuse travels as it burns. Mixing of the refuse in the storage bunker prior to burning also helps homogenize the

fuel. Proper design of the overfire air jets, combustion temperature, and overfire air ratio promotes oxidation of remaining carbon monoxide gases to CO₂. When all of these design features and operation practices are employed, CO production is minimized.

A review of CO emission data from the major mass-burn facilities in the U.S. are presented below:

<u>Facility</u>	<u>Emission Factor (lb/ton)</u>	<u>Reference</u>
Nashville, TN	1.77	(Rigo, 1982)
North Andover, MA (NESWC)*	0.64	(EPA, 1983)
Westchester County, NY*	0.62	(EPA, 1983)
VARIOUS	1.9	(O'Connell, 1982)
Chicago (Northwest), IL	0.672	(Cooper Engineers, 1983)
N. Little Rock	1.0	(EPA, 1980a)
Braintree, MA	4.3	(EPA, 1980a)
Pinellas Unit 3	1.5	(HDR, 1983)

*From Accepted PSD permit applications

Based on information presented above, a CO emission factor of 1.8 lb/ton appears to be a representative number for a modern properly operated mass-burn facility.

Hydrocarbons. Like CO, gaseous hydrocarbon (HC) emissions are also a function of combustion conditions rather than the composition of the solid waste. Larger amounts of HC result from poor combustion at low temperatures with insufficient oxygen. Adequate emission control of HC is provided by the system design, that is employing a well designed furnace system which maintains certain minimum temperature levels.

The HC emissions can be held to very low levels with proper furnace controls, such as providing adequate oxygen in the refuse bed, agitating the input refuse, and ensuring sufficient dwell time, all of which will contribute to burnout of combustible matter and resulting gases.

Hydrocarbons are initially released from the refuse in the furnace bed where they are oxidized to CO and then to CO₂. Achievement of full hydrocarbon combustion within the furnace chamber requires proper mixing of the excess air and retention of resulting gases, at high temperature (>1,400°F) for an adequate retention time (typically >0.5 sec). Once combusted at a high combustion chamber temperature, hydrocarbons do not re-form upon cooling to the lower exit temperatures found in the cold side ESP and associated ductwork.

HC emissions have typically not been quantified at resource recovery facilities. In the past, CO emissions rather than HC emissions have been relied upon exclusively as indicators of combustion efficiency. Of the limited published data available, higher emission rates have been recorded at older, less efficient facilities than at newer modern facilities with effective combustion controls. Based upon the data available and values used in recent PSD permit applications, an expected emission rate of 0.2 lb HC/ton of refuse was selected for this analysis and appears reasonable for a modern mass-burn facility.

This proposed emission factor is higher than stack test data results from the Braintree, MA of 0.12 lb non-methane hydrocarbon (NMHC)/ton refuse, but is within the range referenced by EPA (EPA, 1980b) for waste-to-energy systems of 0.027-0.24 lb NMHC/ton solid waste. HC emission estimates for other facilities are not generally available from the literature.

Nitrogen Oxides. Formation of nitrogen oxides (NO_x) is comprised of two major mechanisms; thermal NO_x formation and fuel NO_x formation. The NO_x produced by exposing the nitrogen contained in the ambient air to the high temperatures of combustion is referred to as thermal NO_x. This is an inevitable result at high temperatures as ambient air contains approximately 78 percent nitrogen (by volume). Fuel NO_x is formed when the nitrogen

contained in the fuel is oxidized to NO and then further oxidized to NO₂. According to a recently published review of NO_x formation (Russell et al, 1984), fuel NO_x appears most likely to be the dominant formation mechanism. The levels of NO_x produced, therefore, is a function of temperature and excess air (oxygen availability). While NO_x formation does occur in modern mass-burn facilities, it is generated in significant quantities only at temperature in excess of 2,000°F. Typical design value flue gas temperatures for modern combustion units are approximately 1400-1800°F.

The control of NO_x is provided primarily by furnace temperature control. there are higher instantaneous local temperatures within the combustion zone, but NO_x formation has relatively slow kinetics requiring a certain residence time. For this same reason, once NO_x is formed, significant disassociation of NO_x does not occur since the disassociation process like the formation process is kinetically slow, so that the NO_x formed in the furnace is essentially "frozen".

Older, less thermally-efficient furnaces have demonstrated relatively low NO_x emissions indicative of poor low-temperature combustion quality rather than adequate emissions control. Effective temperature control means lowering furnace temperatures to minimize NO_x formation without inordinately increasing the emissions of other pollutants such as CO, HC, and odors. Based on a review of data quantifying NO_x emissions, an emission factor of 3.0 lb NO_x/ton was chosen as representative of the proposed facility.

For the five operating mass-burn facilities shown below, an average of 2.88 lb NO_x per ton (expressed as lb NO₂/ton) of refuse can be calculated.

<u>Facility</u>	<u>Average NO_x Emission Factors (lb/ton)</u>
Oceanside, NY	4.59
Braintree, MA	2.58
Harrisburg, PA	2.13
Chicago NW, IL	2.51
Nashville, TN	<u>2.59</u>
AVERAGE	2.88

The proposed emission factor is also consistent with emission estimates from other similar facilities' PSD permits recently approved by the U.S. EPA (EPA, 1983) shown below:

<u>Facility</u>	<u>PSD Permit Emission Estimate</u> <u>lbs NO_x/ton refuse</u>
Baltimore, MD (Northeast MD Waste Disposal Authority)	3.19
North Andover, MA	2.92
Westchester CO, NY	3.00

The chosen value of 3.0 lb NO₂/ton is also suggested by EPA (EPA, 1977) in its AP-42 air pollution emission guidelines.

Sulfur Dioxide. Sulfur dioxide (SO₂) formation in the 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 forms, as organic sulfur chiefly in coated papers as sulfides (S₂-), sulfate (SO₄²⁻) and sulfite (SO₃²⁻). All of these compounds except sulfate, which typically accounts for 2-3 percent of the fuel sulfur content, can be converted to SO₂ during combustion. Analysis has suggested that one half of the total sulfur in the fuel is retained in the grate residue, one-quarter is absorbed by flyash, and one-quarter is emitted in the flue gas (Kaiser 1968). Since over 99 percent of flyash produced can be retained by an electrostatic precipitator, it can be assumed from this analysis that about one-quarter of the refuse sulfur is emitted from a facility. Based on observations of coal-fired facilities, it has been suggested that only 30 percent of the non-residue sulfur is absorbed by flyash, hence 35 percent of the refuse sulfur would be emitted in the flue gas (Niessen 1978).

The form of the sulfur emitted would be predominantly SO₂, with 1-2 percent of the sulfur in the flue gas as gaseous SO₃ (sulfur trioxide) and sulfuric acid mist. The very small amount of the flyash (<1 percent) not captured by the electrostatic precipitator would contain sulfur, where present, in the form of SO₃. Non-SO₂ emissions are discussed separately below.

The SO₂ emissions generated from waste-to-energy conversions have not been considered by regulatory agencies to be a significant environmental problem because resource recovery facility emissions have been well below EPA established levels for fossil fuel facilities. The lower SO₂ emissions observed for resource recovery facilities appear to correspond to the lower sulfur content in its fuel.

It is most appropriate to estimate SO₂ emissions from a waste-to-energy facility based on empirical data. An SO₂ emission factor of 2.5 lb/ton is proposed for the facility based on published EPA emission factors contained in EPA publication AP-42 (EPA, 1977).

This estimate agrees well with stack test results from other mass-burn facilities. Data compiled by Rigo, et al (1982), for six mass-burn units, as presented below, has a weighted average of 2.25 lbs SO₂/ton refuse.

<u>Facility</u>	<u>No. of Samples</u>	<u>Sample Average, lbs SO₂/ton refuse</u>
Oceanside, NY	2	3.03
Braintree, MA	3	3.24
Harrisburg, PA	9	1.09
Chicago NW, IL	8	3.99
Saugus, MA	2	2.0
Nashville, TN	6	0.99

The estimate derived above is consistent with EPA's (1977) emission factor of 2.5 lbs SO₂/ton refuse for these types of facilities and with other emission estimates from mass-burn facilities' PSD permits recently approved by the U.S. EPA:

<u>Facility</u>	<u>PSD Permit Emission Estimate lbs SO₂/ton refuse</u>
Baltimore, MD	4.00
North Andover, MA	2.50
Westchester CO, NY	2.00

From studies completed to date, it is clear that refuse is a non-homogeneous fuel, and that sulfur content of refuse burned can, and will, vary even when the refuse is consistently from the same source. This fact, in combination with the other factors cited earlier, can interact and result in complex sulfur variability patterns which are difficult for plant operators to manage and predict on a short-term basis. Therefore, the estimate of 2.5 lbs SO_2 /ton of refuse can be considered to be a reasonable, appropriate estimate of achievable long-term SO_2 emissions from the facility.

Sulfuric Acid Mist. Small quantities of gaseous SO_3 emissions are associated with emissions of SO_2 . In the flue gas stream and in the emitted vapor plume, the dry gaseous SO_3 reacts with the water droplets to produce sulfuric acid mist, H_2SO_4 . The H_2SO_4 emission is a function of the quantity of SO_2 generation and degree of successive oxidation of SO_2 to SO_3 to H_2SO_4 . The H_2SO_4 emission for a resource recovery facility is best estimated as equal to 1.5 to 2 percent of the SO_2 emission rate by volume. Theoretical SO_3 emissions derived from published ASME data (Combustion Fundamentals of Waste Incineration), as a function of furnace temperature and excess air and fuel sulfur content, are 1.5% to 2.0% by volume of projected total SO_x . When calculating the potential H_2SO_4 emission as 2.0 percent by volume of SO_2 emission factor estimated above, then 7.68×10^{-2} lb H_2SO_4 /ton refuse can be expected as an emission rate from the proposed facility.

Hydrogen Sulfide, Reduced Sulfur Compounds, and Total Reduced Sulfur. No measurable emissions of hydrogen sulfide (H_2S) or total reduced sulfur compounds are expected from modern resource recovery facilities.

The H_2S is formed when organic matter containing sulfur is decomposed in the absence of air. The H_2S is relatively unstable and, in the presence of air, burns to form H_2O and SO_2 . The H_2S also reacts with SO_2 in the presence of moisture, to form H_2O and S. The S may be deposited as pure sulfur or may become re-oxidized to SO_2 , if there is adequate air supply and mixing.

Emission control of these other sulfur compounds is exercised by providing adequate oxygen and a high furnace temperature to ensure full oxidation.

Fluoride. Fluoride furnace emissions are a function of the fluorine (F) content of the solid waste combusted. The fluorine content of refuse in the U.S. has been subject to recent change due to restrictions upon the production of certain fluorine-containing products (aerosol propellents formerly used in spray containers). Emissions of fluorides result primarily from the combustion of fluorinated plastics and other fluorocarbon products.

Fluorine combustion products occur as gaseous fluorides in the flue gas and as solid compounds in the ash. In moist air, liquid droplets of hydrofluoric acid (HF) are found.

Test data from operating facilities, and projected emissions estimates from PSD permits for recent EPA-approved facilities, generally do not include emission factors for HF, except for the Baltimore, Maryland facility, which projects 0.05 lb HF/ton refuse will result. In an EPA memo (EPA, 1980a) an emission factor of 0.045-0.06 lb HF per ton of refuse was indicated as a reasonable estimate. A conservative projection of 0.06 lb HF/ton refuse has been identified for use in this analysis.

Hydrogen Chloride. Hydrogen chloride (HCl) emission is primarily a function of the chlorine content of the fuel. The emission of HCl depends both on the quantity of chlorine in the solid waste and on the species of chlorine present because not all of the chlorine content of the combusted solid waste exits the stack as gaseous HCl. Chlorine occurs in the waste stream as organic chlorine (chlorinated organic combustibles) and as inorganic chlorine; e.g., NaCl. Organic chlorine has generally been held to be the main source of stack HCl emissions (Hollander et al. 1980), but in the last decade, inorganic chlorine volatilization and/or conversion to HCl has been suggested (Altar 1979; Krause et al. 1974; Robertson 1974). Chlorine that is not volatilized or converted to HCl remains in the grate residue; some stack HCl may precipitate out in the flyash also.

Organic chlorine is found in chlorinated plastics (e.g., polyvinyl chloride, PVC), rubber (5 percent chlorine by weight), paper, and textiles in refuse. Inorganic chlorine occurs in solid waste chiefly as sodium and potassium salts (NaCl, KCl).

Emission factors from stack test data obtained from other mass-burn waste-to-energy facilities (Rigo et al, 1982) are reported as:

<u>Facility</u>	<u>Number of Samples</u>	<u>Average lb HCl/Ton Refuse</u>
Harrisburg, PA	6	3.84
Chicago NW, IL	27	4.49
Saugus, MA	29	3.78
Nashville, TN	4	1.60

The average emission factor for these facilities is 3.43 lb HCl/ton refuse, with a weighted average of 3.94 HCl/ton. Therefore, based on these data, a value of 4.0 lb HCl/ton of refuse is considered a reasonable emission level.

Vinyl Chloride, Other Chlorinated Organics and Free CL_2 . No measurable/significant emissions of gaseous vinyl chloride (H_2CHCl) are expected from the proposed resource recovery facilities. This also applies to other chlorinated organics such as phosgene ($COCl_2$), as well as to free gaseous CL_2 . Most of the chlorine released in the combustion is converted to gaseous HCl before exiting the furnace.

Lead. Lead (Pb) emission from the combustion of solid waste is primarily a function of the solid waste composition. Lead is widespread as a trace metal in most components of the combustible fraction of solid waste, and also appears in more concentrated metallic forms in the metals fraction, particularly in ferrous cans and general solderings. The Pb associates with particles in the stack upon volatilization which allows for its control by ESP's.

Lead is melted and volatilized in the combustion process and then retained in, or redeposited onto, the bottom ash and flyash, but some will reach the ESP as submicron fumes and droplets.

Emission estimates for lead presented in recent PSD applications and published literature have been derived from actual measured lead concentrations in the flue gas particles or have been proposed as a percentage/ratio of total flue gas particles. EPA, 1980a, suggested that based on combustion testing, the lead emission factor would be 8 to 10 percent of the particulate emissions. This would amount to 9 percent by weight stack test. Using a reasonable value of 10%, the Pb emission factor would be .048 lb/ton of refuse.

Mercury. Mercury (Hg) (and mercury compounds) is capable of passing through an ESP without collection because of its volatility. Mercury and its compounds evident in solid waste are typically found in trace quantities. Usually, only a minor portion of Hg is retained in the grate residue as the Hg volatilized into the flue gas tends to condense into particles as it travels through the decreasing temperature of the system towards exit.

Emission measurements for Hg are generally not readily available for operating resource recovery facilities. Based upon the estimates used in PSD permit applications and presented in literature for similar facilities (O'Connell et al., 1982), a value of 5.2×10^{-3} lb Hg/ton of refuse was selected as an emission factor for this facility.

Beryllium. Beryllium (Be) emissions are functions of the solid waste composition and the particulate removal efficiency of the ESP for small beryllium containing particles. Beryllium is contained in solid waste in trace quantities, therefore, beryllium emissions are expected to be minimal.

Beryllium in refuse combustion systems is associated with ash and airborne particles. The Be in refuse will be retained in the ash during combustion, so resultant stack emissions can be effectively reduced by a high ESP

particulate collection efficiency. The Be is generally well-distributed among the ash particles but does appear to be somewhat more concentrated among smaller particles. As with other trace components, there are minimal data available on the emissions of beryllium from mass-burn facilities similar to that proposed. Based upon values used in other PSD applications, an emission factor of 13.1×10^{-6} lb Be/ton of refuse has been selected for this analysis (ADL, 1981 and CDM, 1984).

<u>Reference</u>	<u>Permitted Emission Estimate lbs BE/ton refuse</u>
CDM, 1984	13.2×10^{-6}
ADL, 1981	13.0×10^{-6}

Asbestos. Measurable stack emissions of free asbestos fibers are not expected for resource recovery facilities. Furnace emission of asbestos is a function of asbestos in the solid waste. The emission control procedure for this material is to keep it out of the furnace. Demolition waste and any other identifiable asbestos-contaminated waste are generally not accepted at resource recovery facilities.

SECTION 5.0
SOURCE AND POLLUTANT APPLICABILITY

5.0 SOURCE AND POLLUTANT APPLICABILITY

Source Applicability

The proposed resource recovery facility would burn over 250 tons of refuse per day and has the potential to emit greater than 100 tons per year of certain pollutants. Therefore, it is considered a major stationary source, and is subject to PSD review.

Emission Unit Applicability

The proposed facility will contain 4 mass-burn furnaces equipped with steam generating boilers capable of charging 400 tpd of refuse. The combustion gases will be exhausted through individual flues contained in a single 220-foot stack. No significant quantifiable fugitive emissions will be generated from this facility. The tipping area and refuse storage bunker will be totally enclosed and kept under negative pressure. The air exhausted from this area will be drawn into the furnaces as combustion air supply.

Pollutant Applicability

The PSD regulations state that if the proposed source emits pollutants for which the site area is designated as attainment or unclassifiable (or any other PSD regulated pollutants that are not subject to ambient air quality standards), and it emits these pollutants at a rate greater than the significant emission rate, the source is subject to PSD review for those pollutants. A source is exempt from PSD review and subject to New Source Review for Nonattainment Areas for those pollutants designated as non-attainment in the siting area. Table 5-1 compares the PSD significant emission rates with the potential source emissions.

The Faulkenburg Road site is located in the federally- and state-designated West Central Florida Intrastate Air Quality Control Region (AQCR). The proposed site and impact areas located in Hillsborough County are designated as attainment with respect to the NAAQS for carbon monoxide, nitrogen

TABLE 5-1

SIGNIFICANT EMISSION RATES AND FACILITY POTENTIAL TO EMIT
VALUES FOR PSD REGULATED POLLUTANTS

Pollutants	Significant ^a Emission Rates (tons/year)	Potential ^b to Emit (tons/year)
Particulate matter	25	140
Carbon monoxide	100	526
Nitrogen oxides	40	876
Sulfur dioxide	40	730
Ozone (VOCs)	40	58
Lead	0.6	14
Asbestos	0.007	---
Beryllium	0.0004	3.83×10^{-3}
Mercury	0.1	1.52
Vinyl chloride	1.0	---
Fluorides	3	17.5
Sulfuric acid mist	7	22.4
Total reduced sulfur (including H ₂ S)	10	---
Reduced sulfur (including H ₂ S)	10	---
Hydrogen sulfide	10	---
Hydrogen chloride	---	1168

SOURCE:

^aFAC 17.2 Part V Table 500.2.^bEmission estimates at 100 percent system capacity for Baseline Control
Alternative - ESP 0.025 gr/dscf @ 12 percent CO₂.

dioxide, and lead; unclassifiable for sulfur dioxide; and is nonattainment with respect to the NAAQS for total suspended particulates and ozone. Areas designated as unclassifiable are areas where insufficient or unrepresentative monitoring data exist to warrant an attainment designation, but these are areas treated as attainment until proven otherwise. Based on the pollutant emission rates and the attainment status of the area, the proposed source is subject to PSD review for the pollutants listed on Table 5-1 with the exception of total suspended particulates, ozone, asbestos, vinyl chloride, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds. The remaining pollutants subject to PSD Review include carbon monoxide, nitrogen oxides, sulfur dioxide, lead, beryllium, mercury, fluorides, and sulfuric acid mist. Hydrogen chloride was also added to this list, as requested by DER. Total suspended particulates and ozone are subject to review under the New Source Review for Nonattainment Areas (FAC 17-2.510).

SECTION 6.0

**BEST AVAILABLE CONTROL TECHNOLOGY/
LOWEST ACHIEVABLE EMISSION RATE ANALYSIS**

6.0 BEST AVAILABLE CONTROL TECHNOLOGY/LOWEST ACHIEVABLE EMISSION RATE ANALYSIS

The evaluation of the emission control technology proposed for a new source is to be contained within the Best Available Control Technology (BACT) and Lowest Achievable Emission Rate (LAER) analyses which are integral portions of the PSD and NSR processes. The BACT analysis is required under the PSD review process, and the LAER analysis is required under New Source Review (NSR) for Non-Attainment Areas, Florida Administrative Code 17-2.510. For purposes of consistency and continuity, both analyses have been incorporated into this section. The BACT/LAER analysis provides the rationale for selecting the control strategy to best satisfy the individual constraints of the area surrounding the site and to minimize the impacts on energy, economic and environmental issues.

A BACT/LAER analysis involves: the review of pollutant applicability, the identification of sensitive concerns, and the selection of control strategy alternatives. These elements are further evaluated using energy, economic and environmental criteria. It is assumed for this analysis that the facility will operate at 100% availability at the maximum firing rate of 110% of the nameplate rating (equal to 1760 TPD). This will provide for worst-case analysis in terms of emissions (both short- and long-term) and their environmental impacts, energy consumption, and economic (operations and maintenance) considerations. Finally, the BACT/LAER decision-making process culminates in a preferred control strategy for minimizing the emission of regulated pollutants from the proposed source within the above constraints. The control option finally selected as LAER for particulate matter is the electrostatic precipitator designed to limit particulate emissions to 0.025 gr/dscf corrected to 12% CO₂, and along with other design specifications is BACT for other regulated pollutants.

Potential sensitive concerns to be included in the BACT/LAER analysis can be addressed on the basis of energy, economic and environmental issues. Relative to energy supply, the project will have a positive effect. The facility is designed to produce steam and electricity during the combustion process. This generation will help satisfy an existing energy demand that

would otherwise be supplied by existing fossil-fuel combustion units. Furthermore, no direct energy is recovered from the landfilling of MSW, but fugitive emissions and odor are generated from that disposal method.

The economic impacts analysis of the alternative air pollutant control strategies is based on the following factors: capital cost (debt service), maintenance costs (including supplies and labor), and operations cost (cost of power, chemicals, water, waste disposal). Facility design features that affect air pollutant emissions but which are primarily related to the furnace design and operational parameters (i.e. grate design, excess air level, etc.) are not included in the economic analysis. With this data the total annual cost (economic impact) of each control strategy for each pollutant can be assessed and comparisons made in terms of cost effectiveness.

In general, the positive environmental impacts of the facility would include the reduction of landfilling activities and a resultant reduction in fugitive dust emissions, vehicular emissions (carbon monoxide, hydrocarbons, and nitrogen oxides), odor problems, potential groundwater pollution, and a reduction in the consumption of land resources for landfilling activities. However, the facility would directly impact air quality by releasing atmospheric pollutants as identified in Section 4.0. The level of degradation is assessed on a comparative basis for both the individual control technology considered and the relative impact on the environment.

The environmental impact analysis was performed by calculating incremental ground-level air pollutant impacts of the various control alternatives. The EPA-approved short-term version of the Industrial Source Complex Model (ISCST) model was chosen due to its capability to analyze the aerodynamic affects of the buildings comprising the facility on plume dispersion (downwash). This is required since the proposed stack height is less than the calculated GEP requirements. The modeling methodology and protocol that is followed to calculate facility impacts in Section 7.0 was also used in the BACT/LAER analysis. The stack parameters that were used in the modeling exercise simulated worst-case conditions. That is, recently cleaned boilers operating at maximum load conditions (1760 tpd or 110 percent of

the nameplate rating) and firing a waste with a low HHV (4000 BTU/lb). The boiler tubes, being recently cleaned, allow for maximum heat transfer which therefore reduces flue gas temperature; hence, reduces plume rise and pollutant dispersion. This particular condition will occur only briefly. As the units are operated, the boiler tubes become fouled, thereby reducing heat transfer and increasing the flue gas temperature which aids pollutant dispersion. Although worst-case conditions should be used to calculate maximum short-term pollutant concentrations, annual average conditions would be used to calculate maximum long-term concentrations. However, to minimize the computer time involved with the modeling activities, all impacts, both short and long-term were predicted based on worst-case stack gas exit conditions. This would therefore overpredict the long-term concentrations providing a degree of conservatism. Also, this assumption of worst-case conditions holds true even under conditions of changing waste throughput due to variations in waste quality (i.e. HHV). The operating characteristics of the system were discussed earlier in Sections 2 and 4. Worst-case conditions at maximum load corresponds to firing 1760 tpd of solid waste with an HHV of 4,000 BTU/lb and a stack gas exit temperature of 430 deg. F (ESP Case). The modeling data base and options used in the analysis are summarized in Section 7. Source operating data used as input to the model for all control alternatives are listed in Table 6-1. None of the control options studied resulted in pollutant impact projections in violation of the NAAQS or PSD increments (a detailed NAAQS analysis is contained in Section 7.0).

Although BACT determinations are made on a case-by-case basis, EPA pursues a program to disseminate information on control technology determinations. This is done in a nationally consistent manner through the BACT/LAER Clearinghouse (EPA, 1982 and EPA, 1983). The basic purposes of the BACT/LAER Clearinghouse are to: (1) provide state and local agencies with current control technology determinations, (2) summarize recent determinations for sources of similar size and nature, and (3) provide data on the emission limits imposed on new or modified sources.

TABLE 6-1

Source Operating Data

	<u>Stack Height (m)</u>	<u>Exit Gas Temperature (°K)</u>	<u>Exit Gas¹ Velocity (m/s)</u>	<u>Effective Stack² Internal diameter (m)</u>
ESP (at 0.025 gr/dscf @ 12% CO ₂)	67	494	16.8	3.5
Fabric Filter	67	494	16.8	3.5
Dry Scrubber/ESP and Dry Scrubber/Fabric Filter	67	416	16.8	3.22
ESP/Wet Scrubber	67	400	16.8	3.15

Building Dimensions

<u>Height (m)</u>	<u>Width (m)</u>	<u>Length (m)</u>	<u>Maximum Projected width (m)</u>	<u>Width/Length³ Dimension used in the Model (m)</u>
42.7	51.5	22.9	56.4	49.9

¹Exit velocity for all alternatives were set equal to that of the baseline modeling case (i.e. that condition modeled in the worst-case analysis) so as not to bias modeling results.

²Effective internal diameter is the diameter necessary to maintain an exit gas velocity of 16.8 m/s under maximum load conditions.

³The width/length dimension is the dimension of the width and length of a fictitious building whose area is equal to that of a circle whose diameter is the maximum projected width listed above.

Table 6-2 contains a list of BACT determinations made nationwide and is intended as a reference. Again, no two BACT determinations are exactly alike due to the case-by-case decision method stipulated by EPA.

The data presented in the following analysis are primarily based on information collected from various equipment vendors. The relative values have been reviewed by CDM and appear to be in general agreement with current established practices and experience.

This section presents the BACT/LAER analysis for each pollutant subject to PSD and NSR reviews and thereby identifies the control alternatives, the process leading to the proposed strategy, the selected control strategy and the level of control proposed for each applicable pollutant. The control alternatives for each pollutant have been selected from a longer list of potential control alternatives. Those analyzed below appear to be the best suited for this application.

6.1 PARTICULATE MATTER

The control of particulate matter from refuse combustion is regulated under New Source Performance Standards (NSPS) (40 CFR 60). The Federal NSPS standard for a Municipal Solid Waste (MSW) combustion facility is 0.08 grains of particulate per dry standard cubic foot (gr/dscf) of exhaust gas corrected to 12 percent CO₂. Based on preliminary design data, this emission rate would correspond to approximately 0.48 pounds of particulate per ton of refuse burned.

Resource recovery facilities operating in Florida are also subject to the DER regulation, Specific Source Emission Limiting Standards for Incinerators (17-2.600(1)(c)). Particulate emissions for sources greater than 50 tons per day are limited to 0.08 gr/dscf corrected to 50 percent excess air. This standard is essentially the same as the federal NSPS Standard. The design emission rate proposed for the facility is 0.025 grains of particulate per dry standard cubic foot of exhaust gas, corrected to 12 percent carbon dioxide (0.025 gr/dscf at 12% CO₂), which is well below the aforementioned emission standards.

TABLE 6-2

RECENT BACT DETERMINATIONS FOR FACILITIES BURNING REFUSE

SOURCE TYPE/COMPANY NAME LOCATION/PERMIT NUMBER DATE OF ISSUE	SOURCE SIZE PROCESS DESCRIPTION	PROPOSED CONTROL TECHNOLOGY	BACT EMISSION LIMITATION DETERMINATION
Refuse Combustion/Energy Answers Corp. Rochester, MA 025-120MA14 3/15/82	3 new waterwall boilers rated at 600 tpd each firing refuse derived fuel	o 3 stage ESP with overall PM collection efficiency of 96% o low sulfur refuse o boiler design for NO _x	PM: 0.05 gr/dscf @ 12% CO ₂ SO ₂ : 0.23 lb/MMBTU NO _x : 0.5 lb/MMBTU
Refuse Combustion/Municipal Incinerator Pulaski Hwy. Baltimore, MD 78MD-09 1/25/80	600 tpd municipal incinerator	o ESP with an overall PM collection efficiency of 98% o proper combustion techniques for SO ₂ , CO, VOC, NO _x	PM: subject to LAER not BACT (0.03 gr/dscf @ 12% CO ₂) SO ₂ : 35.1 lb/hr CO: 30 lb/hr VOC: 1.3 lb/hr NO _x : 2.6 lb/hr
Refuse Combustion/NE MD Waste Disposal Authority Baltimore, MD 81MD-01 9/10/81	3 new mass-burning waterwall boilers with a total capacity of 2010 tpd	NOT SPECIFIED	SO ₂ : 335 lb/hr CO: 109 lb/hr NO _x : 267 lb/hr F: 4.2 lb/hr
Refuse Combustion/Refuse Fuels Inc. Lawrence, MA 023-121MA12 3/23/81	new waterwall furnace with a total capacity of 960 tpd, firing refuse derived fuel	o 5 field ESP with an overall PM collection efficiency of 98% o low S RDF o boiler design for NO _x control	PM: Subject to LAER not BACT (0.025 gr/dscf @ 12% CO ₂) SO ₂ : 1.2 lb/MMBTU NO ₂ : 0.7 lb/MMBTU
Refuse Combustion/Resource Authority Gallatin, TN 8/1/80	2 new refuse mass- burning waterwall boilers at 75 tpd each	o Scrubber and fabric filters with an overall PM collection efficiency of 99%	PM: 0.04 gr/dscf
NOTE: due to problems encountered with the existing scrubber/fabric filter system, they are being replaced with ESP's.			

TABLE 6-2 (Continued)

RECENT BACT DETERMINATIONS FOR FACILITIES BURNING REFUSE

SOURCE TYPE/COMPANY NAME LOCATION/PERMIT NUMBER DATE OF ISSUE	SOURCE SIZE PROCESS DESCRIPTION	PROPOSED CONTROL TECHNOLOGY	BACT EMISSION LIMITATION DETERMINATION
Refuse Combustion/NESWC North Andover, MA 029-121-MA16 5/27/82	2 new mass-burn water- wall refuse fired boilers with a total capacity of 1607 tpd	o ESP designed to meet approved BACT determination o low S fuel	PM: 0.05 gr/dscf @ 12% CO ₂ CO: 0.07 lb/MMBTU H ₂ SO ₄ : 0.02 lb/MMBTU SO ₂ : 0.27 lb/MMBTU NO _x : 0.32 lb/MMBTU
Refuse Combustion/McKay Bay Tampa, FL PSD-FL-086 7/2/82	new refuse fired mass- burn furnaces with a total capacity of 1000 tpd	o ESP designed to comply with LAER o low S fuel o boiler design and operating pro- cedures for NO _x control	PM: Subject to LAER not BACT (0.025 gr/dscf @ 12% CO ₂) SO ₂ : 170 lb/hr NO _x : 300 lb/hr VOC: 9 lb/hr Be: 5.0 gr/day F: 6.0 lb/hr Hg: 0.6 lb/hr Pb: 3.1 lb/hr
Refuse Combustion/Westchester County, NY 2/22/82	new mass-burn waterwall refuse fired boilers with a total capacity of 2250 tpd.	o ESP designed to comply with approved BACT determination	PM 0.03 gr/dscf NO : 3.0 lb/ton CO _x 0.62 lb/ton
Refuse Combustion/Pinellas County, FL Pinellas Park, FL 8/31/83	additional mass-burn waterwall refuse fired boiler with a total capacity of 1,050 tpd	o ESP designed to comply with approved BACT determination	PM: 0.03 gr/dscf @ 12% CO ₂ SO ₂ : 1.0 lb/ton NO _x : 3.0 lb/ton CO _x : 1.5 lb/ton

SOURCES: (EPA, 1982) and (EPA, 1983)
NESWC PSD permit, #023-121-MA16
McKay Bay PSD permit, #PSD-FL-086
(HDR, 1983)

As mentioned in Section 5.0, the source is located in an area designated as non-attainment for particulate matter, and therefore subject to New Source Review and LAER. A particulate matter emission rate of 0.025 gr/dscf at 12% CO₂ is considered to represent LAER for this source based on a review of the most stringent emission limitation contained in any State Implementation Plan (Maryland and the District of Columbia). Since LAER for particulate matter is proposed at 0.025 gr/dscf at 12% CO₂, no control efficiency was considered that would result in a higher particulate matter emission rate.

The alternative particulate control systems capable of meeting the particulate limitation of 0.025 gr/dscf at 12% CO₂ have been considered for review include:

1. Electrostatic precipitator (ESP).
2. High energy wet venturi scrubber.
3. Fabric filtration system (or baghouse).

The individual control efficiencies of the systems presented above can be compared based on actual operating experience and/or theoretical design values. These control systems are all capable of meeting the emission requirements as established by State and Federal source performance guidelines. Any of the particulate control systems presented in this section could, if properly designed and operated, meet this emission level.

The following factors were considered in selecting LAER at 0.025 gr/dscf:

- Maryland's air code (and others), the most stringent state emission standard in the U.S., at 0.03 gr/dscf at 12% CO₂.
- Recent LAER determinations for Refuse Fuels Inc. in Lawrence, Massachusetts and the McKay Bay facility in Tampa, Florida both at 0.025 gr/dscf at 12% CO₂, utilizing electrostatic precipitators (See Table 6-2).

- Recent BACT determination for the resource recovery facility in Westchester County, New York at 0.03 gr/dscf at 12% CO₂, utilizing an electrostatic precipitator.

The recent LAER determinations for Lawrence, Massachusetts and Tampa, Florida suggest that a LAER of 0.025 gr/dscf at 12% CO₂ represents the lowest emission level that can be reliably obtained by a state-of-the-art electrostatic precipitator over the long-term. The fact that vendors are now willing to guarantee to 0.020 gr/dscf at 12% CO₂ should be qualified by the fact that vendors tend to overstate their product's capabilities particularly in a competitive bid situation and also that manufacturer's guarantees at these low levels usually extend to the initial compliance test only, whereas the LAER standard would be applicable for the entire 20 to 30 year project life. Furthermore, it has been noted that ESP performance has a tendency to deteriorate slightly with time (O'Connell, 1982). In light of the above discussion, it would be prudent to set LAER at 0.025 gr/dscf at 12% CO₂ knowing that this proposed emission rate must be maintained over the 20-30 year project life.

Several alternative particulate control systems have been considered for review under LAER including: an electrostatic precipitator (ESP), a wet venturi scrubber, and a fabric filter (FF). The electrostatic precipitator is the standard customary flue gas cleaning device historically applied to municipal solid waste (MSW) combustion facilities and utility boilers for particulate control. Fabric filters have been used on utility boilers on a limited basis and to an even lesser degree on MSW combustion facilities and can still be considered in the developmental stage from a long-term operations point of view. Use of wet scrubbing systems on utility and industrial boilers are not uncommon. However, their application on MSW combustion facilities has been very limited. Operating experience with wet scrubbing systems on MSW plants has been largely unsuccessful due to the corrosion problems from the saturated flue gas, the need for stack gas reheat, and costs associated with wastewater disposal.

The air pollution control devices mentioned above have historically been applied to various combustion processes and all systems have either demonstrated, or can be designed to achieve control efficiencies in compliance with the proposed LAER particulate emission rate of 0.025 gr/dscf at 12% CO₂.

Description of Alternative Control Systems

Electrostatic Precipitators. Collection of particles is accomplished by producing an electrical charge on the particle and attracting the particle to collecting surfaces of opposite polarity. The collected dry particles are mechanically removed from the collecting surfaces and fall to the bottom hopper of the ESP for removal and transportation to landfill. Some major MSW resource recovery facilities equipped with ESPs are located in Braintree, MA; Harrisburg, PA; Chicago NW, IL; Nashville, TN; Norfolk, VA; Saugus, MA; Montreal (Des Carriers); Quebec, and Pinellas County, FL. MSW combustion facilities throughout the U.S. and the world, are successfully utilizing ESPs for the efficient control of particulate matter.

The use of ESPs to control particulate emissions from utility boilers and MSW combustion facilities has proven to be acceptable based on many years of operating experience. Also, ESPs when compared to the other control technologies discussed hereafter have, in general, proven to be the most cost-effective, reliable, and most frequently applied technology available for controlling particulates from major combustion sources, especially MSW resource recovery facilities.

Several factors affect the collection efficiency of an ESP system. These include:

- Collection plate area per unit gas flow rate (specific collection area - "SCA").
- Gas velocity through collectors.
- Size distribution and properties of the particles.

- Number, width and length of gas passages.
- Electrical field strength.
- Particle in-field residence time.

It is possible to attain the desired control efficiency by altering the design specification for each of the above parameters. Furthermore, several positive characteristics of an ESP are important when considering their use in controlling combustion emissions. These include:

- High overall collection efficiency and reliability.
- Relatively low power requirements.
- Ability to accommodate flue gas temperatures in the general range of 250° F to 550° F.
- Minimal change in collection efficiency over a wide range of particle sizes.
- Minimal fire hazard potential.

However, when combusting municipal solid waste, the potential operational problems typically encountered which affect ESP performance are:

- Variations in flue gas moisture content and flyash resistivity.
- Condensation of corrosive flue gas constituents.
- Variation in processing (and emission) rate.
- Deviations between design and actual gas flow rates.

Except for the corrosivity issue, the major negative effect of the potential problems stated above is to somewhat lower the collection efficiency. This deficiency can be resolved by increasing the overall design efficiency of the ESP. Corrosion problems can be alleviated through proper construction to avoid ambient air leakage into the ESP and

insulation and external heating of the unit to avoid cold spots where condensation can occur. Corrosivity is normally not a problem as long as flue gas temperature remains above 250°F and below 550°F.

High Energy Wet Venturi Scrubber. Collection of particles in a venturi is accomplished through inertial impaction of the particles on droplets of water. The collection efficiency of the particles is proportionately related to the water droplet size. Due to the presence of submicron particulate in the combustion gases of resource recovery plants, a very high energy input is needed to form the small water droplets required for the high particulate removal efficiencies needed to meet regulations. Disadvantages of the venturi option are:

- Materials of construction must be corrosion resistant, hence costly.
- Flue gas will be saturated with resultant visible stack steam plume.
- Relatively poor plume rise due to low plume temperatures (unless stack gas reheat is utilized - which consumes energy).
- Additional waste water treatment facilities required.
- A sludge (wet) product must be disposed.
- Excessive energy-power costs will be required for the venturi to meet the proposed TSP guarantee. It is estimated the venturies will operate at approximately 50 inches water column pressure drop.

Due to these overwhelming disadvantages, the venturi alternative is not considered a viable means of TSP control and no further analysis of this option will be performed. The more detailed analysis of various control options focuses on those technologies with fewer limiting features.

Fabric Filters. The use of a fabric filtration system (baghouse) for controlling particulate emissions from combustion sources is an evolving technology and its application to resource recovery facility has been

mostly limited to small plants, 100 tpd or less. Operating experience in large mass-burning plants has been largely unsuccessful due to deterioration of the bags from flue gas temperature excursions, to blinding of the bags from variable moisture content in the flue gas, and to corrosion of the bags and metal components from acid gas condensation.

Collection of particles is accomplished through filtration by multiple tubular fabric filter media (bags). The bags are contained in multiple modular units which comprise the total baghouse system. Initial collection forms a thick porous cake of collected particulate on the bags. This cake then acts as the filter collection device with the bag serving to support the particulate cake. As the cake builds, the pressure drop across the baghouse also increases and the cake must be removed or cleaned. Baghouses are categorized according to the method utilized for cleaning the bags: shaker, reverse-air and pulse jet. The shaker baghouse would not be suitable for this project, because the type of fabric required for this high-temperature application cannot structurally withstand the violent shaking action over an extended operating period. The other two systems gently clean the bags by reversing the air flow through the bags. The reverse air baghouse utilizes an external centrifugal fan and the pulse jet uses high-pressure compressed air.

The major advantages of the fabric filtration systems are the improved control efficiency for particulate removal over standard ESP systems. A fabric filter is not as dependent on gas volume and composition versus an ESP, and it will accept surges in gas flow and particulates with no significant increase in particulate emissions. Resistivity of flyash for low sulfur fuels, which affects ESP performance, is not a problem with a fabric filter. Fabric filtration systems also have a greater control efficiency for smaller particle sizes and even some affinity for condensable organics as compared to ESP systems.

The disadvantages of fabric filters are as follows:

- Susceptibility to fires.

- Consistent bag quality difficult to achieve (a possible problem due to the large number of bags used).
- Blinding or clogging of the filter fabric.
- Loss of structural integrity at high temperature surges above 550°F.
- Cementation in a humid low-temperature gas stream.
- Short and uncertain bag life because of limited operating experience.

These conditions could occur during the operation of the Hillsborough County Facility and cause the baghouse to become inoperable. As an example, if one bag should fail out of the approximate 1500 bags per furnace required, a visible particulate plume could result.

Fabric designs are available that minimize the effects of temperature, corrosivity, abrasion and the potential for combustion. Stainless steel bags could be used which would eliminate the possibility of fires. Individual bag failures can be limited when the fabric and cleaning methods are properly selected. Gas velocity, pressure drop, and the air-to-cloth ratio are important operating parameters that must be considered in designing a system. However, predicting the build up of filter cake and the resulting increase in pressure drop remains a difficult task that places uncertainties in designing the baghouse.

In general, fabric filters have not been proven on refuse combustion plants from a longevity standpoint, as compared with ESPs. To date, there have been only three full-scale mass burning facilities utilizing fabric filters as the sole control device, two in Switzerland, the other in East Bridgewater, Massachusetts. The East Bridgewater facility is composed of 2 units at 150 tpd each. Both facilities mentioned above are sized considerably lower than the proposed Hillsborough County facility. The chief problem at the East Bridgewater plant was corrosion to metal and fabric surfaces due to acid condensation occurring at cold spots during system shutdowns. The plant has been shutdown for several years.

Operating experience at the Neuchatal, Switzerland plant is reported to be satisfactory following considerable system modifications. No data is available on the other Swiss facility.

Recently, baghouses have been utilized on several small municipal plants utilizing modular combustion units (MCU's). These plants include:

- Windham, Connecticut
- Portsmouth, New Hampshire
- Auburn, Maine
- Industrial plant, Baltimore, Maryland

At these facilities (except the Baltimore plant), stainless steel bags were used to eliminate the possibility of bag damage due to fires. However, blinding of the bags has been a recurring problem at these plants due to variation in the moisture content of the flue gas. At the Windham plant, blinding of the bags was so severe that the suction from the I.D. fan collapsed the bags. At the facility in Baltimore, Maryland, fabric bags were used on a MCU facility burning plant trash. Bag failures (holes in bags) have occurred frequently due to carryover of glowing particles (sparklers). Similar problems were encountered at a municipal refuse facility in Gallatin, Tennessee which utilized Teflon bags. The baghouse is presently being abandoned, and an ESP will be installed.

Based on very limited operating data, bag life projections are difficult to estimate. For the Hillsborough County application, it is estimated that complete bag replacement would be required every two years.

Thus, the major uncertainty of fabric filtration systems, as compared to ESPs, is their reliability which is dependent on bag life and other variables and can result in increased O&M costs.

Performance Comparison of Alternative Systems

The ESP and Fabric filter control systems outlined above are both capable of meeting the particulate emission requirements proposed as LAER. The

individual control efficiencies of the systems presented above can be compared based on actual operating experience and/or theoretical design values. The outlet particulate loading of 0.025 gr/dscf @ 12% CO₂ would require approximately 99+% control efficiency. Since either control alternative (ESP or baghouse) could achieve the proposed emission rate, the selection of particulate control technology will be based on reliability issues.

Based on an extensive literature search by O'Connell, et al., only three operational installations of fabric filters on large-scale incinerators were found. Recently, there have been a few fabric filter installations on small-scale MCUs which have been largely unsuccessful, as previously noted. Therefore, a rather low reliability would have to be assigned to the fabric filter based on its very limited operating experience. In contrast, the system with the highest reliability, longest operating history, and highest number of installed units is the electrostatic precipitator.

In conclusion, based on the proven operating record of the ESP, the control device selected to achieve LAER for particular matter at 0.025 gr/dscf is the electrostatic precipitator.

6.2 OXIDES OF NITROGEN

The installation of nitrogen dioxide (NO_x) emission control technologies on combustion units is in various stages of development. The USEPA is sponsoring pilot programs in conjunction with major utilities for post combustion NO_x control on fossil fuel-fired boilers. NO_x emissions can also be controlled in the combustion process.

NO_x emissions from combustion processes result from an oxidation of nitrogen compounds in the combustion air and in the refuse. Formation of NO_x is highly dependent on temperature, pressure and residence time in the combustion unit. A lower, uniform temperature and uniform mixing of air and burning refuse generally eliminates high oxygen concentration gradients and sharp temperature gradients that are conducive to nitrogen oxide

formation. The amount of NO_x released from a specific source is therefore a function of the design and operation of the combustion unit.

Currently, NO_x control techniques other than standard refuse combustion control techniques (i.e., control of grate speed, refuse feed, temperature control, underfire and overfire air supply), are not practiced on mass-burning systems. Combustion modification techniques used on fossil fuel boilers are generally not applicable to mass-burn systems or tend to cause higher CO emissions and unacceptable boiler corrosion. Add-on NO_x control systems are still in the developmental stage and thus should not be considered as BACT or LAER technologies (O'Connell et al., 1982 and Russell, 1984).

Thus, the system for control of NO_x emission will be the proprietary grate and combustion control system of the mass-burn equipment boiler supplier.

According to EPA publication AP-42 (EPA, 1977), the emission of NO_x from a present-day resource recovery facility is approximately 3.0 pounds per ton of refuse charged. At this rate the maximum annual predicted impact concentration of NO_x from the proposed ESP control alternative case is 1.04 ug/m^3 , well below the NAAQS standard of 100 ug/m^3 and essentially equal to the NAAQS significance level of 1.0 ug/m^3 . Therefore, the source will have a minimal impact on air quality with respect to nitrogen oxides. BACT for nitrogen oxides is proposed as the combustion controls inherent to the system design as mentioned above.

6.3 CARBON MONOXIDE (CO)

The site area is designated as attainment with respect to the NAAQS for carbon monoxide, and therefore the source is subject to PSD review and is required to undergo BACT review for carbon monoxide. Since carbon monoxide is a product of incomplete combustion, its formation is largely dependent on the overfire air ratio, the design of the overfire air jets, and the combustion temperature. Specific add-on technologies for control of CO have not been incorporated into present-day resource recovery facility designs. CO emissions are controlled in modern facilities by using

commonly-employed combustion control measures, i.e. control of the combustion air to achieve a minimum furnace temperature of approximately 1850°F, while maintaining achieve a high enough temperature for good burn-out of volatilized hydrocarbons. This entails the optimal placement of the overfire air jets and the use of high pressure air to promote good mixing and turbulence of partially combusted furnace gases with the secondary air. Using these control measures usually provides adequate control of CO (O'Connell et al., 1982). No additional controls are required.

Based on modern plant design the emission rate for CO is estimated to be 1.8 lb per ton of refuse charged. The resulting maximum hourly CO concentration is estimated to be 31.5 ug/m³ which is well below the significance level 2,000 ug/m³, and the source will have an insignificant impact on air quality with respect to carbon monoxide. Therefore, BACT for CO is the grate and combustion control system of the boiler supplier.

6.4 VOLATILE ORGANIC COMPOUNDS

The project site is located in an ozone non-attainment area which usually requires stringent control for volatile organic compounds (VOC) or hydrocarbons (HC). Since the proposed emission for HC is less than the 100 tons per year, the facility is not subject to the LAER requirement. However, VOC are the products of incomplete combustion. Present-day grate and combustion control systems are designed to maintain elevated oxygen levels and provide for a near complete burnout of VOC. No existing resource recovery facility uses any type of add-on control system to reduce HC emissions. State-of-the-art combustion control systems inherent in the furnace/boiler design are usually considered LAER for VOC. The proposed facility shall employ such a furnace/boiler design. The proposed emission HC factor is, therefore, 0.2 lb/ton.

6.5 LEAD, MERCURY, AND BERYLLIUM

Due to the presence of trace quantities of these materials in refuse, a portion of these metals will be volatilized and delivered to the air pollution control device. Volatile trace metals are expected to condense

upon the smaller particulates contained in the exhaust stream. Thus, by achieving control of particulate matter, control of trace metals (lead, mercury, and beryllium) is also practiced. Therefore, all of the control technologies evaluated for particulate matter are suitable for controlling the above trace metals. The control technologies for particulate matter have been previously described and the reliability characteristics of these systems have also been evaluated.

In general, fabric filters have the ability (as demonstrated in pilot tests) to capture a greater percentage of the fine particulate than an ESP and therefore should provide additional control of trace metals. Before a BACT determination can be made, the ambient air quality impacts and economics of these control alternatives must be evaluated.

Comparison of Trace Metal Air Quality Impacts For Alternative Control Technologies

To estimate potential public health impacts associated with an increase in air contaminants, it is most expedient to compare the estimated ground level concentrations to established state or national ambient air quality standards. However, there are many toxic pollutants for which there are no applicable national or state ambient air quality standards. Therefore, many public health and air quality specialists have been using established occupational standards which are not directly comparable to acceptable ambient levels because they are based on an exposure for a 40-hour work week, a healthy male, average worklife cycle, and other specific work place factors. It is therefore necessary to convert the higher work place standards to realistic ambient levels, designed to protect the public health.

The State of Florida has not developed any additional ambient air quality standards or guidelines dealing with noncriteria pollutants. However, a highly regarded set of standards/guidelines is the New York State Ambient Air Quality Standards and the Accepted Ambient Levels (AAL's) published by the New York State Department of Environmental Conservation (NYSDEC) - Division of Air Resources. The AAL's were developed from established occupational standards (Time Weighted Average/Threshold Limit Values) and

appropriate factors of safety. The NYSDEC approach is used here because it provides a conservative framework for assessing the potential public health impacts associated with an increase in toxic air contaminants and the appropriate application of control equipment. These standards represent the most advanced formal program in the U.S. for the control of hazardous ambient air contaminants.

Lead

The lead emission rate for the ESP control alternative is 0.48 lb/ton. This results in an incremental ground level concentration of 0.017 ug/m^3 (annual average). This is approximately 1.1% of the NAAQS for lead of 1.5 ug/m^3 . Therefore, the source is expected to have a minimal impact on air quality with respect to lead.

Mercury and Beryllium

Mercury emissions are minimally affected by particulate control devices. The mercury emission rate from the ESP control option is $5.2 \times 10^{-3} \text{ lb/ton}$. This results in an incremental ground level concentration increase of $1.8 \times 10^{-3} \text{ ug/m}^3$ (annual average). Although no federal or state standards exist for mercury, New York State has developed a guideline concentration to be followed in permitting activities. The New York State (AAL) guidelines list an annual mercury concentration of 0.167 ug/m^3 . Although no mercury background concentrations are available, it is believed that due to the low levels of mercury projected (only 1.08% of the guideline) and the limited number of sources of mercury emissions to the atmosphere, the AAL guideline will not be exceeded.

The controlled beryllium emission rate is projected to be $1.31 \times 10^{-6} \text{ lb/ton}$. The resulting incremental ground level concentration of beryllium from the ESP control case is $8.84 \times 10^{-5} \text{ ug/m}^3$ for a 24 hour averaging time. Although no NAAQS exists for beryllium, New York has established a state air quality standard for beryllium of 0.01 ug/m^3 for a one month averaging time. Comparing a 24-hour predicted impact with a one month average standard results in a conservative assessment. The data indicate

that the beryllium impact is well below the New York standard for beryllium. Although no beryllium background concentrations exist, it is believed that due to the low levels of beryllium projected and the limited number of sources of beryllium emissions to the atmosphere, the NYS beryllium standard (used as a guideline here) will not be exceeded.

Comparison of Environmental, Economic, and Reliability Issues for Trace Metal Control Technologies

As previously discussed, regardless of the control alternative selected, the facility is not expected to significantly impact ambient air quality with respect to lead, mercury, and beryllium.

The economic summary presented in Table 6-3 indicates that the incremental annual cost for the fabric filter alternative at \$2.34 per ton is slightly greater than the annual cost for the ESP alternative at \$2.02 per ton. The ESP has a significantly higher capital cost than the fabric filter case, but the large operations and maintenance (O&M) cost for the fabric filter, particularly for bag replacement labor and materials, negates the capital cost advantage of the fabric filter. (The back-up data for the development of capital and O&M costs is presented in Section 6.7 - Supplemental Economic Data). Thus, on the basis of total annual cost there is a slight advantage to the ESP alternative.

Operating experience with fabric filters is very limited. Based on an extensive literature search by O'Connell, et al., (1982), only three operational installations of fabric filters on large-scale resource recovery facilities were found. Recently, there have been a few fabric filter installations on small-scale MCUs which have been largely unsuccessful, as previously noted. Therefore, a rather low reliability would have to be assigned to the fabric filter based on its very limited operating experience. In contrast, the system with the highest reliability, longest operating history, and highest number of installed units is the electrostatic precipitator.

TABLE 6-3
ECONOMIC COMPARISON OF
ALTERNATIVE TRACE METAL CONTROL STRATEGIES

<u>System and Outlet Grain Loading (gr/dscf) (1)</u>	<u>Control Technology Cost Totals(2)</u>		<u>Percent Over ESP Case Cost</u>
	<u>Annual Cost For Control System(\$)</u>	<u>Annual Cost Per Ton (\$)</u>	
ESP @ 0.025 gr/dscf	1,178,000.	2.02	--
Fabric Filtration	1,369,000.	2.34	.16

(1) Corrected to 12% CO₂.

(2) Increase in plant costs attributed to control devices.

In conclusion, since the environmental and economic issues are not conclusive in determining the trace metal control technology, the selection of control system is based on reliability issues. Based on the proven operating record of the ESP, the control device selected as BACT for trace metals is the electrostatic precipitator consistent with the LAER determination for particulate matter.

6.6 SULFUR DIOXIDE AND ACID GASES

The application of a control device to remove any one of these pollutants (SO_2 , HCl , H_2SO_4 , and HF) would be effective in controlling a portion of all of these emissions. In addition, they all play a role in forming acidic gases in the atmosphere (either directly or through a series of reactions). Therefore, these pollutants are addressed concurrently in the BACT/LAER analysis.

Federal authorities have not yet established sulfur dioxide or acid gas NSPS for MSW resource recovery facilities. Therefore a case-by-case review is required to determine an allowable emission rate for SO_2 and acid gases. The following analysis for SO_2 has been prepared to satisfy the impact assessment criteria within the scope of the BACT evaluation.

Alternative Control Systems

The control alternatives that would reduce SO_2 and acid gas emissions include wet scrubbers and dry scrubbers usually followed by an ESP or baghouse. Electrostatic precipitators and baghouses alone are not SO_2 (nor acid gas) control technologies.

Dry Scrubber - Electrostatic Precipitator System

Dry scrubbing systems control SO_2 and acid gases through chemical absorption and neutralization. This process is accomplished by contacting the flue gases with a fine alkaline slurry spray. The spray can be injected into the dry scrubber through atomizing nozzles or rotating discs.

Typically following dry scrubbing systems an electrostatic precipitator or fabric filter is utilized for particulate control.

A description of the dry scrubbing process follows:

- The fine droplets of either calcium or sodium based alkaline slurry quickly dry when contacted with the furnace gases in the quench reactor tower. The SO_2 and other acid gases will react with the calcium or sodium reagent while the H_2O is being evaporated, leaving a dry powder.
- A portion of the large (particle size) reacted dry particles, unreacted reagent, and inlet particles drop to the bottom of the dry scrubber and are discharged for disposal.
- Smaller (particle size) reacted particles, unreacted reagent and inlet particles exit the dry scrubber and enter the conventional particulate control device. If a baghouse is utilized as the TSP control device, the unreacted reagent will be retained in the thick dust cake on the bags. This unreacted reagent acts to further neutralize the SO_2 (approximately 5 percent) as the flue gases pass through the cake containing the reagent. An ESP will not further affect SO_2 and acid gas control.

The disadvantages of a dry scrubber are as follows:

- Minimal design and operation/maintenance experience.
- Susceptibility of clogging spray nozzles and/or quench tower wall chemical accumulation.
- Additional space requirements.
- Additional solids disposal (containing soluble salts).

- Decrease in plume temperature reducing plume rise thereby reducing plume dispersion.

The main advantage of a dry scrubbing system (in comparison to particulate control devices) is the ability to efficiently remove both particulate and gaseous (SO_2 , H_2SO_4 , HF, HCl) elements from the gas stream. Other advantages include the following:

- No visible steam plume (as with a wet scrubber) when ambient temperature is above approximately 40° F. This temperature will vary due to relative atmospheric humidity.
- No corrosion problems as compared to wet scrubber. Materials of construction are normally mild carbon steel.
- Lower pressure drop as compared to wet scrubber.

Operating experience with dry scrubbing technology (with either ESP or baghouse) is very limited. Presently the only dry scrubbing system in municipal solid waste service in the United States is the Teller Dry Scrubbing System, installed in 1979 at Framingham, Massachusetts. The Framingham refuse combustion facility is a 250 TPD plant consisting of two Volund rotary kilns; each sized at 250 TPD (100% standby capability). In comparison, the proposed Hillsborough County facility is composed of four units sized at 400 tpd each. These units are designed for full operation with no standby capability. The Framingham system utilizes a baghouse for final particulate control. After an initial extensive shakedown period, the system has reportedly been operating for the last 2.5 years in compliance with the Massachusetts Air Pollution Code. However, very little data has been made available concerning the operations and maintenance requirements and system availability of this unit.

There are a few European and Japanese resource recovery facilities which utilize dry scrubbing systems. A consultant's recent survey of dry scrubbing systems on MSW resource recovery facilities in Europe, conducted for the Port Authority of NY and NJ; concluded that the dry scrubbing

process is essentially in the experimental stage, i.e., still under development (Dvirka, 1981). The following West German plants were visited: Hamburg-Stellinger Moor, Oberhausen, and Duesseldorf. Two of the installations were pilot plants, and the only fully operational plant is Hamburg-Stellinger Moor. The Hamburg plant was built with grant money from the West German federal government and was used for research and development activities. The primary function of the dry scrubbing equipment was to enhance ESP performance by cooling and humidifying the gases. It therefore can not be considered a commercial plant. The major problems at these installations were:

- Fouling of the reactor tower with alkaline chemicals
- Clogging and replacement of the atomizing slurry nozzles
- Frequent maintenance of chemical and residue handling systems
- Much higher than anticipated chemical usage
- Poor system reliability; i.e., acid gas absorption efficiencies have not been achieved on a sustained basis.

Only the Oberhausen plant (a research pilot plant) utilized a bag house, and the expected life of the bag filters could not be addressed since the plant did not operate consistently enough to yield reliable data. In contrast to the European experience, Teller Environmental Systems claims to have numerous operating installations, mostly in Japan. Limited operating data recently made available on a few of the newer installations indicate that these plants appear to be operating satisfactorily and meeting particulate and acid gas emission codes. Very little is known about the operating history, availability, and maintenance requirements of these facilities.

In summary, although recent facilities overseas appear to be operating satisfactorily, dry scrubbing is an evolving technology which as yet has not demonstrated commercial, long-term reliability on refuse combustion facilities, especially large-scale systems.

Electrostatic Precipitation - Wet Scrubber System. An alternative to the previously described system (dry scrubber/ESP or fabric filter) is a control technique that utilizes an ESP and wet scrubber to remove both particulate and gaseous pollutants from the flue gas stream. In this case, a standard ESP is installed ahead of the wet scrubber. The ESP is the primary particulate control device. The wet scrubber subsequently removes additional particulates as well as gaseous pollutants by absorption and neutralization.

Many variations of scrubber design exist such as packed towers, weir scrubbers, impingement scrubbers, crossflow scrubbers and venturi scrubbers. For the Hillsborough County facility, packed towers with sodium-based reagent slurries were selected for further analysis. Lime-based systems are not recommended for wet scrubbers due to the high likelihood of plugging and clogging of the packed tower section. A typical packed tower would be equipped with the following internals and their respective functions:

- Inlet spray manifold - cools the gases to adiabatic saturation temperature, approximately 140° F, with either fresh water or recirculated sodium-based slurry.
- Packed section - packing will distribute liquid sodium-based slurry and acid gases for complete mixing and absorption and neutralization of SO_2 .
- Mist eliminator - removes carryover mist from reentrainment into the exiting gas stream. Mist would contain reacted solids and unreacted sodium reagent which could exit stack as particulate.

The disadvantages of the wet scrubber are as follows:

- Higher pressure drop as compared to the dry scrubber. A wet scrubber for gaseous pollutant control will operate with about a 6 inch w.c. pressure drop and a dry scrubber will operate with a 1.5 to 3.5 inch w.c. pressure drop.

- High corrosion-resistant materials of construction are required for the scrubber and downstream ductwork, fans and flues.
- Due to gases being lowered to the adiabatic saturation temperature, a dense steam plume from the stack will be visible. This problem can be solved by flue gas reheat downstream of the wet scrubber. Reheat could be accomplished through heat exchangers utilizing steam from the plant extracted from the flue gas by a heat exchanger, or fossil fuel-derived heat, all of which will increase operating costs.
- Liquid waste discharged from the scrubber water system contains sodium sulfite and sodium bisulfite which require oxidation before discharge to the co-located wastewater treatment plant (WWTP). Also, the maximum allowable concentration of total dissolved solids discharged to the WWTP is 500 mg/l, which would effectively prohibit the discharge of the scrubber water to the WWTP and a wastewater pretreatment system would be required prior to discharge.

The advantages of the wet scrubber are as follows:

- No solid discharge.
- Higher gaseous pollutant control efficiencies as compared to dry scrubbers.
- Longer operating history as compared to dry scrubbers.

Performance Comparison of Alternative Systems

The control efficiencies of the various systems for SO_2 and acid gases (HCl , HF , H_2SO_4) are tabulated in Table 6-4. The data indicate that the highest degree of control for SO_2 and acid gases is achieved by the ESP/wet scrubber system and the dry scrubber/fabric filter system respectively. However, the BACT evaluation of the performance of alternative control systems should be based on the control efficiency, environmental impact, reliability, operating experience and economics of the proposed systems.

TABLE 6-4

PERFORMANCE SPECIFICATIONS FOR ALTERNATIVE SO₂ CONTROL SYSTEMS

Control Alternative	<u>Worst Case Stack Exit Conditions</u>		<u>Proposed Removal Efficiency(%)</u>			
	<u>Flow Rate</u> (ACFM)	<u>Temperature</u> (°F)	<u>Maximum TSP</u> <u>Loading</u> (gr/dscf*)	TSP	SO ₂	HCl, HF, H ₂ SO ₄
ESP @ LAER	343,600	430	0.025	99+	0	0
ESP and dry scrubber	299,600	290	0.025	99+	65	80
ESP and wet scrubber	278,000	260	0.025	99+	75	90
Dry scrubber and fabric filter	289,600	290	0.025	99+	70	92

* Corrected to 12% CO₂

The removal efficiencies for the dry scrubber/electrostatic precipitator system (as quoted from performance data furnished by system vendors) are 65 percent for sulfur dioxide and 80 percent for acid gases. For the wet scrubber/electrostatic precipitator system the removal efficiencies are quoted as 75 percent for SO_2 and 90 percent for acid gases. The dry scrubber/fabric filter system has removal efficiencies of 70 percent for SO_2 and 92 percent for acid gases.

Particulate outlet loadings and removal efficiencies for the SO_2 control technologies are also listed in Table 6-4. These technologies are designed to control particulate matter to the same outlet loading as the proposed ESP case, 0.025 grains/dscf corrected to 12% CO_2 .

Comparison of SO_2 Air Quality Impacts for the Alternative Control Technologies

A comparative analysis of the sulfur dioxide impacts of alternative technologies is presented in Table 6-5. The estimated maximum ground level concentrations were calculated by applying the EPA-approved ISC model. Worst-case operating conditions were applied to define stack operating conditions while design efficiencies were applied to calculate the pollutant release rates. A comparison of projected SO_2 impacts with the NAAQS, PSD significance levels, and PSD increments was made.

The facility impact on ambient SO_2 levels for the no SO_2 control options (ESP and fabric filter) is predicted to be insignificant for the annual concentration impact and slight for the 24 hour concentration impacts. The baseline control option (ESP case) results in a maximum annual incremental ground level concentration of 0.86 ug/m^3 and a 24 hour impact of 17.3 ug/m^3 . These values correspond to 1.4 and 6.7 percent of the FAAQS for SO_2 . Additionally, they consume approximately 4.3 and 19.0 percent of the total PSD increments. The annual SO_2 impact from the ESP control option is below the PSD significance level of 1.0 ug/m^3 . The 24-hour SO_2 impact from this control option is 17.3 ug/m^3 . This is above the significance level of 5.0 ug/m^3 but it indicates a slight impact, since it is only 6.7 percent of the FAAQS for SO_2 . The SO_2 impacts for the dry and wet scrubber alternatives are also below the annual PSD significance levels.

TABLE 6-5

COMPARATIVE ANALYSIS OF ALTERNATIVE SO₂ CONTROL TECHNOLOGIES
ON ANNUAL AND 24-HOUR SULFUR DIOXIDE CONCENTRATIONS

Control Alternative	Annual Concentrations			24-Hour Concentration		
	Estimated Maximum Impact (ug/m ³)	Percent of FAAQS** (%)	Percent of PSD Increment** (%)	Estimated Maximum Impact (ug/m ³)	Percent of FAAQS*** (%)	Percent of PSD Increment*** (%)
ESP @ LAER	0.86	1.4	4.3	17.3	6.7	19.0
ESP-dry scrubber	0.51	0.9	2.6	8.2	3.2	9.0
ESP-wet scrubber	0.42	0.7	2.1	6.4	2.5	7.0
Dry scrubber - fabric filters	0.43	0.7	2.2	7.0	2.7	7.7

**AnnualFAAQS = 60 ug/m³Increment = 20 ug/m³

Significance

Level = 1 ug/m³***24-HourFAAQS = 260 ug/m³Increment = 91 ug/m³

Significance

Level = 5 ug/m³

As stated previously, the SO₂ control technologies are designed to control particulate matter to the same degree as the ESP at 0.025 grains/dscf. The particulate air quality impacts for the SO₂ control technologies are presented in Table 6-6. For all dry and wet scrubber cases the annual and 24-hour particulate concentration levels were slightly greater than the concentrations for the proposed ESP case. Higher particulate air quality impacts result from the scrubbing alternatives, because the stack gases for these alternatives had a lower temperature and less buoyancy and hence dispersion would be less. This is a negative factor when considering these devices for application to this project because the area is designated as non-attainment for TSP. Therefore, TSP impacts should be reduced. However, for the dry and wet scrubbing alternatives the particulate impacts for the annual and 24-hour concentrations would be less than the PSD significance levels indicating an insignificant impact. Thus, for all control alternatives the impact on the annual and 24 hour particulate concentrations would be insignificant or negligible.

In addition, the proposed facility will satisfy an energy demand that would otherwise have to be satisfied by some other power generating facility. Typically, fossil fuels for large, central, power-generating stations contain 0.5 to over 2 percent sulfur content, whereas the sulfur content of the refuse burned at the proposed resource recovery facility is about 0.12 percent (CDM, 1984). Thus, the proposed resource recovery facility will burn a fuel containing 40 to 70 percent less sulfur than typical fossil fuel fired generating facilities. Therefore it is apparent that burning refuse to produce energy is an environmental benefit with respect to SO₂ emissions, in comparison to burning fossil fuels with 0.5 to over 2 percent sulfur content.

Comparison of Acid Gas Impacts For the Alternative Control Options

As was true with mercury and beryllium, no ambient air quality standards exist for acid gases emitted by the facility. Therefore, the NYSDEC guidelines for estimating Acceptable Ambient Levels (AAL's) were used to evaluate estimated air quality impacts from acid gases. The NYSDEC approach provides a conservative framework for assessing the potential

TABLE 6-6

PROJECTED PARTICULATE CONCENTRATIONS FOR ALTERNATIVE SO₂
CONTROL TECHNOLOGIES AS COMPARED TO FAAQS AND PSD INCREMENTS

Control Alternative	Annual Concentrations			24-Hour Concentration		
	Estimated Maximum Impact (ug/m ³)	Percent of FAAQS* (%)	Percent of PSD Increment* (%)	Estimated Maximum Impact (ug/m ³)	Percent of FAAQS** (%)	Percent of PSD Increment** (%)
ESP @ LAER (0.025 gr/dscf)	0.17	0.3	0.9	3.4	2.2	9.1
ESP and dry scrubber @ LAER	0.28	0.5	1.5	4.5	3.0	12.1
ESP and wet scrubber @ LAER	0.32	0.5	0.7	4.9	3.3	13.3
Dry scrubber and fabric filter @ LAER	0.28	0.5	0.5	4.5	3.0	12.1

*AnnualFAAQS = 60 ug/m³Increment = 19 ug/m³Significance level = 1 ug/m³**24-HourFAAQS = 150 ug/m³Increment = 37 ug/m³Significance level = 5 ug/m³

public health impacts associated with an increase in toxic air contaminants and the appropriate application of control equipment.

Hydrogen Chloride. The New York State Department of Environmental Conservation and Department of Health has classified toxic air contaminants based on their degree of risk to human health. HCl is classified as a low toxicity air contaminant. This classification refers to contaminants that are known irritants and have not shown any confirmed carcinogenicity in animal tests. Based on the NYSDEC classification, an acceptable ambient level (annual concentration) is calculated for HCl by dividing the Threshold Limit Value/Time Weighted Average for HCl by 50. The Threshold Limit Value (ACGIH, 1980) for HCl is 7000 ug/m^3 , thus the acceptable ambient level is 140 ug/m^3 .

The maximum increase in the ambient annual HCl concentration from the control alternative yielding the worst case impact is 1.42 ug/m^3 which is well below the acceptable ambient level (only about 1.0 percent of the AAL). This increase does not take into consideration existing background concentrations of HCl. No measured data exist on the background concentrations in the study area but due to the limited number of sources of HCl it is unlikely that it is much greater than the source concentration. Together the source and background concentration should be well below the 140 ug/m^3 guideline.

Sulfuric Acid Mist. H_2SO_4 is also classified as a low toxicity air contaminant by NYSDEC. Although no AAL has been developed for H_2SO_4 , a TLV of 1000 ug/m^3 has been established. Using techniques suggested by NYSDEC an AAL can be calculated for comparison of impacts. To provide for a conservative analysis, the TLV was divided by 300 instead of 50 to develop the AAL of 3.33 ug/m^3 . The conservatism lies in the fact that for low toxicity pollutants a factor of 50 applies, not 300. The maximum net increase in the ambient H_2SO_4 concentration from the control alternative yielding the worst-case annual impact (ESP case) is 0.027 ug/m^3 which is well below AAL, about 0.8 percent of the level. No data on H_2SO_4 background levels exist but due to the limited number of sources of H_2SO_4 , it is believed that ambient levels are extremely low. With the additional

impact from the worst case control option, it is expected that future levels will remain well within the guideline value.

Hydrogen Fluorides. Fluorine does not occur free in nature due to its extreme activity. No NAAQS have been developed for fluorides, but New York State has established a state fluoride ambient standard of 2.85 ug/m^3 averaged over a 24 hour period. The projected hydrogen fluoride impact from the facility utilizing the control alternative yielding the maximum impacts is predicted to be 0.41 ug/m^3 for a 24-hour averaging. This is well below the fluoride standard of 2.85 ug/m^3 . Although no fluoride background concentration exists, it is believed that due to the low levels of hydrogen fluoride projected and the limited number of sources of fluoride emissions to the atmosphere, the fluoride standard will not be exceeded.

Comparison of Environmental, Economic and Reliability Issues For SO_2 and Acid Gas Control Technologies

As shown in Table 6-5, the emissions of SO_2 and acid gases are greatly affected by the selection of the control alternative. But, as described previously, the impacts of SO_2 are expected to have a slight to insignificant impact on air quality. In addition to emitting less SO_2 per energy unit input than fossil fuel facilities, the facility will generate electricity thereby satisfying a demand that would have had to be generated at some other facility, which in all probability would result in a net increase in SO_2 emissions in the region (albeit small). Therefore BACT for SO_2 and H_2SO_4 with respect to environmental criteria is to burn refuse as the boiler feed fuel which contains low quantities of sulfur (on the average 0.1% S). Also, the facility design will also provide space for possible future retrofit of acid gas controls, if their use becomes necessary due to changes in regulations.

In comparison with NYSDEC Acceptable Ambient Levels of pollutants, it has been determined that the acid gas emissions (from hydrogen fluoride, sulfuric acid, and hydrochloric acid) are not significant. Therefore,

there does not appear to be sufficient justification to control SO_2 and acid gases from an environmental or health effects point of view.

The cost totals for all SO_2 and acid gas control alternatives are tabulated in Table 6-7. The data presented include the total annual cost for each control system, the annual cost per ton of solid waste processed, and the percent of the alternative's cost over the proposed ESP case at 0.025 gr/dscf. The annual cost per ton is meaningful in that it represents the relative increase in cost per ton of refuse disposed of at the facility directly attributable to the addition of control equipment. For the proposed ESP case (no SO_2 control) \$2.02 will be added to the tipping fee for air pollution control. For SO_2 control between \$5.41 (for dry scrubber/ESP) and \$7.42 (wet scrubber/ESP) would be added to the tipping fee. The wet and dry scrubber system costs are 1.7 to 2.7 times greater than the cost of the ESP alone, and although considerable control of SO_2 and acid gases would be achieved with these systems, the environmental and health benefits (in terms of impact on ambient air quality) are not significant enough to warrant the much higher annual costs. As noted in the SO_2 air quality impact section, the ESP case would result in an insignificant impact on the annual SO_2 concentration and a slight impact on the 24-hour SO_2 concentration levels.

O'Connell, et al., (1982), arrived at a similar conclusion in their study of emissions and control technologies for modern municipal resource recovery facilities. They concluded that while scrubbing systems can be considered for LAER, high operating costs "will probably preclude them from being established as BACT." Therefore, dry or wet scrubbing systems were not considered cost-effective control strategies in light of the high capital and operating costs limited reliability performance data, and the minimal health and environmental benefits derived for most sources.

Concerning reliability, the lack of operating data on these systems has already been noted. O'Connell, et al., (1982); made a similar assessment stating that although these scrubbers appear to have demonstrated control of SO_2 and HCl in practice, no performance test data of adequate quality to meet EPA standards has been found to verify their performance. In addi-

TABLE 6-7

ECONOMIC COMPARISON OF ALTERNATIVE SO₂ AND ACID GAS
CONTROL STRATEGIES

System and Outlet Grain Loading (gr/dscf) (1)	Control Technology Cost Totals(2)		
	Annual Cost For Control System(\$)	Annual Cost Per Ton (\$)	Percent Over Base Case Cost
ESP @ LAER 0.025	1,178,000.	2.02	--
Dry Scrubber & ESP @ 0.025	3,159,000.	5.41	168.
Wet Scrubber & ESP @ 0.025	4,389,000.	7.52	272.
Dry Scrubber & Fabric Filtration @ 0.025	3,339,000.	5.72	183.

(1) Corrected to 12% CO₂.

(2) Increase in plant costs attributed to control devices.

tion. Although manufacturers claim to have numerous installations, worldwide, only three dry scrubbing systems have been in operation over two years. Thus, the reliability of these systems, particularly the ability to perform at the proposed removal efficiencies (as stated in Table 6-4) for the 20-year design life is still questionable.

Based on the environmental, economic, and reliability issues presented above, BACT for SO_2 and the acid gases is the electrostatic precipitator. In other words no additional control is required for SO_2 and acid gases.

6.7 SUPPLEMENTAL ECONOMIC DATA

This section explains the basis of the economic analysis which was used to evaluate the cost-effectiveness of each control technology. The economic data and O&M requirements for the proposed control technologies were supplied by reputable equipment suppliers. Using good engineering judgment, CDM selected those data which most accurately represent the true capital and O&M costs for each control alternative. In order to be consistent in deriving unit costs, the continuous design rated capacity was used. This approach allows the intercomparison of relative differences on the same basis.

Capital and Operations/Maintenance (O&M) costs for the alternative control systems are presented in Table 6-8. Capital costs were obtained from manufacturers of air pollution control systems and include shipping and installation. The least expensive system is the fabric filter (at 0.025 gr/dscf) at \$3,694,000, while the most expensive is the dry scrubber/fabric filtration alternative at \$12,887,000. Capital costs were annualized assuming a 20-year plant life and bond interest rate of 12.5% (capital recovery factor = 0.13810).

Operations and Maintenance costs include the following components: power, labor, materials and supplies, chemicals, waste disposal, and special costs. O&M costs are based on plant operation 24 hours/day, 365 days/year. Total power use for each control alternative is presented and contains an adjustment for additional I.D. fan horsepower to account for the pressure

TABLE 6-8

CAPITAL AND OPERATIONS/MAINTENANCE COSTS FOR ALTERNATIVE CONTROL STRATEGIES

System and Outlet Grain Loading, lb gr/dscf ⁽¹⁾	CAPITAL COSTS (IN THOUSAND OF \$)		POWER REQUIREMENTS AND ANNUAL O&M COSTS (IN THOUSANDS OF \$)								
	Capital Cost	Annualized ⁽²⁾ Capital Cost	Power (KW)	Power ⁽³⁾ Cost	Labor ⁽⁴⁾ Cost	Materials ⁽⁵⁾ & Supplies	Chemical ⁽⁶⁾ Cost	Waste ⁽⁷⁾ Disposal	Special Costs	Total O&M Costs	Total Annual Cost
ESP @ 0.025	4,500.	622.	790.	540.	37.	90.	0.	152.	0.	819.	1,441.
Fabric Filter @ 0.025	3,694	510.	218.	152.	353.	112.	0.	152.	166. ⁽⁸⁾	935.	1,445.
Dry Scrubber & ESP @ 0.025	12,831.	1,772.	1397.	980.	160.	336.	214.	187.	0.	1,877	3,649.
ESP @ 0.025 & Wet Scrubber	7,810	1,079.	1,751.	1,228.	160.	189.	242.	503.	1,602. ⁽⁹⁾	3,924.	5,003.
Dry Scrubber & Fabric Filter @ 0.025	12,887.	1,780	1,175	824.	242.	398.	242.	187.	78. ⁽¹⁰⁾	1,971	3,751.

NOTES

- (1) Corrected to 12% CO₂.
- (2) Annualized capital costs assume 20 year plant life and interest rate equals 12.5%, (capital recovery factor = 0.13810).
- (3) Power costs assume plant operation 24 hr/day, 365 days/year. Power cost = \$0.08/kwHr.
- (4) Labor costs assume base labor rate equals \$25,000/yr, fringe benefits @ 25%, 4 shifts.
- (5) Materials and supplies were taken as 2% of capital cost for ESP cases and 3% of capital cost for all other cases.
- (6) Chemical costs assume lime @ \$90/ton and sodium carbonate @ \$120/ton.
- (7) Fee for hauling and disposal of flyash at landfill is \$20/ton and sewer use fee equals \$0.50/1000 gal.
- (8) Bag replacement: 10% during 1st year and 100% at end of 2nd year, \$40/bag, approximately 1500 bags/bag house.
- (9) Steam used for stack gas reheat: valued at \$7.00/1000 lb. steam. This steam would have been used to produce power if stack gas reheat was not required.
- (10) Bag replacement: about 50% of bag replacement cost for fabric filter case due to upstream dry scrubbing system which extends bag life.

drop through the control device. Forfeited power costs were based on an estimated rate of \$0.04 per kilowatt-hour.

Labor costs include manpower for normal operations and for scheduled and unscheduled maintenance. Of all the systems considered, the ESP is probably the most highly automated. The wet and dry scrubbing systems require a moderate degree of operator attention, mostly to assist with the chemical feed systems. The high labor cost for the fabric filter alternatives was due to maintenance labor for bag replacement, considering that every two years all the bags (approximately 6000 bags) would have to be replaced. Labor costs were based on a base rate of \$25,000/year, fringe benefits at 25 percent, and 4 working shifts.

Materials and supply costs were calculated at 2 percent of the installed capital cost for the ESP cases and 3 percent for all other systems. This difference is due principally to the relative simplicity of the ESP compared to the other systems and the fact that there is a better data base for ESPs on solid waste combustion facilities than the other systems considered. Operational reliability for the other systems was judged to be not as great as for the ESP cases.

Based on system manufacturers' recommendations, chemical costs for the wet and dry scrubbing systems were based on use of lime (at \$90/ton) and sodium carbonate (at \$120/ton) (rather than caustic-NaOH). Lime and sodium carbonate is far less expensive than NaOH. For an equivalent amount neutralizing capacity, lime has only one tenth the cost of NaOH.

Waste disposal costs for hauling and landfilling of the flyash (particles captured by the air pollution control device) are recorded for each alternative. A hauling and disposal cost for Hillsborough County of \$20.00/ton was used in this analysis. For the ESP/wet scrubber alternative, the waste disposal cost also includes the sewer use fee associated with discharging approximately 1.7 million gallons per day of scrubber water (laden with sodium chloride and sodium sulfate salts) to the co-located WWTP. A sewer use fee of \$0.50/1000 gallons was used.

Special costs included the cost of bag replacement for the fabric filter alternatives. For the case with the fabric filter as the sole control device, bag replacement was estimated to be 10 percent in the first year and 100 percent at the end of the second year. Cost of the filter bags was \$40/bag, and each baghouse contained approximately 1500 bags. For the dry scrubber/fabric filter case, bag replacement was estimated to be about 60% less frequent due to the beneficial effect of the upstream dry scrubber which would reduce the particulate loading and also the flue gas temperature.

Also under special costs, the ESP/wet scrubber alternative includes the energy cost for reheating the scrubber stack gas. The stack gas temperature exiting the scrubber would be low (approximately 140°F), and saturated with moisture, causing a large, white plume to be visible under certain meteorological conditions. Such a plume would be aesthetically undesirable. To alleviate this problem, a steam-to-gas heat exchanger would be used to reheat the scrubber exhaust gas to 260°F. This reduces condensation of moisture in the stack and decreases the frequency of plume visibility. The steam would be supplied by the refuse boiler, and therefore less steam would be available for power production. Approximately 7 percent of the total steam produced would be required for stack gas reheat. The value of the forfeited steam was assumed to be \$7/1000 pounds of steam, a conservative low value.

Total annual costs for each alternative, presented in Table 6-8, were utilized in the BACT evaluations for each pollutant in the preceding sections.

6.8 THE PROPOSED BACT/LAER CONTROL TECHNOLOGY

The preceding sections have outlined on a pollutant-by-pollutant basis the various control technologies applicable for controlling air pollutant emissions from the proposed facility. Each has been evaluated on the basis of environmental, economic, and interrelated issues such as reliability and feasibility.

The recommended BACT for trace metals, SO_2 , and acid gases indicate that the ESP alternative would best satisfy the energy, economic and environmental criteria important in this application. Furthermore, the proposed control technology designed to meet LAER for particulate matter is an ESP at 0.025 gr/dscf @ 12% CO_2 . Thus, the control technology selected to meet LAER for particulates is compatible with the BACT for all applicable criteria pollutants, trace metals, and acid gases. Thus, the electrostatic precipitator with the ability to limit particulate emissions to 0.025 gr/dscf @ 12% CO_2 , should be considered as LAER for particulate matter and, along with other design specifications, BACT for the other criteria pollutants for the proposed facility. The proposed LAER and BACT emission rates for all applicable pollutants appear to be well within other recent LAER and BACT determinations made for similar facilities listed in Table 6-2.

SECTION 7.0

AIR QUALITY ANALYSIS

7.0 AIR QUALITY ANALYSIS

An air quality analysis was conducted to evaluate the impact of the proposed emissions on ambient air quality in Hillsborough County. This analysis estimates the ambient concentrations of the quantifiable PSD pollutants and HCl. Each step of the modeling analysis was discussed with and approved by the Florida DER.

7.1 TECHNICAL APPROACH

The air quality impacts resulting from operation of the facility were estimated using EPA and DER approved and recommended mathematical dispersion models. Air quality modeling is an analytical tool used to predict ambient pollutant concentrations resulting from pollutant emission rates. Pollutants produced by the proposed resource recovery facility are emitted from the facility's stack at certain rates and concentrations. The pollutant concentration is a measure of how much of a given pollutant is contained in a unit volume (parcel) of exhaust gas which is discharged from the stack. The pollutants emitted from the stack become mixed with the atmospheric flow and are transported downwind. The turbulent air motions dilute the parcel of polluted air with the surrounding air such that the concentration at ground level is substantially less than when it exited the stack. Dispersion models estimate ground level concentrations at specific locations by mathematically simulating the dilution of the polluted air parcels between the source at specified locations (receptors). The rate at which dilution takes place depends on various meteorological factors, such as wind speed and direction, atmospheric stability, the mixing height, and other physical factors, such as topography and nearby building structures.

Model Selection

The Industrial Source Complex (ISC) model was selected to estimate ground-level concentrations from the proposed facility and other major sources within Hillsborough County. The ISC model is a steady-state Gaussian plume

model which was developed and approved by EPA for simulating dispersion from various air pollution sources. The ISC model can simulate terrain, building downwash associated with stacks below GEP, and transitional plume rise for separately located sources in either urban or rural environments. Each of these factors are important in simulating dispersion of pollutants from the proposed Hillsborough County facility. ISC was selected principally for its ability to simulate aerodynamic downwash and handle multiple separately located sources.

Meteorology

Meteorological input to the model consists of surface and upper air data recorded at Tampa International Airport for 1970 to 1974. The surface data are composed of hourly values for wind speed, wind direction, temperature, and atmospheric stability. Atmospheric stability is a measure of the atmosphere's ability to promote or suppress mixing. The upper air data are derived from vertical temperature profiles which are measured twice daily. From these temperature profiles hourly mixing heights are obtained using a method outlined by Holtzworth (1972). The mixing height is the depth of the atmospheric layer, measured from the surface upward to the first inversion, through which vertical mixing of stack emissions takes place.

Rural dispersion coefficients were used to simulate the dispersion environment characteristic of the site area using the land-use technique developed by AVER (1978) as recommended by EPA (1981).

A complete discussion regarding the suitability of the Tampa International Airport data can be found in the Power Plant Siting Application Section 2.3.7.1. Seasonal/Diurnal wind roses and stability/wind frequency distribution tables which complement this discussion are found in Exhibit B of this PSD. Hourly meteorological data associated with the peak concentrations are also presented in this section.

Source Data

The resource recovery facility will consist of four boilers each capable of firing 400 tons per day (tpd) of reference solid waste. The boilers will typically not be run above 100% of the maximum continuous rate (MCR) but operation at 110% of the MCR caused the greatest air quality impacts and was, therefore, used throughout the air quality analysis (See Section 3.0). The stack parameters and flue gas conditions for the "worst-case" boiler operating condition are presented in Table 7-1. The flue gases from each boiler will be vented to a separate flue; the four flues will be encased in a common stack. Pollutant emission rates quantified in Section 4.0 were used to estimate projected pollutant impacts. Emissions data are based on using an electrostatic precipitator (ESP) designed to meet an outlet particulate loading of 0.025 gr/dscf, corrected to 12% CO₂.

A major consideration in the modeling analysis of an air pollution source is the potential for aerodynamic downwash to occur. Aerodynamic downwash results in enhanced ground-level concentrations caused by pollutants emitted from the stack being caught in air passing over and around building structures. The region of disturbed air flow is known as the cavity zone or turbulent wake. The size of the cavity/wake region depends on the geometry of the facility structures and the relative wind direction. Pollutants emitted from the facility's stack upwind of a building can be entrained into the cavity/wake region, if the stack height is low, relative to the building height, or the momentum of the flue gases is insufficient to escape the turbulent zone. When aerodynamic down wash occurs, the pollutants are rapidly mixed within the cavity/wake region and brought down to ground-level much quicker than without the influence of building downwash.

Based on the dimensions of this facility, the Good Engineering Practice (GEP) stack height is 106.8 m. Because the proposed stack height (67.0 m) is less than GEP, a downwash analysis was performed with the ISC model. As indicated by the modeling results, utilizing a stack height lower than GEP produces acceptable air quality impacts. A discussion of the GEP stack height analysis is contained in Section 3.3 and in Appendix 10.16.

TABLE 7-1

STACK PARAMETERS USED IN REFINED MODEL ANALYSIS

Base Elevation	12.1 meters
Stack Height	67.0 meters
Effective Stack Diameter	3.5 meters
Exit Velocity*	16.82 m/s
Exhaust Temperature*	494 ⁰ K
Building Height	42.7 meters
Building Width	51.5 meters
Building Length	22.9 meters
Maximum Projected Width	56.4 meters
Equivalent Length/Width	49.9 meters

*Based on the worst-case boiler operating condition as defined in screening analysis.

7.2 MODELING APPROACH

The modeling analysis was conducted in three phases; screening analysis, refined modeling, and additional impact analysis. Each phase of the modeling was discussed with and approved by DER. Details of the screening analysis are discussed in Exhibit A. The refined modeling and additional impact analysis are discussed in Exhibit C. A synopsis of each modeling phase is contained below.

Screening Analysis

The screening analysis was conducted to identify the worst-case boiler operating condition, identify those pollutants with a potential for significant impact, and establish receptor locations for the refined modeling. The screening modeling runs were made using the ISC dispersion model and 26 worst-case meteorological conditions recommended for use by EPA (1977). As previously stated, the 110% boiler load condition yielded the greatest air quality impact. This corresponds to a 440 tpd throughput per boiler of 4000 Btu/lb solid waste. Pollutants with annual averaging times were not evaluated since no scaling factor has been generally accepted which relates 1-hour concentrations to annual concentrations. Of those pollutants with shorter averaging times, SO_2 showed a potential for significant impact. The maximum short-term impact occurred at 400m. Thus a grid with receptors located at 129m (closest property boundary), 200m, 300m, 400m, 500m, 600m and every kilometer from 1 to 10 km along radials located every 10^0 beginning at 10^0 of north was used for the refined analysis.

Refined Modeling

Using the information developed during the screening analysis, refined (hour-by-hour) modeling was performed using the ISC dispersion model and 5 years (1970 to 1974) of Tampa International Airport meteorological data. The modeling was conducted using unit emissions (1 gram per second) and scaling the output from the model according to the magnitude of the emission rate for each pollutant (Table 7-2). These results were evaluated to

TABLE 7-2
EMISSION RATES FOR THE PROPOSED FACILITY

<u>Pollutant</u>	<u>Emission Rates*</u>	
	<u>#/ton</u>	<u>g/s</u>
Total Suspended Particulates	0.48	4.46
Sulfur Dioxide	2.5	23.1
Carbon Monoxide	1.8	16.6
Nitrogen Oxides	3.0	27.7
Lead	0.048	0.444
Mercury	5.2×10^{-3}	0.048
Sulfuric Acid Mist	7.68×10^{-2}	0.710
Beryllium	1.31×10^{-5}	1.21×10^{-4}
Fluorides	0.06	0.554
Non-Methane Hydrocarbons	0.2	1.85
Total Reduced Sulfur	neg.	neg.
Reduced Sulfur Compounds	neg.	neg.
Vinyl Chloride	neg.	neg.
Asbestos	neg.	neg.
Hydrogen Chloride	4.0	37.9

*Emission rates based on a throughput equal to 110% of design capacity.

identify those pollutants which had an impact greater than the significance level and define the significant impact area of those pollutants. The significant impact area (SIA) is then defined as a circular area whose radius is equal to the greatest distance to which the refined modeling shows the facility's emissions will have a significant impact. The modeling results showed that the 3-hour and 24-hour SO_2 concentrations were above the DER and EPA significance levels. Therefore additional detailed modeling of the background source emissions for assessing PSD increment consumption and compliance with ambient standards is required for these pollutant averaging periods. For all other pollutants and averaging periods the predicted concentrations will be added to the background levels and then compared to the corresponding FAAQS. The short-term (averaging period of 24-hour or less) NAAQS and PSD increments can be exceeded at each receptor once per calendar year. That is, the highest predicted short-term concentration at each receptor is not used to determine if the proposed source is in compliance with the standards. Rather, the highest of the second-highest short-term concentrations over all the receptors predicted for a calendar year is used to determine compliance. The predicted highest annual concentrations must be below the standards/increments at all receptors for each year.

Additional Source Analysis

Since the highest 3-hour and 24-hour SO_2 concentrations exceed the corresponding significance level, a more detailed evaluation for these time periods is required to assess the SO_2 impacts. This additional analysis included the modeling of existing sources which have a significant SO_2 impact with the facility's SIA as defined for the 3-hour and 24-hour averaging period. The full five years of hourly meteorological data was modeled using two separate receptor grids, one corresponding to the 3-hour SO_2 SIA which extends radially outward to 0.5 km, and the other grid corresponding to those additional receptors needed to define the 24-hour SO_2 SIA which extends outward to 0.9 km.

The existing SO_2 source inventory used in this analysis is listed in Table C-3. The existing background SO_2 sources were broken into two separate source groupings. They include:

- sources that were previously permitted under the PSD provisions (i.e., increment consuming sources), and
- other existing major sources that could potentially significantly impact the proposed SO₂ SIA for the facility (these sources do not consume any SO₂ increment).

The SO₂ impacts of these two source groupings were quantified and added to the measured SO₂ levels to establish the combined or enhanced background SO₂ concentrations for the 3-hour and 24-hour averaging times. Adding modeled impacts of existing sources to the monitored data results in a "double counting" in that the sources already contribute to the ambient levels. The conservativeness of this NAAQS/FAAQS compliance analysis is increased by adding the modeled results of the two separate source groups to the measured background levels without regard to the location or time (period, day or year) that the impact occurred.

7.3 AIR QUALITY MONITORING DATA

Among other activities, the Hillsborough County Environmental Protection Commission (HCEPC) is responsible for monitoring ambient air quality within the county. HCEPC operates 65 monitoring stations and receives information from other private monitoring stations totaling an air quality network of 83 stations, many of which monitor for more than one pollutant. A complete set of Standard Operating Procedures govern all aspects of the monitoring activities including installation, calibration, collection, and validation. A quality assurance program which governs the network operation is contained in HCEPC's "Air Monitoring Quality Assurance Plan", is published in Environmental Quality, and meets the PSD Quality Assurance requirements where applicable. The monitor located nearest the site for each of the criteria pollutants is listed in Table 7-3. Additional, HCEPC monitoring data is listed in Table D-2.

The SO₂ monitor at the HCEPC office, located 9.9 km from the facility, is the closest continuous SO₂ monitor to the proposed site. Two SO₂ monitors using bubblers are located 8.9 km and 6.6 km from the site, and operate

TABLE 7-3

Ambient Criteria Pollutant Concentrations
in the Vicinity of the Proposed Facility

Pollutant	Monitor	Station No.	Location with Respect to the Proposed Facility		Averaging Period	Concentration Category	1983 Concentration ($\mu\text{g}/\text{m}^3$)
			Direction (Degrees)	Distance (km)			
SO ₂ *	HCEPC	4360-052 (120)	278 ⁰	9.9	3-hour	Second-High	493
					24-hour	Second-High	86
					Annual	Highest	16
NO _x	HCEPC	4360-052 (120)	278 ⁰	9.9	Annual	Highest	35
CO	HCEPC	4360-052 (120)	278 ⁰	9.9	1-hour	Second-High	12,600
					8-hour	Second-High	5,700
TSP**	Orient Rd.	1800-082 (82)	285 ⁰	3.3	24-hour	Second-High	115
					Annual	Highest	54
O ₃ **	Davis Island	4360-035 (63)	259 ⁰	11.5	1-hour	2nd Daily High	281
Pb	Orient Rd.	1800-082 (82)	285 ⁰	3.3	Calendar Quarter	Highest	0.8

*Two SO₂ monitors using bubblers are located closer to the facility and associated impact area. However, since these monitors only operate every sixth day, the continuous monitoring results should be more reliable. Additionally, the concentrations obtained at the bubbler sites were less than those recorded at the continuous monitoring site located at the Hillsborough County EPC offices.

**Designated as non-attainment

every sixth day. Although the measured concentrations are lower, the data recorded at the continuous monitor located at the HCEPC offices are considered to be more reliable. Therefore, the monitoring concentrations recorded at the HCEPC continuous monitor is considered at least as high as concentrations expected at the site and will be used to establish background concentrations.

The NO_x and CO monitors at the HCEPC office are the closest continuous NO_x and CO monitors to the proposed site. Auto emissions associated with large urban areas are the major contributors to the ambient concentrations of these pollutants. Since the HCEPC office is located within the City of Tampa, the concentrations of NO_x and CO monitored here are expected to be at least as great as those found at the proposed site.

The proposed site is located in a non-attainment area for TSP and O_3 . The O_3 monitor at Davis Island clearly shows ambient concentrations in excess of the standard. The TSP monitor at Orient Road, however, shows concentrations less than the standard. There are a couple of reasons for this. There are about twenty TSP monitors within the non-attainment area; of these, two recorded a 24-hour TSP concentration in excess of the FAAQS in 1983. One is credited with exceeding the annual and 24-hour standards by having the annual and second-highest 24-hour concentrations greater than corresponding FAAQS. While having 18 of 20 monitors showing ambient concentrations better than the FAAQS is good, two years of violation-free monitoring is required before an area can be reclassified from non-attainment to attainment. Thus the Orient Rd. monitor for TSP is considered representative for the site even though the area is classified non-attainment and the monitor shows ambient concentrations less than the standard.

The Orient Road site is also the location for the nearest lead monitor. This site was initially chosen by HCEPC to monitor an existing source of industrial lead emissions. Lead concentrations at Orient Road are the second highest in Hillsborough County. Since the Orient Road monitor is already placed to monitor high lead concentrations, ambient concentrations monitored at the proposed site are expected to be lower.

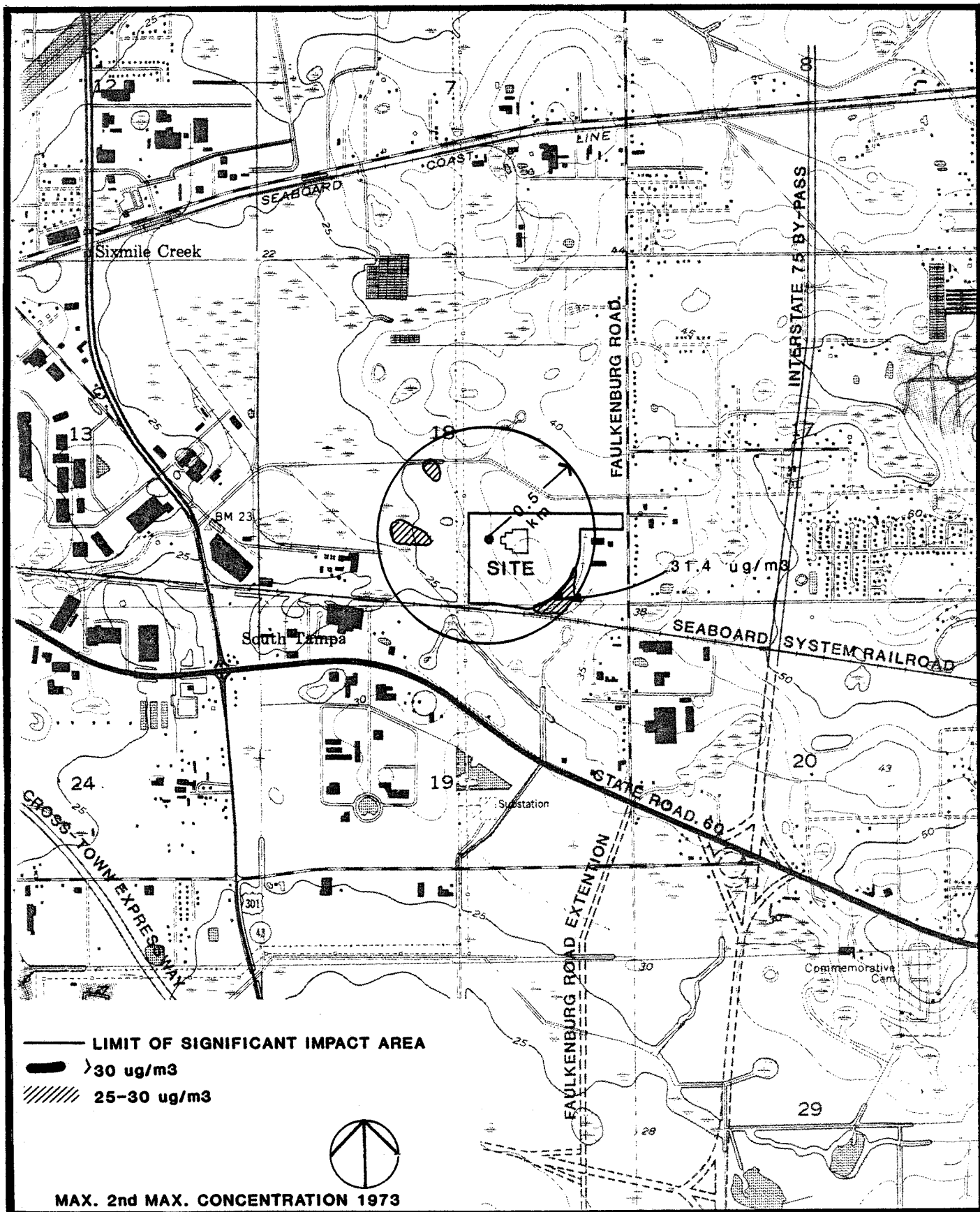
7.4 RESULTS OF THE MODELING ANALYSIS FOR THE CRITERIA POLLUTANTS

The results of the refined analysis indicate that the 3-hour and 24-hour SO_2 concentrations are above the significance levels previously defined in Table 2-5. The maximum 3-hour SO_2 concentration of 37.4 ug/m^3 and the maximum 24-hour SO_2 concentration of 17.3 ug/m^3 are compared to the significance limits of 25 ug/m^3 and 5 ug/m^3 respectively. The SIA is defined as a circular area whose radius is equal to the greatest distance to which the facility's emissions will have a significant impact. The 3-hour SO_2 SIA extends 0.5 km from the site (Figure 7-1). The 24-hour SO_2 SIA extends 0.9 km from the site (Figure 7-2).

The annual NO_2 concentration of 1.04 mg/m^3 exceeds the significance level at only one receptor location and only for one of the five modeled years. This level would not have been exceeded if annual average emissions and operating conditions had been used instead of maximum hourly conditions to estimate annual average concentrations. Furthermore, it was conservatively assumed in the analysis that all NO_x emitted by the facility was emitted as NO_2 . EPA stated that the initial concentration of NO_2 may be adjusted if adequate data are available to account for the expected rate of conversion (45 Fed. Reg. 31311, May 13, 1980). If either of these methods were adopted, the resulting ground-level NO_2 concentrations would be below the significance level. DER has agreed that an additional impact analysis is not required for NO_2 . (see Figure 7-3).

PSD Increment Consumption Analysis

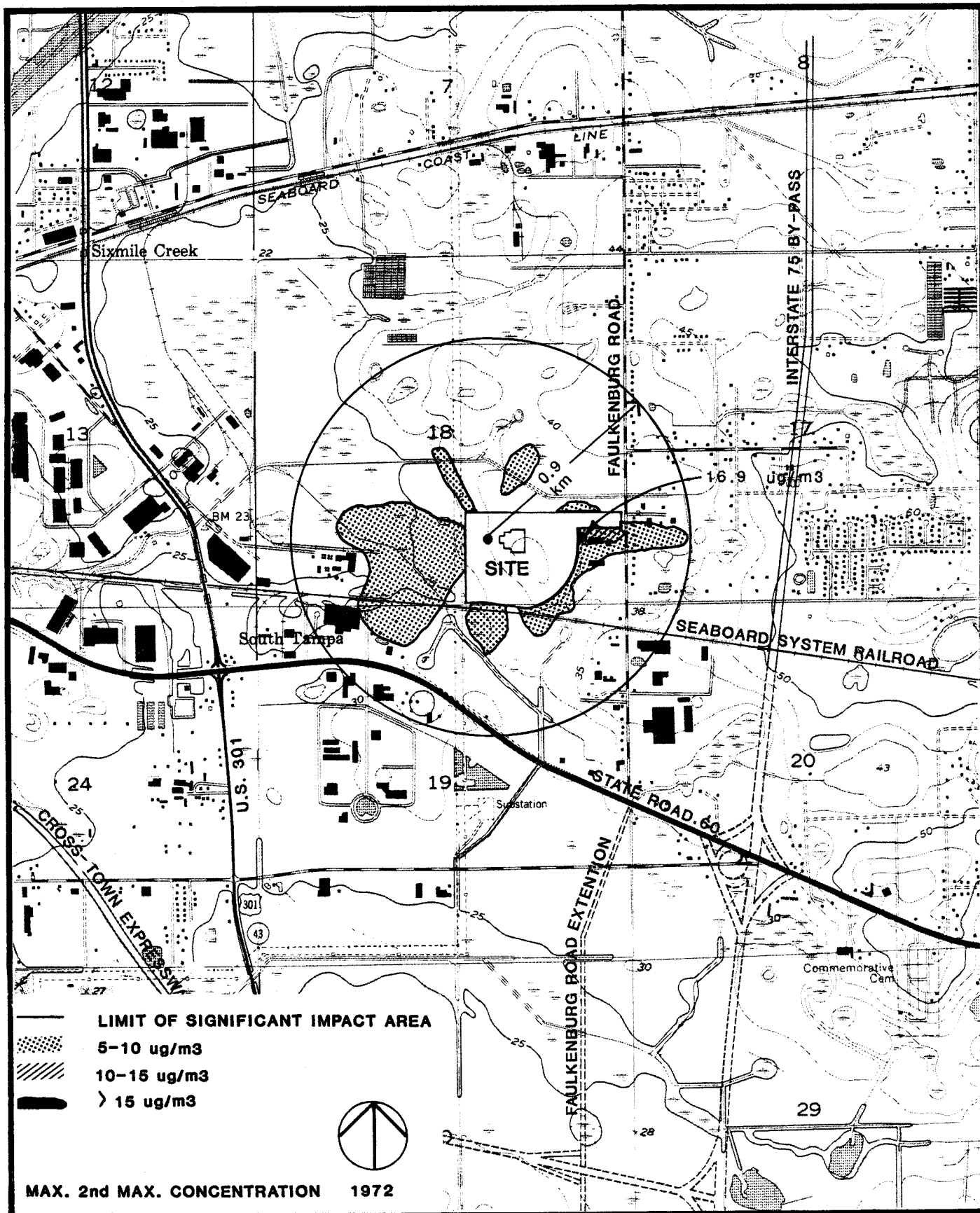
The PSD baseline date was triggered in December 1977 by the TECO Big Bend power plant. PSD increment must be shared between this and any other source permitted since that date. Other increment consuming sources include the McKay Bay and Pinellas County Resource Recovery facilities. Since the site is located in a TSP non-attainment area, particulate emissions are evaluated under the Non-attainment Area New Source Review provisions and not PSD. Thus, no TSP increment consumption analysis was conducted. The results of the SO_2 increment consumption analysis are presented in Table



HILLSBOROUGH COUNTY
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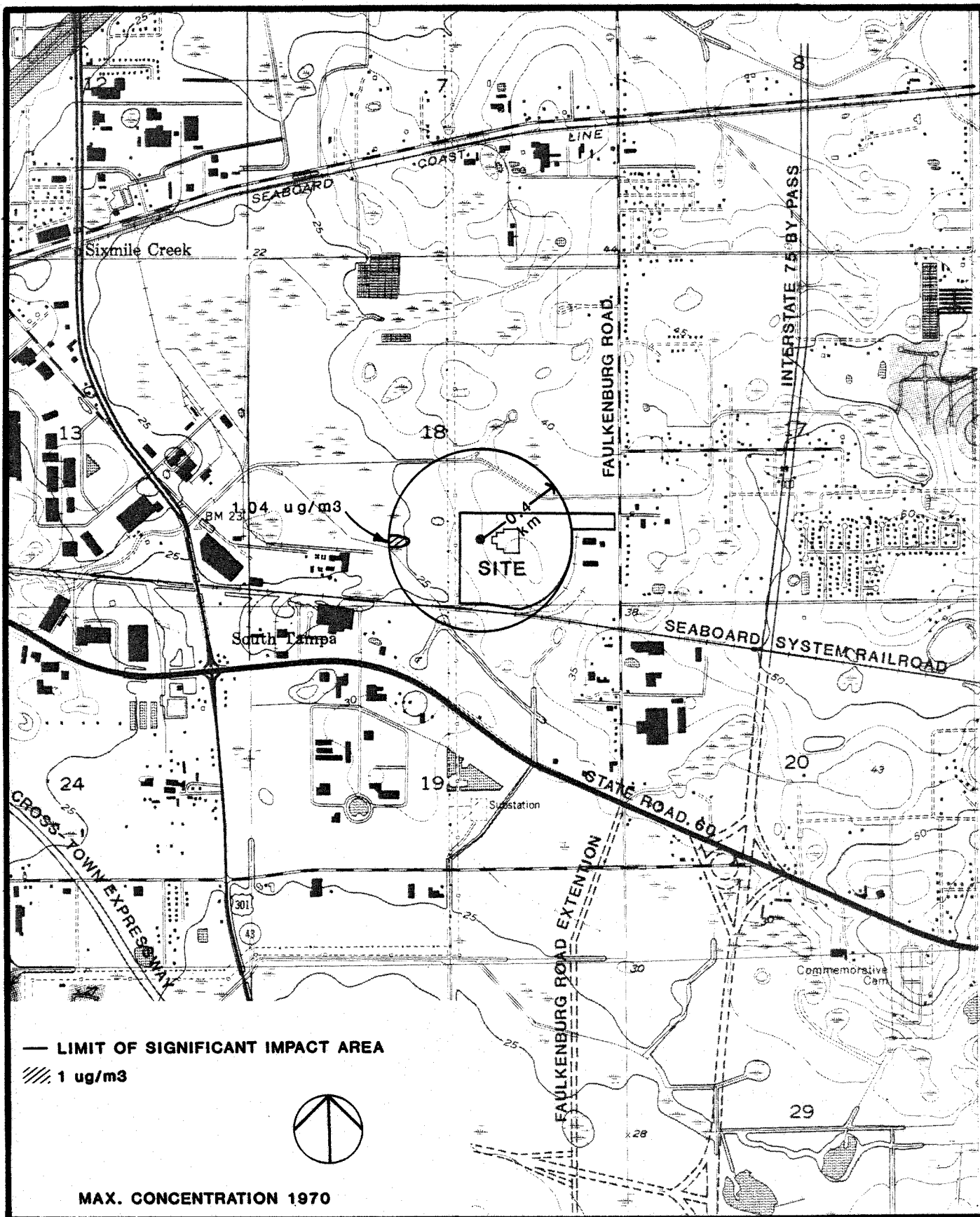
Figure 7-1
3-HOUR SO₂ SIGNIFICANT IMPACT AREA





HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

Figure 7-2
24-HOUR SO₂ SIGNIFICANT IMPACT AREA



HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

Figure 7-3
ANNUAL NO_x SIGNIFICANT IMPACT AREA

7-4. Since the proposed resource recovery facility will have a significant impact for the 3-hour and 24-hour SO₂ averaging periods, increment consuming sources are included in the increment analysis. The combined impact of the previously permitted PSD sources consume 47% of the 3-hour SO₂ and 62.9% of the 24-hour SO₂ increment. The proposed facility will consume 6.1% of the 3-hour SO₂ increment and 18.6% of the remaining 24-hour SO₂ increment. The annual SO₂ impact is less than the significance level, therefore no increment analysis is required.

FAAQS Compliance Analysis

A demonstration of compliance with the FAAQS is required only for those criteria pollutants that have a significant impact, i.e., for 3-hour and 24-hour SO₂. For the sake of completeness, measured background concentrations have been added to the highest, second-highest short-term and highest annual predicted facility impacts for the other criteria pollutant/averaging periods to estimate total ambient concentrations. The results of the FAAQS analysis are presented in Table 7-4.

Compliance for the 3-hour SO₂ and 24-hour SO₂ averaging periods was demonstrated by adding the highest, second-highest predicted SO₂ concentrations to the combined background concentrations. The combined background concentration used in this analysis is the sum of three separate components:

- measured ambient background SO₂ levels,
- predicted background SO₂ levels from PSD sources, and
- predicted background SO₂ levels from other existing major sources (excluding PSD sources).

The results of this analysis indicates compliance with NAAQS and FAAQS for all PSD pollutants over all averaging periods. For all the pollutants subject to PSD, the major contributor to ambient air quality was the combined background concentration.

TABLE 7-4
PSD AND FAAQS COMPLIANCE DEMONSTRATION

Pollutant	Averaging Period*	Proposed Impact (ug/m ³)	% of FAAQS (%)	PSD Sources (ug/m ³)	Other Major Sources (ug/m ³)	Monitored Background (ug/m ³)	PSD Increment Consumed (ug/m ³) (%)	Comparison to FAAQS (ug/m ³) (%)
Sulfur	3-hour	31.4	(2.4)	233.5	375.2	493	264.9 (51.7)	1133 (87.1)
Dioxide	24-hour	16.9	(6.5)	57.2	81.6	86	74.1 (81.4)	241.7 (93.0)
	Annual	0.9	(1.5)	----	----	16	-----	16.9 (28.2)
Carbon	1-hour	31.5	(0.1)	----	----	12,600	-----	12,632 (31.6)
Monoxide	8-hour	16.3	(0.2)	----	----	5,700	-----	5,716 (57.2)
Nitrogen Oxide	Annual	1.0	(1.0)	----	----	35	-----	36 (36.0)
Lead	3-month**	0.034	(2.1)	----	----	0.8	-----	0.83 (55.6)

* Impacts for averaging periods of 24-hours or less are the highest, second-highest concentrations; the annual and 3-month concentration are the highest concentrations.

** Obtained using Larsen's scaling method.

7.5 AIR QUALITY IMPACT OF NON-CRITERIA POLLUTANTS

In addition to the analysis of criteria pollutants, non-criteria PSD pollutants including HCl were analyzed. The non-criteria pollutants are designated as such because they have no widely established ambient standard. Some states, like New York, have published guidelines, defined as Ambient Acceptable Levels (AAL) which are based on the Threshold Limiting Values/Time Weighted Averages (TLV/TWA) established by the American Conference of Governmental and Industrial Hygienists (ACGIH). New York AAL's are annual concentrations and are 1/50 or 1/300 of the TLV/TWA depending on whether a particular pollutant is considered to have a low toxicity or a moderate to high toxicity. The guidelines are not standards and do not define legal limits, especially when they are used outside the state for which they were adopted. Thus, they will only be used here to establish whether the proposed impacts are relatively high or low. The maximum annual concentration for the non-criteria PSD pollutants and their corresponding AAL's or TLV's are listed in Table 7-5. HCl is not a PSD pollutant but was included at the request of DER. Since the predicted impacts are well below the corresponding guidelines, no adverse air quality impacts are anticipated.

TABLE 7-5

MAXIMUM IMPACTS OF OTHER REGULATED POLLUTANTS

<u>Pollutant</u>	<u>Averaging Period</u>	<u>Highest Predicted Concentration (ug/m³)</u>	<u>Concentrations (ug/m³)</u>		
			<u>NYAQS**</u>	<u>TLV</u>	<u>AAL</u>
Fluorides	24-hour	0.42	2.85	---	---
Beryllium	1-month*	1.58×10^{-5}	0.01	---	---
Mercury	8-hour	0.6×10^{-3}	---	50	---
	Annual	1.8×10^{-3}	---	---	0.17
Sulfuric Acid Mist	8-hour	0.95×10^{-2}	---	1,000	---
	Annual	2.7×10^{-2}	---	---	3.3
Hydrogen Chloride	8-hour	50.8	---	7,000	---
	Annual	1.42	---	---	140

* Obtained using Larson's scaling method.

** New York Ambient Air Quality Standard.

SECTION 8.0

ADDITIONAL IMPACT ANALYSES

8.0 ADDITIONAL IMPACT ANALYSES

This section describes the analysis performed to assess the impact of the proposed facility on Air Quality Related Values (AORVs) as required under the PSD regulations. The AORVs assessed are as follows:

- Visibility in Class I Areas within 100 Km, and
- Potential for impacts to soil and vegetation.

Analyses are also provided for assessing the potential for impact on Class I increments and non-attainment areas.

8.1 VISIBILITY

As required by the Clean Air Act, the potential for visibility degradation at Class I areas within 100 km has been assessed.

This section discusses the results of the Level-1 visibility screening analysis at Chassahowitzka National Wilderness Area (CNWA) for the proposed 1,600 tpd resource recovery facility. CNWA is located 79.6 km to the north-northeast (344°) from the proposed plant site. The Level-1 visibility screening analysis is a simple, straight-forward calculation designed to identify whether emissions from the proposed resource recovery facility would have any potential of adversely affecting visibility in CNWA, the closest Class I area to the proposed facility. If the project passes this first screening test, it is not likely to cause adverse visibility impairment, and further analysis becomes unnecessary. However, if the resource recovery project fails this test, additional analyses would be needed to quantify potential visibility impacts.

The Level-1 visibility screening analysis is described in detail by Latimer and Ireson (1980). Required inputs are source emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and total suspended particulates (TSP), as well as the minimum distance between the source and the Class I area and

the regional background visual range. The emission rates used are 4.46 g/s for TSP, 27.7 g/s for NO_x , and 23.1 g/s for SO_2 . The regional background visual range, taken from the workbook (Latimer and Ireson, 1980) is 25 km. The meteorology for maximum impact suggested by the workbook, which calls for stable (Pasquill-Gifford stability category F), light wind conditions with a 12-hour transport time to the closest Class I area, and limited mixing were assumed in the calculations.

Three parameters were calculated in the Level-1 visibility analysis: C_1 - plume contrast against the sky; C_2 - sky terrain contrast reduction; and C_3 - the change in sky terrain contrast caused by primary and secondary aerosols. If the absolute value of any of these parameters exceeds 0.10, then the source fails the Level-1 test and must proceed to the refined, Level -2 analysis. Table 8-1 presents the calculated value of these parameters, as well as the distance from the source where each parameter passed the Level-1 threshold value.

The results of the Level-1 calculation show the absolute value of all three parameters to be 2 to 3 orders of magnitude below the Level-1 test threshold. Therefore the proposed Hillsborough County Resource Recovery Facility is not likely to cause any visibility impairment at the Chassahowitzka National Wildlife Area.

8.2 GROWTH ANALYSIS

The proposed facility will employ approximately 58 persons. It is anticipated that the majority of these personnel requirements will be filled from within the local labor force. In-migration to the area is therefore not anticipated. As a result, no increase in population attributed to the facility in the area is expected to occur.

The project does not require the destruction, relocation, or alteration of any residential property in the area. In addition, since no net migration to the area is anticipated, there will be no change in demand for housing units in the area.

TABLE 8-1

VISIBILITY SCREENING PARAMETERS

<u>Location</u>	<u>Downwind Distance</u>	<u>Visibility Parameters</u>		
		<u>C1</u>	<u>C2</u>	<u>C3</u>
Chassahowitzka NWA	79.6 km	-0.009	0.008	0.002
Visibility Threshold	14 km	-0.098	0.103	0.001

The construction and operation of the proposed facility will have a minor positive net effect on industrial and commercial development. The facility will promote development by providing for solid waste disposal, and thereby be an integral part of the plans for development within Hillsborough County. It is not anticipated that this effect will be significant when considered on a regional basis.

The growth analysis indicates that no net significant change in employment, population, housing, or commercial/industrial development will be associated with the project. As a result, there will not be any significant increases in pollutant emissions indirectly associated with the proposed resource recovery facility.

8.3 SOILS AND VEGETATION IMPACT ANALYSIS

INTRODUCTION

This section contains a discussion of the potential impacts resulting from emissions from the proposed facility on soils and vegetation of commercial or recreational value as required by FDER Chapter 17-2.500(5)(e). As described in Section 8.2, the proposed facility will not result in significantly increasing associated commercial residential or industrial land uses in the area. Therefore, this section addresses the potential impact on soil and vegetation which may result directly from the proposed facility. Potential impacts from emissions may result from direct deposition of particulates or compounds on leaf surfaces or soils; absorption of emitted compounds by rain droplets and resultant depositions on leaf surfaces and soil with precipitation; absorption of gaseous materials by plant surfaces; and accumulation of emitted compounds in soils to elevated levels which may ultimately affect plant growth or use of the soil.

Air pollutants at elevated concentrations can affect soils and vegetation in a number of ways, although the interrelations between air quality, soil and vegetation are not fully understood (Last, 1982). Pollutant effects on vegetation can manifest itself as a partial destruction of the leaf surface, interference with plant metabolism, flowering and fruiting and may ultimately result in plant death. In agricultural areas potential reduction in crop yield is of concern.

In uncultivated areas inhibition of seed production resulting from significant air quality degradation can diminish the capacity for natural regeneration and cause, in time, the disappearance of some species.

The Florida Ambient Air Quality standards (FAAQs) were also established to protect non-health related parameters; such as vegetation, materials and visibility as well as human health. Pollutants for which standards have been set are: CO, NO_x, O₃, HC, TSP, Pb and SO₂. Maximum concentrations of pollutants emitted from the proposed Hillsborough County resource recovery facility are predicted to occur within one kilometer of the facility. These maximum concentrations will be within FAAQs. In addition, other pollutants are emitted from resource recovery facilities which are not specifically addressed by the FAAQs but may be injurious to plants at certain levels. It is therefore important to identify which types of plants are growing in the vicinity of the site and to determine if the ground level concentrations of pollutants predicted to occur as a result of the operation of the facility will cause any injury to these species.

EXISTING SOILS AND VEGETATION

Existing adjacent land uses to the proposed facility include vacant agricultural land, pasture land, commercial, light and heavy industrial uses, and residential. Directly north of the site, vacant agricultural land and pasture land is found as shown in Figure 2-4 in the Site Certification Application. Immediately adjacent to the site is an undeveloped wooded area. The majority of vegetation in the immediate site vicinity is comprised of pasture grasses, wetland vegetative types and forest species of which long leaf pine and live oak predominate with saw palmetto understory.

The majority of soils in the site vicinity are comprised of the somewhat poorly drained soils of the Leon-Immokalee association, the poorly drained soils of the Rutledge-Plummer association and the well drained soils of the Blanton-Lakeland-Eustis association. Other soil associations encountered within the area include the poorly drained Pompano-Felda-Manatee association, the very poorly drained organic soils of the Brighton-Terra-Ceia association and the well drained to excessively drained Pomello-St. Lucie-Lakewood soil association.

The soils of the Leon-Immokalee association have a characteristic organic pan and are generally used for range, pasture and forest. The Rutledge-Plummer association soils are less perfectly drained than the Leon-Immokalee association and are generally used for forest or, in some cases, pasture. The soils of the Blanton-Lakeland-Eustis association are well suited for many types of agricultural production including citrus crops and small fruits. Although the majority of agricultural production and pasture uses would occur on soils within the three above associations, specialty truck crops may be produced in organic soils of limited extent in the area.

Table 8-2 presents a listing of the different soil types found in the area and the plant communities that would normally be found associated with them. Table 8-3 presents both native and cultivated species that are found in the area. Many of the ornamental species presented in this listing are found to the west of the site, in the City of Tampa, and in the residential communities located to the east of the site. The closest active citrus groves to the site are located some three kilometers to the east, considerably beyond the point of maximum concentration which is within one kilometer of the site.

IMPACT ANALYSIS

The potential impact to soil and vegetation resulting from emissions from the proposed facility are discussed for the following specific compounds and materials: total suspended particulates (TSP); carbon monoxide (CO); sulfuric acid (H_2SO_4); sulfur dioxide (SO_2); nitrogen dioxide (NO_2); fluoride (F); lead (Pb); mercury (Hg); and beryllium (Be).

TABLE 8-2
SOIL AND VEGETATION COMMUNITIES

Soil Classification	Associated Major Community Species
Well drained deep sands	turkey oak, bluejack oak, slash pine, dogwood, hickory
Poorly drained sands over organic hardpans	pine flatwoods (slash pine, palmetto, wire grass)
Poorly drained sands over calcareous substrate	sabal palm, saw palmetto and wire grass
Well drained sands with phosphatic materials	live and laurel oaks, hickory, and pines
Tidal lands	white, black and red mangrove and black needlerush
Freshwater swamps	pond and bald cypress and sweet bay
Poorly drained acid sands	pine flatwoods (slash pine, palmetto, and wire grass)
Poorly drained neutral to alkaline soils	slash pine, water oaks and sweet bay
Poorly drained dark colored sands	pine flatwoods (slash pine, palmetto, and wire grass)
Urban lands	landscape plantings and backyard gardens; commercial/industrial open land is covered by Brazilian pepper
Agricultural lands	pasture land of bahia grass; some citrus groves (oranges, grapefruit)

Source: HDR, 1983

TABLE 8-3
LANDSCAPE, AGRICULTURE AND OTHER
NON-NATIVE SPECIES

Common Name	Genus	Species	Location
<u>Grasses</u>			
Bahiagrass	Paspalum	notatum	pastures and lawns
Bermudagrass	Cynodon	dactylon	lawns
St. Augustine Grass	Stenotaphrum	secundatum	lawns (most common lawn grass)
Wire Grass	Aristida	stricta	native; pine flatwoods
Panic Grass	Panicum	sp.	native; on disturbed sites
<u>Ground Coverings</u>			
Periwinkle	Vinca	spp	native; disturbed sites and landscape plantings
Lily-turn	Liriope	muscare	landscape plantings
<u>Flowers</u>			
Chrysanthemum	Chrysanthemum	indicum	landscape plantings
Begonia	Begonia	sp	landscape plantings & hanging baskets
Geranium	Pelargonium	sp	landscape plantings
Marigold	Tagetes	spp	landscape plantings
Phlox	Phlox	drummondii	native; along roads and railroad tracks
Rose	Rosa	spp	landscape plantings
<u>Bulbs</u>			
Day-lily	Hemerocallis	sp	landscape plantings
Canna lily	Canna	sp	landscape plantings
<u>Ferns</u>			
Asparagus Fern	Asparagus	sp	hanging baskets and window pots
<u>Succulents</u>			
Spanish Bayonet	Yucca	aloifolia	native; landscape plantings and along roadways
Century Plant	Agave	americana	landscape plantings

TABLE 8-3 (Continued)

Common Name	Genus	Species	Location
<u>Palms</u>			
Cabbage palm	Sabal	palmetto	native; prairies and landscape plantings (state fee)
Areca palm	Chrysalidocarpus	lutescens	landscape plantings
Canary Island date palm	Phoenix	canariensis	landscape plantings
Coconut palm	Cocos	nucifera	landscape plantings
Manila palm	Veitchia	merrillii	landscape plantings
Queen palm	Arecastrum	romanzoffianum	landscape plantings
<u>Native Trees</u>			
Slash Pine	Pinus	elliottii	pine flatwoods, swamps, & left on developed land
Longleaf Pine	Pinus	palustris	on drier sites and in landscapes
Live Oak	Quercus	virginiana	better, dry soils and landscapes
Water Oak	Quercus	nigra	poorly drained sites
Red Cedar	Juniperus	silicicola	soils underlain by calcareous material and landscapes
Sweet Gum	Liquidambar	styraciflua	poorly drained sands and loams
Sweet Bay	Magnolia	virginiana	poorly drained acid sands
Turkey Oak	Quercus	laevis	excessively drained sands
Bluejack Oak	Quercus	incana	excessively drained sands
Bald cypress	Taxodium	distichum	riverine swamps
Pond cypress	Taxodium	ascendens	cypress domes and depressed lands among pine flatwoods along ditches and streams
Black mangrove	Avicennia	nitida	tidal swamps
Red mangrove	Rhizophora	mangle	tidal swamps seaward of black mangrove
Hickory	Carya	sp	mesic forests

TABLE 8-3 (Continued)

Common Name	Genus	Species	Location
<u>Native Shrubs</u>			
Saw palmetto	Serenoa	sp	pine flatwoods and deep sands
Yaupon holly	Ilex	vomitorea	deep sands and landscapes
Gallberry	Ilex	coriacea	pine flatwoods
Wax myrtle	Myrica	certifera	pine flatwoods
<u>Exotic Species</u>			
Australian Pine	Casuarina	spp	along roads and property lines
Citrus	Sitrus	spp	oranges, grapefruits, limes, lemons, and tangerines in backyards or small groves
Jerusalem thorn	Parkinsonia	aculeata	disturbed open land and landscapes
Norfolk Island pine	Araucaria	excelsa	landscape plantings
Cajeput	Melaleuca	leucadendra	disturbed open land
Rubber tree	Ficus	sp.	landscape plantings
Banana	Musa	spp	landscape plantings
Sago palm	Cycas	revoluta	landscape plantings
Copper leaf	Acalypha	wilkesiana	landscape plantings
Croton	Cordia	variegatum	landscape plantings
Hibiscus	Hibiscus	spp.	landscape plantings
Oleander	Nerium	oleander	landscape plantings
Surinam cherry	Eugenia	uniflora	landscape plantings
Brazilian pepper			grows in dense thickets on disturbed open land.

Source: HDR, 1983

Total Suspended Particulates. Particulate matter can interfere with plant metabolism when large enough quantities coat leaf surfaces causing the blockage of gas and light exchange mechanisms. The specific sensitivity of plants to particulate matter produced by resource recovery facilities is not known, nor have levels which produce plant injuries from other sources been documented.

The proposed facility will contribute an annual average 0.17 ug/m^3 of TSP. The maximum observed level in 1983 was 54 ug/m^3 , to which the facilities emissions will add an insignificant amount.

Carbon Monoxide. Plants appear to be resistant to high levels of CO. In most species tested, exposure to 115 mg/m^3 for up to three weeks did not produce visible injury (Zimmerman, et al., 1983). More recently exposure to less than 27 ug/m^3 (Chakrabarti, 1976) also produced no visible injury.

The proposed facility will contribute a maximum average annual concentration of 0.62 ug/m^3 . Total concentrations, as a result of the operation of the proposed facility, will thus be considerably below concentrations causing visible injury to vegetation.

Sulfuric Acid. H_2SO_4 is formed when gaseous SO_3 produced by the facility reacts with water droplets. This acidified water vapor can result in acidic precipitation. It is difficult to predict the extent that H_2SO_4 produced by the facility will impact vegetation because (1) H_2SO_4 aerosols are neutralized by the presence of ammonia in the atmosphere (Huntzicher, et al., 1980); (2) when effects of acid precipitation on plants are observed they may be positive due to fertilization impacts of sulfur or negative due to the leaching of leaf surfaces; and (3) the impact of emissions of H_2SO_4 from a single facility on vegetation may be difficult to differentiate from the overall impacts of acid rain on vegetation.

Although evaluation of data relative to acidic precipitation impacts on vegetation is complex the majority of crop species studied to date indicates that exposure to simulated acid rain has little or no adverse impact on vegetative growth and yield.

The proposed facility will add an annual average of 0.03 ug/m^3 of H_2SO_4 . It is not anticipated that this concentration will contribute significantly to acidic precipitation when compared to existing concentrations and other major producers, such as fossil fuel power plants.

Sulfur Dioxide. Sensitivity of plant species to SO_2 appears to vary not only with the climate of an area, but with the duration of exposure. Garsed and Rutter (1982) reported that various species of conifer (Pinus sp.) had markedly differing sensitivities to levels of SO_2 ranging from 200 ug/m^3 for 11 months to 8000 ug/m^3 for 6 hours. A 14% reduction in relative growth rate was seen in one pine species at the 200 ug/m^3 dosage level. A number of oak and pine species (black and red oak, white pine) have been reported to develop visible injury when exposed to concentrations of SO_2 between 786 and $1,572 \text{ ug/m}^3$ for three hours (Jones, et al., 1974). Jones, et al. (1979), have reported a threshold value for foliar injury to certain species (blackberry winged sumac, other herbaceous species) at 340 ug/m^3 for 3 hours under environmental conditions which maximized plant sensitivity.

A maximum annual ground level concentration for SO_2 of 0.86 ug/m^3 is predicted for the Hillsborough County Facility. This value, when added to a background level of 16 ug/m^3 (see Table 4-3) is considerably below the concentration causing a reduction in relative growth rate of a pine species. The maximum background level of SO_2 over a three hour averaging period, however, is 493 ug/m^3 to which the facility will add 31.4 ug/m^3 . Existing maximum levels thus exceed threshold values for certain sensitive species under worst-case conditions.

Nitrogen Dioxide. Nitrogen dioxide can be beneficial to vegetation in specific amounts. Uptake of NO_2 varies with a number of factors such as nutrient supply in the soil, fertilization, and rainfall. NO_2 can also be converted to nitric acid and contribute to acid precipitation. Natural biological cycling of nitrogen compounds produces greater acidity than does atmospheric decomposition (Frink, et al., 1976).

Short-term injury threshold for NO_2 -tolerant species, such as corn and sorghum, has been found to be $24,400 \text{ ug/m}^3 \text{ NO}_2$ for a one-hour exposure when grown in a controlled environment (Heck and Tingey, 1970). Continuous exposure throughout the growth period to $470 \text{ ug/m}^3 \text{ NO}_2$ reduced size and productivity and increase senescence in tomatoes and navel oranges (Taylor, et al., 1975; Spierings, 1971). The concentration of NO_2 has been found to be a greater influence on the extent of injury than the length of exposure.

The greater-than-additive effect of NO_2 and SO_2 in combination on crops has been shown to vary between crop species and varieties. In a recent study of yield reduction in soybeans, no adverse effect was observed at atmospheric concentrations of $481 \text{ ug/m}^3 \text{ SO}_2$ in combination with 155 ug/m^3 of NO_2 (Amundson, 1983). The results of these investigations indicate that the presence of elevated levels of NO_2 in the atmosphere in combination with SO_2 above a threshold level can lead to adverse crop response. NO_2 concentrations below 120 ug/m^3 have not been reported to produce injury in the absence of other pollutants (Thompson, et al., 1974).

The proposed facility will produce a maximum annual NO_2 concentration of 1.04 ug/m^3 . The maximum annual ambient NO_2 concentration recorded in the county was 35 ug/m^3 . Total concentrations will thus be well below the estimated threshold level (120 ug/m^3) of injury to certain plants.

Fluoride. Fluoride is the most phytotoxic of the common air pollutants. Susceptible species can be injured at atmospheric concentrations 10 to 100 times lower than those of other major pollutants (0.8 ug/m^3) (Weinstein and Alscher-Herman, 1982). It accumulates in plants and can cause disease in herbivores which consume vegetation.

Thompson, et al. (1967), reported that Citrus sp. exposed to 0.32 to 0.77 ug HF/m^3 showed no reduction in photosynthesis. Gladiolus sp. were effected by HF at 1.2 ug/m^3 concentrations after 27 days exposure, but not at 0.8 ug/m^3 (Hill, 1969). One of the most sensitive responses of a plant to F is the production of SRS (suture red spots) on peach fruits (Weinstein

and Alscher-Herman, 1982). Exposure to the equivalent of 4 ug/m^3 for 5.25 days induced SRS in more than 50% of fruit (MacLean, et al., via Weinstein and Alscher-Herman, 1982).

Since most F is absorbed through the foliage of plants and stored there, the critical period of exposure is during the months of the growing season. Broadleaf plants which shed their leaves annually accumulate F on a yearly basis only; evergreen species, however, may accumulate F within foliage retained over several years (Sidhu, 1977; Amundson and Weinstein, 1980). Studies by Sidhu (1977, 1978) indicated that defoliation occurred after accumulated F levels in vegetation reached 35 ppm. This threshold level was attained when atmospheric F concentrations during the growing season averaged 0.20 ug/m^3 for conifers and 0.4 ug/m^3 for deciduous, broadleaf species.

Levels of fluoride predicted to be emitted by the Hillsborough County resource recovery facility, 0.02 ug/m^3 (as HF) as an annual average, are below levels seen to cause damage in even the most sensitive species tested.

Lead. Studies have shown that soils are capable of fixing large additions of lead compounds absorbed from the atmosphere (Chapman, 1966). Natural soils typically contain 2-200 ppm of lead (Allaway, 1968). Lead is strongly adsorbed in soils, therefore only minor amounts are available for uptake by vegetation.

Although lead in soils is largely unavailable to plants, the primary entryway of lead into vegetation is through the root system (Zimdahl, 1976). Lagerwerff (1971) found that in radishes grown in an area contaminated by auto emissions, nearly all of the lead in the roots and 60% of the lead in the above-ground parts was attributable to soil, not airborne lead.

Lead toxicity has not been observed in plants growing under natural conditions, except in areas adjacent to heavy emission sources.

The maximum annual predicted incremental ground level pollutant concentration of lead resulting from the proposed facility is 0.02 ug/m^3 which is a relatively low concentration when compared to heavy emission sources.

Mercury. Mercurial compounds emitted to the atmosphere could affect plants by either foliar adsorption or by uptake and translocation from soils (CAST, 1976).

The levels at which adverse impacts to vegetation would result from Hg emissions and deposition, however are not expected to result strictly due to resource recovery facility operations. Grasses growing near an active mercury mine and refining facility in Almadén, Spain, contained levels of Hg 10 to 20 times the world average with no reported vegetative damage (Lundberg, et al., 1979). The concentration of mercury in the soils near the mine ranged from 2.5 to 100 mg/kg whereas the average level of Hg in soils is 0.05 mg/kg (Bohn, et al., 1977). The accumulation of mercury by plants is therefore more of concern due to bioaccumulation in the food chain than due to phytotoxic effects even at these elevated levels. The effects of applying 10 mg/kg of Hg to soils in an experiment to evaluate uptake of Hg by bromegrass indicated that considerable accumulation of Hg was found in the plant root system and only small amounts were translocated to the above ground portions of the plant (Hogg, et al., 1978). The environmental hazards associated with high levels of mercury deposition to soils at waste application sites has therefore been identified as those related to ingestion of soil and plant parts by grazing animals. In the above studies the environmental concentrations of mercury are considerably greater than those expected in the vicinity of the proposed facility. Vegetative impacts are therefore not expected to occur.

Of greater importance is the potential for biomagnification through the food chain, particularly in the vicinity of the proposed resource recovery facility where cattle graze in neighboring pastureland. The predicted mercury impact from the proposed facility, 0.0018 ug/m^3 as an annual average, is considered to be so small that the bioaccumulation/biomagnification of this metal should not present a problem.

Beryllium. Beryllium is highly toxic to plants due to poisoning of plant metabolic functions and nutrient depletion. Visual toxicity and decreases in growth rates have been observed in bean plants grown in nutrient solutions of 3-5 ppm (Romney, et al., 1962). Since Be is more strongly immobilized in calcareous soils, the sensitivity of vegetation to Be is reduced as soil pH is increased (Lisk, 1972) Be content of typical soils range from 0.5 to 10 mg/kg (Bohn, et al., 1977).

Although Be is toxic to plants when added to soils, it associates with organic matter hazards and tends to precipitate as hydroxides, which renders it less available for plant uptake.

The predicted annual Be impact from the proposed facility, 4.9×10^{-7} ug/m³ as an annual average, is so small compared to naturally occurring levels that no toxic effects to vegetation are anticipated.

Hydrogen Chloride. Gaseous HCl will be emitted from the proposed facility as a result of the combustion of certain materials contained in the refuse (especially plastics). HCl fallout onto soil does not pose a serious risk to vegetation. HCl disassociates in soil, and the Cl which occurs in a dissolved form is generally leached from the soil with precipitation. Since it is therefore unavailable for uptake through plant roots, indirect injury to vegetation through the soil is unlikely (Guderian, 1977).

Studies of plant growth in an environment containing gaseous HCl have reported that exposures on the order of 10,000 ug/m³ for 1 to 2 hours will produce plant injury. Intermittent exposure to concentrations of approximately 50 ug/m³ were found to pose minimal risk to sensitive vegetation (Guderian, 1977). Benedict (1974) suggested that concentrations ranging from approximately 6,000 ug/m³ for 1.5 hours to 372 ug/m³ for 120 hours or below would provide for adequate protection from HCl injury.

The proposed facility will increase HCl concentrations by a 1-hour maximum of 109 ug/m³ and an annual average of 1.4 ug/m³. Peak and long term concentrations are well below levels specifically documented to cause

injury and those proposed as adequate for vegetation protection. Therefore, HCl emissions are not expected to adversely impact local vegetation.

8.4 SPECIAL RECEPTOR ANALYSIS

The impact of the proposed emission on the nearest Class I area and Pinellas County SO₂ non-attainment area were evaluated, as required by DER. This analysis included placing a receptor at the corners of the SO₂ non-attainment and Class I areas closest to the proposed source for each of the five years modeled and comparing the predicted impact to the corresponding significance limits. For Class I areas the significance impact levels for 24-hour TSP and SO₂ concentrations are much lower and therefore more stringent than any other area.

CLASS I AIR QUALITY ANALYSIS

As mentioned in section 8.1, the class I area nearest to the facility is the Chassakowitzka National Wildlife Area (CNWA) located 79.6 km to the north-northwest. An analysis of potential impacts on this area was performed using the ISC dispersion model and the same five year meteorological data set and source input values employed for the compliance demonstration in section 7. The pollutants analyzed are those with specified increments, namely SO₂ and TSP, as well as NO₂, and CO. These four were chosen due to their regulatory status as criteria pollutants, and the significance of their emissions.

Table 8-4 presents the results of this analysis for the averaging periods of interest. X/O (concentration/emission rate) values are presented in this table for 1 gram/second emission rate. The day and year of the predicted maximum is also listed. Table 8-5 details the maximum concentration and the appropriate significance level for the four pollutants at the proposed emission rates. As can be noted from Table 8-5, all predicted impacts are approximately 10% or less of their respective significance levels. Therefore, no significant impact is predicted at the CNWA.

TABLE 8-4
SPECIAL RECEPTOR MODELING RESULTS

<u>Averaging Period</u>	<u>Receptor</u>	<u>Maximum X/Q</u>	<u>Day</u>	<u>Year</u>
Annual	SO ₂ NA ^a	0.00192	--	1970
	Class I ^b	0.00059	--	1971
24-hour	SO ₂ NA	0.01864	355	1970
	Class I	0.01256	46	1974
8-hour	SO ₂ NA	0.05118	355	1972
	Class I	0.03858	46	1974
3-hour	SO ₂ NA	0.12345	355	1972
	Class I	0.10289	46	1972
1-hour	SO ₂ NA	0.24369	2	1974
	Class I	0.18397	347	1970

a - SO₂ Non-Attainment Area, modeled at 43.5 km at 296° from proposed source.

b - Chassahowitzka National Wildlife Area, modeled at 79.6 km at 344° from proposed source.

TABLE 8-5
MAXIMUM CONCENTRATIONS -- SPECIAL RECEPTORS

<u>Pollutant</u>	<u>Averaging Time</u>	<u>Receptor</u>	<u>Maximum Concentration (ug/m3)</u>	<u>PSD Significant Impact Level</u>
SO ₂	Annual	SO ₂ NA	0.04	1
		Class I	0.01	1
	24-hour	SO ₂ NA	0.4	5
		Class I	0.3	1
	3-hour	SO ₂ NA	2.9	25
		Class I	2.4	25
TSP	Annual	Class I	0.003	1
	24-hour	Class I	0.06	1
NO ₂	Annual	Class I	0.02	1
CO	8-hour	Class I	0.6	500
	1-hour	Class I	3.1	2000

SO₂ NON-ATTAINMENT AREA ANALYSIS

As identified in Table 8-4, an SO₂ non-attainment area is located 43.5 km west-northwest (296°) of the proposed resource recovery plant. An analysis similar to that used for the CNWA Class I area was conducted. Results of the analysis is presented in Tables 8-4 and 8-5. As with the Class I area, no significant impact is predicted.

SECTION 9.0

EMISSION OFFSETS

9.0 EMISSION OFFSETS

The proposed Hillsborough County Resource Recovery Facility will be located in an ozone (O_3) and total suspended particulate matter (TSP) non-attainment area. The entire county is classified as non-attainment with respect to the standards for O_3 . The TSP non-attainment area is defined as a circle with a 12 km radius centered at the intersection of U.S. 41 and State Road 60. The Non-attainment Area New Source Review regulations provide that major sources emitting the affected pollutant at amounts equal to or greater than 100 tons per year are subject to obtain emission offsets. Resource recovery facilities need not obtain all the necessary offsets prior to the issuance of a permit to construct, as long as the best effort was made to obtain the required offsets, all available offsets have been secured, and a commitment is made to continue to seek emission offsets and apply them as the offsets become available (FAC 17-2.510(3)(c)).

Ozone is a secondary pollutant formed by interactions of primary pollutants, primarily hydrocarbons, and is not directly emitted in any discernable amount from the proposed facility. Therefore, hydrocarbon emissions are regulated to achieve compliance with the ambient O_3 standard. The maximum allowable annual emission rate for hydrocarbons from the proposed facility is 58 tons per year. Since this is less than the 100 tons per year cutoff level, the application of LAER and emission offsets are not required for this pollutant.

The maximum allowable annual particulate emission rate for the proposed resource recovery facility is 140 tons per year, which does not exceed the 100 ton per year threshold. The facility is, therefore, subject to the application of LAER and the commitment of emission offsets for particulate matter. To obtain these offsets a list of major sources of particulate matter was compiled from the 1982 emission inventory maintained by the Hillsborough County Environmental Protection Commission. Three sources were identified: Gardiner Inc., General Portland Inc., and Tampa Electric Company. Hillsborough County has sent a letter to each of these sources

requesting available offsets. The responses from these letters will be forwarded to the Florida DER as they are received. Hillsborough County will apply any and all offsets when they become available.

MAJOR SOURCES OF PARTICULATE EMISSIONS
WITHIN THE TSP NON-ATTAINMENT AREA

NAME OF FIRM

TELEPHONE

1. Allen Morrison, Environmental and Chemical
Services Manager
Gardinier, Inc.
P.O. Box 3269
Tampa, Florida 33601 (813) 677-9111
2. Henry Winders, Environmental Manager (813) 872-7777
c/o Bob Pretat, Senior Plant Engineer
General Portland, Inc., Fla. Division
P.O. Box 1002
Tampa, Florida 33601
3. Jerry L. Williams, Director - Environmental Planning (813) 228-4837
Tampa Electric Company
P.O. Box 111
Tampa, Florida 33601

COUNTY



OF HILLSBOROUGH

P.O. BOX 1110 TAMPA, FLORIDA 33601

NORMAN W. HICKEY, COUNTY ADMINISTRATOR

July 19, 1984

Jerry L. Williams, Director-Environmental Planning
Tampa Electric Company - Tampa
P.O. Box 111
Tampa, Florida 33601

Dear Mr. Williams:

Hillsborough County will be constructing a 1200 ton per day solid waste energy resource recovery facility on a 50 acre site north of State Road 60 and west of Faulkenburg Road. This facility will take municipal solid waste generated within the unincorporated areas of Hillsborough County and convert it into electricity for sale to the Tampa Electric Company. Each of the three boilers will be fitted with an electrostatic precipitator and operate at the lowest achievable emission rate for particulate matter.

The State of Florida non-attainment new source review regulations require that emission offsets be obtained for non-attainment pollutants emitted from sources located in non-attainment areas. Because the Faulkenburg Road site is located within a Total Suspended Particulate (TSP) non-attainment area in Hillsborough County, the County is seeking TSP offsets from other major particulate sources.

Emission offsets represent a reduced emission rate due to improved particulate control, reduced operating hours, or some other means. If your firm possesses such offsets, please contact Dr. Marc Rogoff, at (813)272-6674.

Your time and consideration are appreciated.

Sincerely,

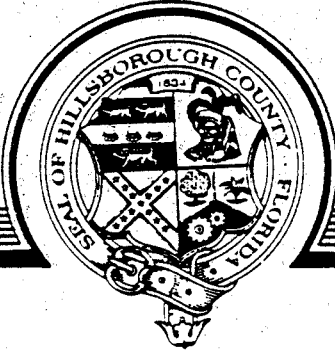
A handwritten signature in cursive script, reading "Warren N. Smith".

Warren N. Smith, Director
Department of Solid Waste

WNS/pd

COUNTY OF HILLSBOROUGH

P.O. BOX 1110 TAMPA, FLORIDA 33601



NORMAN W. HICKEY, COUNTY ADMINISTRATOR
July 19, 1984

Robert Pretat, Senior Plant Engineer
General Portland, Inc., Florida Division
P.O. Box 1002
Tampa, Florida 33601
Attn: Henry Winders, Environmental Engineer

Dear Mr. Pretat:

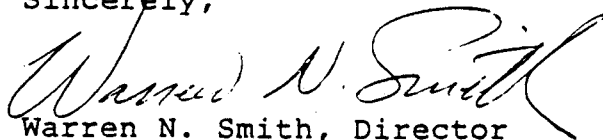
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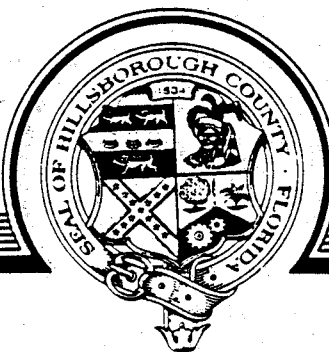


Warren N. Smith, Director
Department of Solid Waste

WNS/pd

COUNTY OF HILLSBOROUGH

P.O. BOX 1110 TAMPA, FLORIDA 33601



NORMAN W. HICKEY, COUNTY ADMINISTRATOR

July 19, 1984

Allen Morrison, Environmental
and Chemical Services Manager
Gardinier, Inc.
P.O. Box 3269
Tampa, Florida 33601

Dear Mr. Morrison:

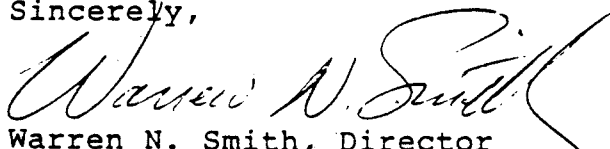
Hillsborough County will be constructing a 1200 ton per day solid waste energy resource recovery facility on a 50 acre site north of State Road 60 and west of Faulkenburg Road. This facility will take municipal solid waste generated within the unincorporated areas of Hillsborough County and convert it into electricity for sale to the Tampa Electric Company. Each of the three boilers will be fitted with an electrostatic precipitator and operate at the lowest achievable emission rate for particulate matter.

The State of Florida non-attainment new source review regulations require that emission offsets be obtained for non-attainment pollutants emitted from sources located in non-attainment areas. Because the Faulkenburg Road site is located within a Total Suspended Particulate (TSP) non-attainment area in Hillsborough County, the County is seeking TSP offsets from other major particulate sources.

Emission offsets represent a reduced emission rate due to improved particulate control, reduced operating hours, or some other means. If your firm possesses such offsets, please contact Dr. Marc Rogoff, at (813)272-6674.

Your time and consideration are appreciated.

Sincerely,



Warren N. Smith, Director
Department of Solid Waste

WNS/pd

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Exhibit A

SCREENING MODEL ANALYSIS

EXHIBIT A

SCREENING ANALYSIS FOR WORST CASE BOILER LOADING CONDITIONS

A screening analysis, using the expected air pollutant emission rates from the proposed Hillsborough Resource Recovery Facility, has been performed to identify those conditions and pollutants which warrant additional review. As the boiler's operating load changes the plume dispersion characteristics change. The condition yielding the greatest air quality impact must be identified for future modeling activities. The pollutant impacts must be assessed for their potential for significant impact. Pollutants displaying no such potential may be subject to a less rigorous review. Finally the areas downwind of the plume subject to the greatest impact, must be identified so that receptor placement in a more refined analysis will yield the maximum pollutant concentrations.

The Industrial Source Complex Short-Term (ISCST) dispersion model was applied with a range of meteorological conditions. The facility is situated in a rural setting, therefore, the rural option was employed (based on EPA recommended methodology-[Auer, 1978]) in the execution of the model. With the proposed stack height being below the GEP height for the facility, the building induced downwash option was employed. The receptor locations, meteorological conditions and the scaling factors to determine the concentrations for various short-term averaging periods were approved by FDER. A summary of those options and conditions used in the initial screening model analysis are located in Tables A-1 and A-2.

The boiler loads examined are those representing the maximum (110% load), typical (100% load), and minimum (50% load) operating conditions. The heat content of the refuse was also investigated by making modeling runs using values of 4,000 and 4,500 Btu/lb. These boiler loads and heating values are summarized into four cases (Table A-3). The stack parameters and

TABLE A-1
MODEL OPTIONS USED IN SCREENING MODEL ASSESSMENT

<u>Options</u>	<u>Description</u>	
Dispersion Parameter	Rural	
Wind Profile Exponent	<u>Stability</u>	<u>Exponent</u>
	A	.10
	B	.15
	C	.20
	D	.25
	E	.30
	F	.30
Vertical Potential Temp. Gradient	Default	
Plume Rise	Transitional	
Stack Tip Downwash	Not Used	
Number of Receptors	38	
Entrainment Coefficient for Unstable Atmosphere	Beta 1 - .600	
Entrainment coefficient for Stable Atmosphere	Beta 2 - .600	
Anemometer Height	10.0m	
Decay Coefficient	0.0	
Building Induced Downwash	Yes	

TABLE A-2

METEOROLOGICAL CONDITIONS USED IN SCREENING MODEL ANALYSIS

<u>Stability</u>	<u>Mixing Height (m)</u>	<u>Winds Speed (m/s)</u>
A	5000	1.0
A	5000	2.0
A	5000	3.0
B	5000	1.0
B	5000	2.0
B	5000	3.0
B	5000	4.0
B	5000	5.0
C	5000	1.0
C	5000	3.0
C	5000	5.0
C	5000	7.0
C	5000	10.0
D	5000	1.0
D	5000	3.0
D	5000	5.0
D	5000	7.0
D	5000	10.0
D	5000	12.0
D	5000	15.0
D	5000	20.0
E	5000	1.0
E	5000	3.0
E	5000	5.0
F	5000	1.0
F	5000	3.0

TABLE A-3

BOILER OPERATING CONDITIONS

CASE	Refuse Fired ⁽¹⁾		Flue Exit (from all 4 boilers)			
	Heat Content (BTU/lb)	Firing Rate* (TPD)	Exit Gas Temperature °F (°K)	Flow Rate ACFM	Exit Gas Velocity fps** (m/s)	
A	4,000	440	430 (494)	343,635	55.2	(16.82)
B ⁺	4,500	400	455 (508)	351,030	56.4	(17.19)
C	4,000	200	430 (494)	156,190	25.1	(7.65)
D	4,000	400	430 (494)	312,395	50.3	(15.32)

(1) Norminal Facility Capacity is 1,600 tpd (400 tpd for 4 boilers).

*Per boiler (4 boiler total).

**Flue diameter = 5.75 ft (1.75 m) for an effective diameter of 3.5 m.

+Case B is the typical load case firing reference waste.

building dimensions used in the screening runs are listed in Table A-4. Table A-5 shows the emission rates for each of the pollutants examined. The stack parameters and emission rates reflect the variations in the boiler operating conditions.

The ground level concentrations shown in Table A-6 are scaled, using the wind direction persistence scaling factors from the maximum one-hour concentration calculated in each of the screening runs. These concentrations represent a conservative analysis particularly for pollutant concentrations with longer averaging times.

The results indicate that the maximum load case (Case A) of 110% of nameplate rating, firing a waste with a low BTU content (4,000 BTU/lb) produced the highest ground level pollutant impacts. The results tabulated in Table A-6 indicate a potential for significant SO₂ impact.

The areas downwind of the plume showing greatest impact are between 0.3 and 0.7 km. During the refined modeling analysis receptors would be concentrated within this range.

Although there is no generally accepted scaling factor for estimating maximum annual concentrations from 1-hour modeled values, the potential for a significant annual impact for SO₂ and NO₂ exists. This is based on the ratio of maximum modeled annual concentrations to 1-hour concentrations of 0.05 from other modeling studies involving a single facility. Actual determination of significant impacts and significant impact areas were based on the refined modeling analysis presented in Exhibit C. This analysis consisted of employing a computer-simulated dispersion model using sequential meteorological data from Tampa International Airport. The results from this analysis were used to further quantify the impacts from the proposed facility on the surrounding area.

TABLE A-4

STACK PARAMETERS USED IN SCREENING MODEL ASSESSMENT

Base Elevation	-	12.1 meters
Stack Height	-	67.0 meters
Exit Temperature	-	494.0 °K Cases A,C & D 508.0 °K - Case B
Exit Velocity	-	Case A - 16.82 m/s Case B - 17.19 m/s Case C - 7.65 m/s Case D - 15.32 m/s
Effective Stack Diameter	-	3.5 meters
Building Height	-	42.7 meters
Building Width		51.5 meters
Building Length		22.9 meters
Maximum Projected Width		56.4 meters
Equivalent Length/Width		49.9 meters

TABLE A-5

EMISSION ESTIMATES FROM PROPOSED FACILITY

<u>Pollutant</u>	<u>Emission Rate (grams/sec)⁽¹⁾</u>		
	<u>Case A</u>	<u>Case B,D</u>	<u>Case C</u>
Particulate Matter	4.47	4.06	2.03
Sulfur Dioxide	23.1	21.0	10.5
Nitrogen Oxides	27.7	25.2	12.6
Carbon Monoxide	16.6	15.1	7.6

(1) Combined emission rates for all four boilers operating under the condition defined by the corresponding case.

TABLE A-6

SUMMARY OF SCREENING MODELING RESULTS

<u>Pollutant</u>	<u>Averaging Period</u>	<u>MAXIMUM CONCENTRATION ($\mu\text{g}/\text{m}^3$)</u>				<u>Significant Impact Level</u>
		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	
TSP	24 hr	3.1	2.8	2.1	2.9	5
SO ₂	3 hr	36.0	32.1	25.0	33.8	25
	24 hr	16.0	14.3	11.1	15.0	5
CO	1 hr	28.7	25.6	20.0	27.0	2,000
	8 hr	20.1	18.0	14.0	18.9	500
NO ₂	1 hr	47.9	42.7	33.4	45.1	*

*No significant impact level is defined for NO₂ for a 1-hour averaging time. Its supplied only to make an approximation of the annual NO₂ impact.

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

November 8, 1983

Mr. Donald M. Pomelia
Camp, Dresser, and McKee Inc.
One Center Plaza
Boston, Massachusetts 02108

Re: Hillsborough County Resource Recovery Project

Dear Mr. Pomelia:

Enclosed please find copies of the meteorological data from Tampa, Florida for the specified days you requested.

The proposed modeling methodology you have outlined in your November 4, 1983 letter is appropriate and acceptable for the air quality analysis. In addition to the placement of the receptors you have noted, additional receptors should be placed at the boundaries of any Class I area within 100 kilometers of the source and along the boundary of any nonattainment area within 50 kilometers of the sources unless it is clear from the screening modeling that these areas will not be significantly impacted.

If we can be of any further assistance please let us know.

Sincerely,

A handwritten signature in cursive script, appearing to read "Thomas C. Rogers".

Thomas Rogers
Meteorologist

TR/s
enclosures
cc: Larry George

EXHIBIT B
METEOROLOGICAL DATA

METEOROLOGICAL DATA
ASSOCIATED WITH
HIGHEST CONCENTRATIONS

Meteorological Data

The meteorological data corresponding to the highest, second-highest (HSH) concentrations corresponding to each of the short-term averaging times is listed in the following tables. These tables are presented chronologically. The averaging periods are block averages, for example, eight 3-hour averages and one 24-hour average would be calculated for each day.

The concentrations corresponding to the highest 3-hour and highest 8-hour averaging times occur in 1972 on day 50 (Table B-1) during period five (hours 13 to 15) and period two (9 to 16) respectively. These periods are characterized by a moderate northwest wind during neutral stability conditions.

The highest 24-hour pollutant concentration occurs on day 173 of the year 1972. This day is characterized by moderate westerly winds under neutral stability conditions. The following day, 174 (Table B-3) corresponds to the HSH 24-hour concentration. The conditions on this day are similar to the previous day.

The concentrations corresponding to the HSH 8-hour averaging time occur in 1972 on day 175 (Table B-4) in period one (hours 1 to 8). The conditions on this day are similar to the two previous days with moderate westerly winds and neutral stability.

The meteorological data in 1973 day 355 (Table B-5) period 3 (hours 7 to 9) produce the HSH 3-hour concentrations. Neutral stability and moderate northwest winds prevail during this period.

The highest and HSH 1-hour concentrations occur in 1974 on day 351 during hour 21 and 22 respectively. The conditions associated with these hours are moderate west-northwest winds and stable stability.

Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.

Table B-1

*** HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY 1972 ***

* METEOROLOGICAL DATA FOR DAY 50 *

HRUR	FLOW VECTOR (DEGREES)	RANDOM FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	INPUT STABILITY CATEGORY	ADJUSTED STABILITY CATEGORY
1	150.0	154.0	8.23	1220.4	286.5	4	4
2	150.0	150.0	7.20	1234.9	285.4	4	4
3	150.0	150.0	5.66	1249.3	284.3	4	4
4	150.0	153.0	6.69	1263.7	283.7	4	4
5	150.0	154.0	6.17	1278.1	283.2	4	4
6	140.0	141.0	5.66	1292.6	282.6	4	4
7	130.0	133.0	8.23	1307.0	282.6	4	4
8	110.0	113.0	7.72	1321.4	283.2	4	4
9	130.0	132.0	11.32	1335.9	284.3	4	4
10	120.0	117.0	12.86	1350.3	284.8	4	4
11	130.0	131.0	13.38	1364.7	285.9	4	4
12	130.0	133.0	14.40	1379.1	285.9	4	4
13	130.0	132.0	15.43	1393.6	285.4	4	4
14	130.0	131.0	13.89	1408.0	285.4	4	4
15	130.0	130.0	13.38	1408.0	284.8	4	4
16	130.0	127.0	12.35	1408.0	284.3	4	4
17	140.0	140.0	9.26	1408.0	284.3	4	4
18	150.0	153.0	9.20	1408.0	283.7	4	4
19	150.0	151.0	7.20	1408.0	282.6	4	4
20	140.0	144.0	9.23	1408.1	283.2	4	4
21	150.0	149.0	7.20	1409.8	282.6	4	4
22	150.0	150.0	7.72	1410.4	282.6	4	4
23	150.0	153.0	6.75	1411.1	282.6	4	4
24	150.0	158.0	7.20	1411.8	281.5	4	4

Table B-2

*** HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY 1972 ***

* METEOROLOGICAL DATA FOR DAY 173 *

HOUP	FLOW VECTOR (DEGREES)	RANDOM FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	INPUT STABILITY CATEGORY	ADJUSTED STABILITY CATEGORY
1	70.0	74.0	5.14	979.6	298.7	5	5
2	60.0	60.0	6.17	948.1	299.3	4	4
3	80.0	76.0	6.17	916.5	299.3	4	4
4	70.0	74.0	6.69	884.9	299.3	4	4
5	90.0	88.0	7.20	853.3	299.3	4	4
6	80.0	80.0	7.20	821.7	299.3	4	4
7	60.0	76.0	6.69	790.1	299.8	4	4
8	90.0	92.0	7.72	758.5	300.4	4	4
9	80.0	84.0	8.23	726.9	300.9	4	4
10	80.0	79.0	7.20	695.4	300.9	4	4
11	90.0	91.0	8.75	663.8	301.5	4	4
12	90.0	93.0	8.23	632.2	302.0	4	4
13	90.0	92.0	8.23	600.6	302.6	4	4
14	90.0	87.0	8.23	569.0	302.6	4	4
15	90.0	86.0	7.72	569.0	302.6	4	4
16	90.0	93.0	7.20	569.0	302.6	4	4
17	90.0	94.0	7.20	569.0	302.0	4	4
18	90.0	92.0	7.20	569.0	300.9	4	4
19	90.0	92.0	5.14	569.0	300.9	4	4
20	93.0	91.0	5.14	591.5	300.4	4	4
21	90.0	91.0	5.14	630.2	299.8	4	4
22	90.0	89.0	4.12	666.8	299.8	4	4
23	90.0	87.0	5.14	707.4	299.8	4	4
24	90.0	93.0	6.69	746.1	299.8	4	4

Table B-3

*** HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY 1972

* METEOROLOGICAL DATA FOR DAY 174 *

HOUR	RANDOM		WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP.. (DEG. K)	INPUT STABILITY CATEGORY	ADJUSTED STABILITY CATEGORY
	FLOW VECTOR (DEGREES)	FLOW VECTOR (DEGREES)					
1	80.0	77.0	5.66	784.6	299.8	4	4
2	80.0	83.0	5.14	823.3	299.8	4	4
3	90.0	94.0	6.17	861.9	299.8	4	4
4	90.0	88.0	6.17	900.5	299.8	4	4
5	90.0	87.0	6.17	939.2	299.8	4	4
6	90.0	89.0	6.17	977.8	299.8	4	4
7	90.0	86.0	4.63	1016.5	299.8	4	4
8	90.0	94.0	5.14	1055.1	300.4	4	4
9	90.0	88.0	6.17	1093.8	300.9	4	4
10	90.0	91.0	6.17	1132.4	301.5	4	4
11	100.0	103.0	6.69	1171.1	302.0	4	4
12	100.0	97.0	6.69	1209.7	302.6	4	4
13	100.0	103.0	7.20	1246.4	303.2	4	4
14	100.0	103.0	7.20	1287.0	303.2	3	3
15	90.0	91.0	8.23	1287.0	303.2	4	4
16	100.0	97.0	7.72	1287.0	303.2	4	4
17	90.0	88.0	7.20	1287.0	302.0	4	4
18	90.0	92.0	7.72	1287.0	302.0	4	4
19	90.0	92.0	6.69	1287.0	300.9	4	4
20	90.0	89.0	5.66	1291.6	300.4	4	4
21	90.0	89.0	6.17	1299.7	300.4	4	4
22	90.0	94.0	5.14	1307.7	299.8	4	4
23	80.0	85.0	5.14	1315.7	299.8	4	4
24	80.0	85.0	5.14	1323.7	299.8	4	4

Table B-4

*** HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY 1972

* METEOROLOGICAL DATA FOR DAY 175 *

HOOR	FLOW VECTOR (DEGREES)	RANDOM FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	INPUT STABILITY CATEGORY	ADJUSTED STABILITY CATEGORY
1	90.0	91.0	5.14	1331.7	299.8	4	4
2	90.0	90.0	5.66	1339.7	299.8	4	4
3	90.0	91.0	7.20	1347.8	299.8	4	4
4	90.0	87.0	7.72	1355.8	299.8	4	4
5	90.0	93.0	7.20	1363.8	299.8	4	4
6	90.0	86.0	5.66	1371.8	299.8	4	4
7	100.0	99.0	7.20	1379.9	299.8	4	4
8	90.0	92.0	7.72	1387.9	299.8	4	4
9	110.0	114.0	4.12	1395.9	299.3	4	4
10	90.0	92.0	3.09	1403.9	302.0	4	4
11	100.0	97.0	7.72	1411.9	302.0	4	4
12	100.0	105.0	6.09	1420.0	303.2	4	4
13	90.0	91.0	6.17	1428.0	303.2	3	3
14	90.0	91.0	7.20	1436.0	303.7	3	3
15	90.0	92.0	6.17	1436.0	303.2	4	4
16	100.0	101.0	6.17	1436.0	303.2	4	4
17	90.0	86.0	5.66	1436.0	303.2	4	4
18	90.0	89.0	5.14	1436.0	302.0	4	4
19	90.0	91.0	4.03	1436.0	300.9	4	4
20	80.0	85.0	4.12	1421.3	299.8	5	5
21	80.0	77.0	4.12	1395.8	299.8	5	5
22	90.0	89.0	5.14	1370.3	299.8	5	5
23	80.0	79.0	5.14	1344.7	299.8	4	4
24	90.0	90.0	6.17	1319.2	299.8	4	4

Table B-5

*** HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY 1973 ***

* METEOROLOGICAL DATA FOR DAY 355 *

HOOR	FLOW VECTOR (DEGREES)	RANDOM FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	INPUT STABILITY CATEGORY	ADJUSTED STABILITY CATEGORY
1	110.0	106.0	9.77	244.2	288.7	4	4
2	100.0	104.0	10.29	254.9	287.6	4	4
3	110.0	113.0	10.29	265.6	287.0	4	4
4	110.0	107.0	6.69	276.2	285.9	4	4
5	130.0	126.0	7.72	286.9	285.4	4	4
6	130.0	126.0	7.72	297.6	284.8	4	4
7	130.0	129.0	7.20	308.3	284.3	4	4
8	130.0	130.0	8.23	318.9	284.3	4	4
9	130.0	127.0	8.23	329.6	285.4	4	4
10	140.0	142.0	8.23	340.3	285.9	4	4
11	120.0	117.0	8.75	351.0	287.0	4	4
12	110.0	111.0	10.29	361.6	286.5	4	4
13	120.0	123.0	9.26	372.3	285.9	4	4
14	120.0	116.0	8.23	383.0	285.9	4	4
15	120.0	124.0	9.26	383.0	285.4	4	4
16	130.0	134.0	9.26	383.0	284.6	4	4
17	130.0	128.0	7.72	383.0	283.7	4	4
18	140.0	140.0	7.20	388.3	282.0	4	4
19	140.0	140.0	5.14	400.8	280.9	5	5
20	140.0	147.0	4.63	413.4	279.3	5	5
21	160.0	165.0	4.63	426.0	279.3	5	5
22	160.0	160.0	3.60	438.6	278.7	5	5
23	180.0	178.0	3.60	451.2	278.2	5	5
24	200.0	203.0	3.60	463.8	277.6	5	5

Table B-6

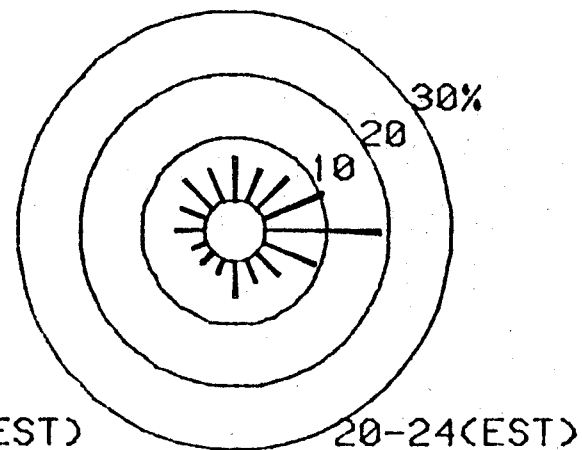
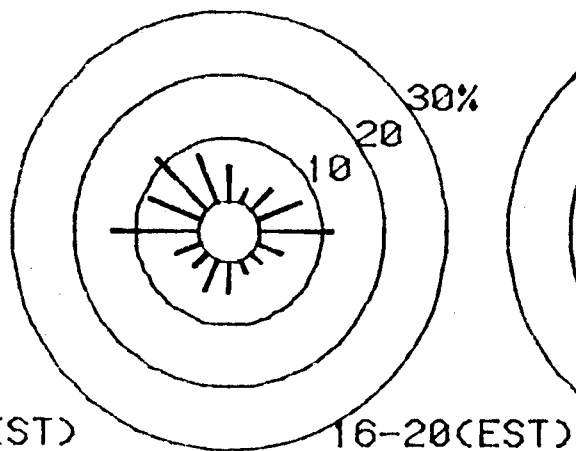
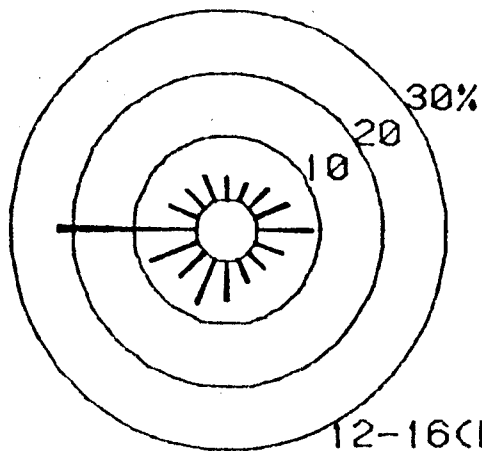
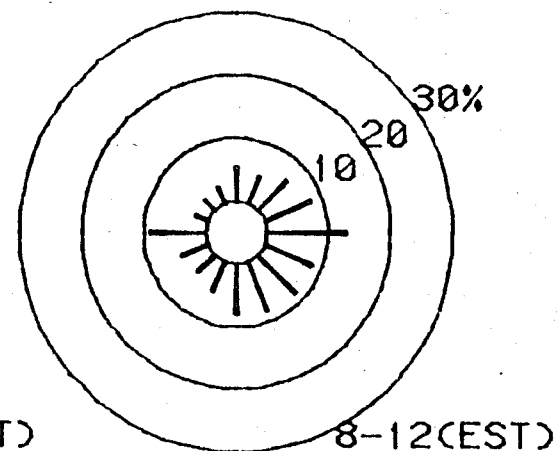
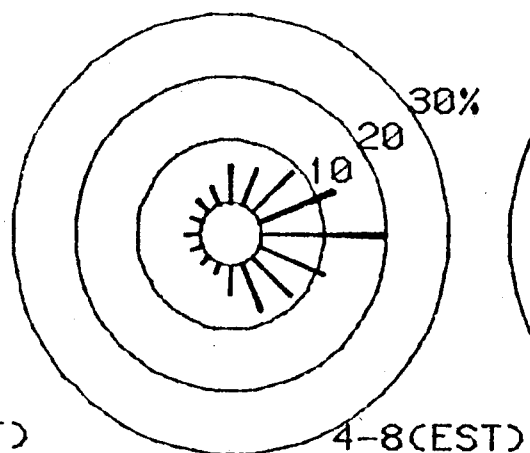
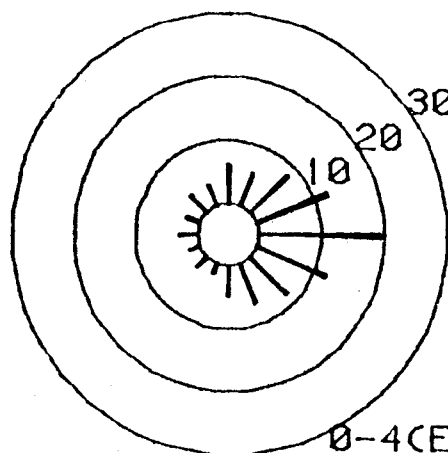
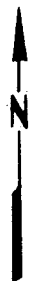
*** HILLSBOROUGH COUNTY RESOURCE RECOVERY FACILITY 1974 ***

* METEOROLOGICAL DATA FOR DAY 351 *

HOUP	FLOW VECTOR (DEGREES)	RANDOM FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	INPUT STABILITY CATEGORY	ADJUSTED STABILITY CATEGORY
1	150.0	150.0	3.60	636.1	286.5	4	4
2	170.0	172.0	1.54	648.0	285.9	5	5
3	190.0	192.0	2.57	659.8	285.4	5	5
4	350.0	347.0	1.54	671.0	284.8	6	6
5	90.0	87.0	1.54	683.5	285.4	6	6
6	90.0	93.0	1.00	695.3	285.4	6	6
7	140.0	141.0	2.06	707.1	285.4	5	5
8	120.0	125.0	1.54	70.1	285.4	4	4
9	120.0	120.0	1.00	198.4	286.5	3	3
10	110.0	113.0	2.06	316.7	288.2	3	3
11	20.0	25.0	3.09	435.1	289.8	4	4
12	30.0	31.0	4.12	553.4	290.4	3	3
13	150.0	155.1	10.29	671.7	288.2	4	4
14	130.0	133.0	7.20	790.0	289.3	4	4
15	120.0	121.0	7.20	750.0	289.8	4	4
16	120.0	116.0	7.72	790.0	289.3	4	4
17	130.0	127.0	5.14	790.0	287.6	4	4
18	140.0	143.0	5.14	793.0	286.5	5	5
19	140.0	140.0	2.57	799.6	284.1	6	6
20	100.0	103.0	1.54	806.3	283.7	6	6
21	110.0	109.0	7.20	812.9	286.5	6	6
22	110.0	109.0	5.59	819.6	286.5	5	5
23	140.0	140.0	6.17	826.2	286.5	4	4
24	140.0	144.0	5.56	832.9	285.4	4	4

SEASONAL/DIURNAL WIND ROSES

DIURNAL WIND DIRECTION ROSES

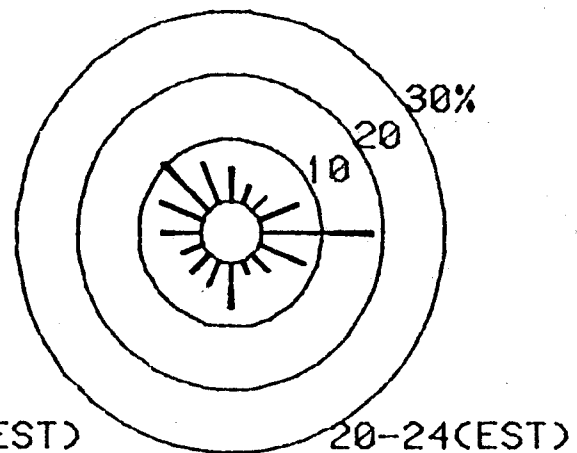
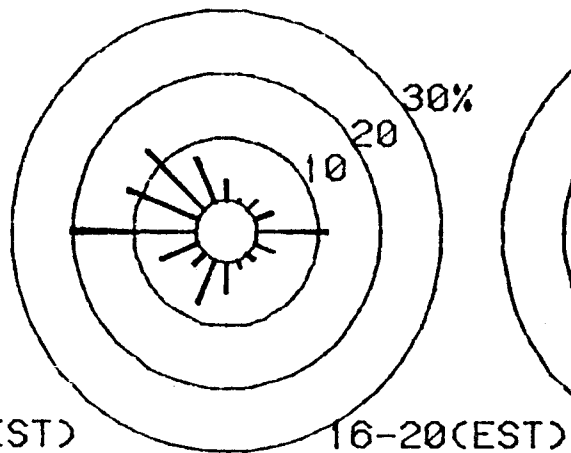
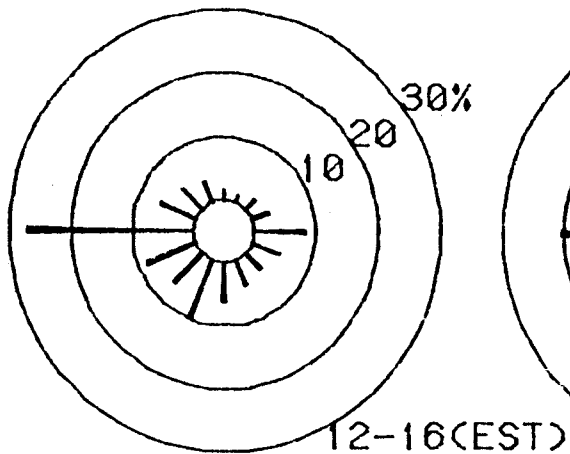
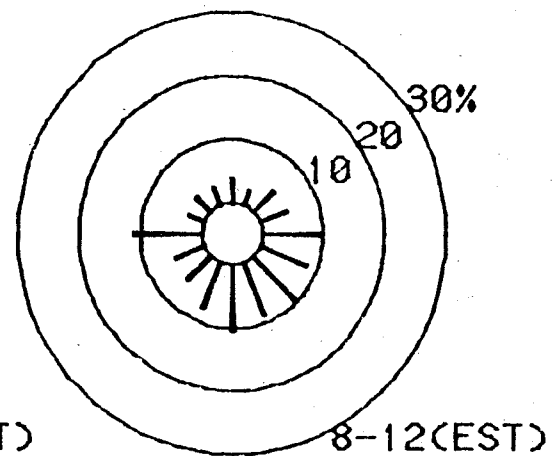
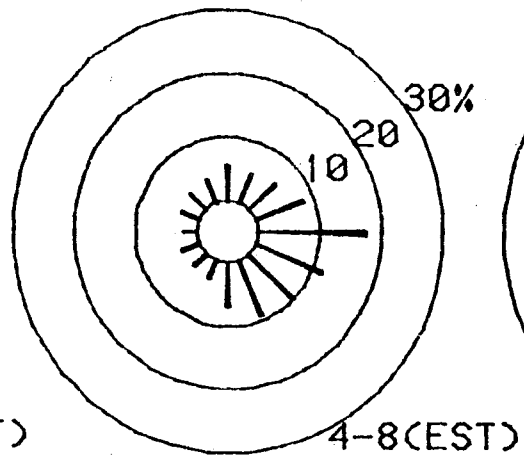
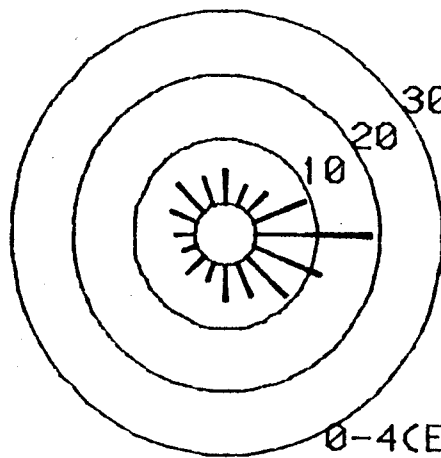


ALL SEASONS (1970 through 1974)

HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE B-1
DIURNAL WIND DIRECTION ROSES

DIURNAL WIND DIRECTION ROSES

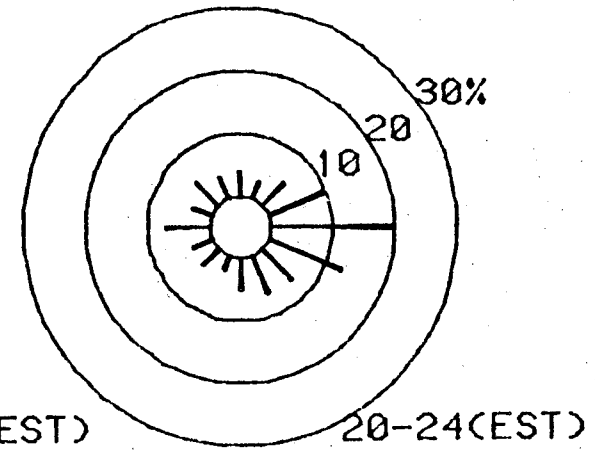
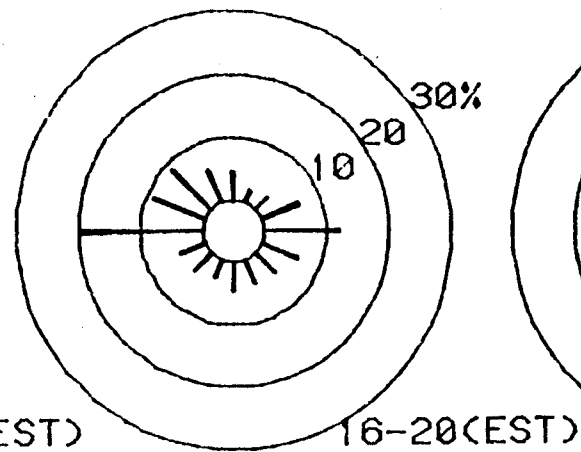
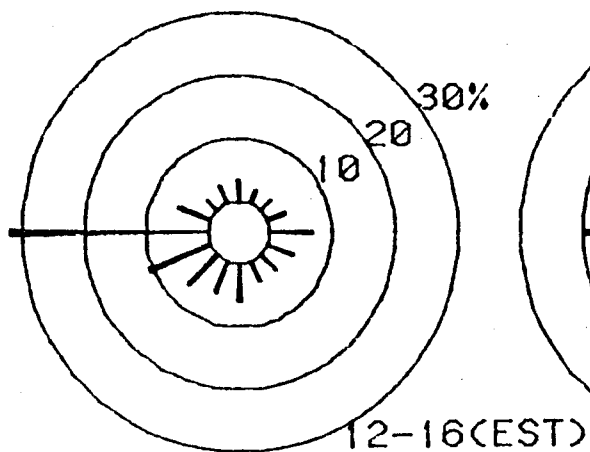
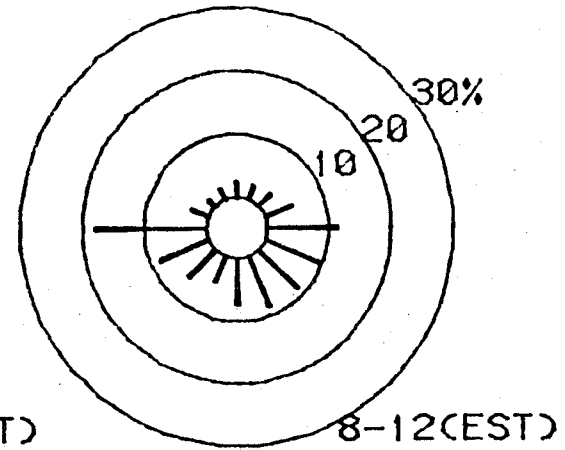
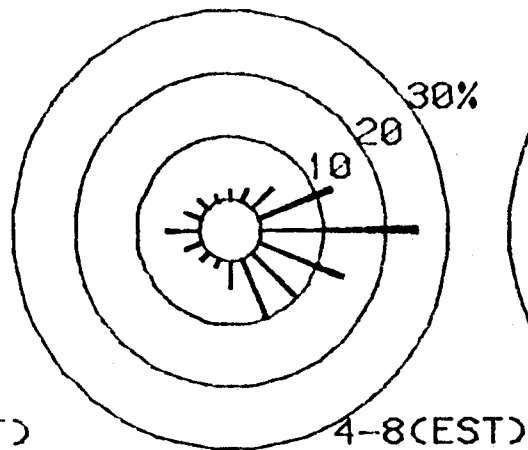
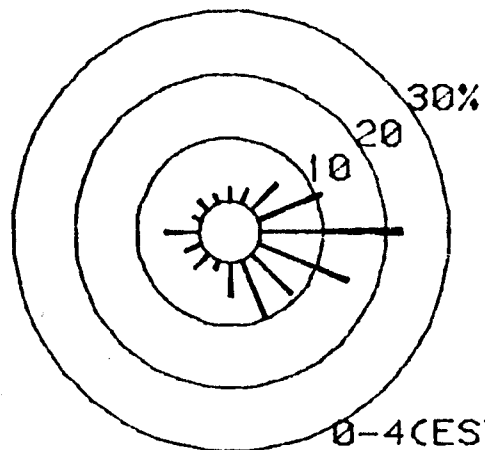
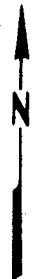


SPRING SEASONS (1970 through 1974)

HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE B-2
DIURNAL WIND ROSES FOR SPRING

DIURNAL WIND DIRECTION ROSES

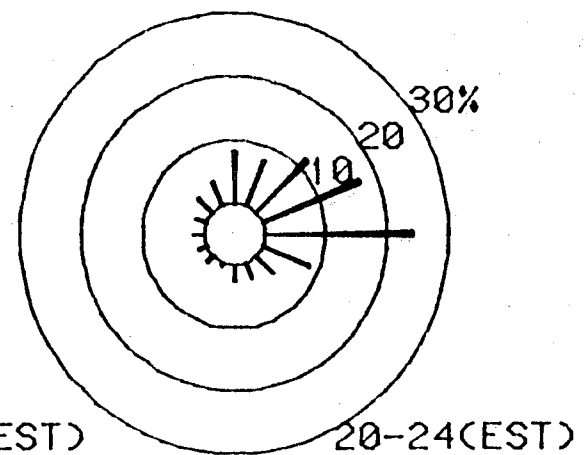
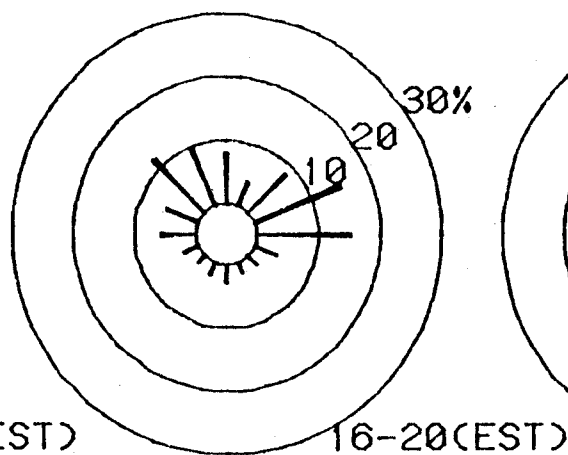
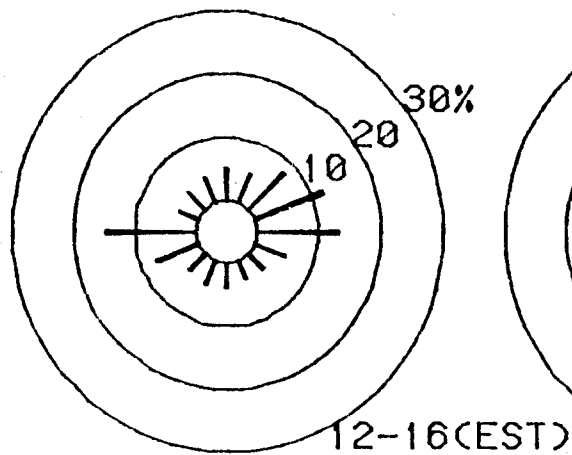
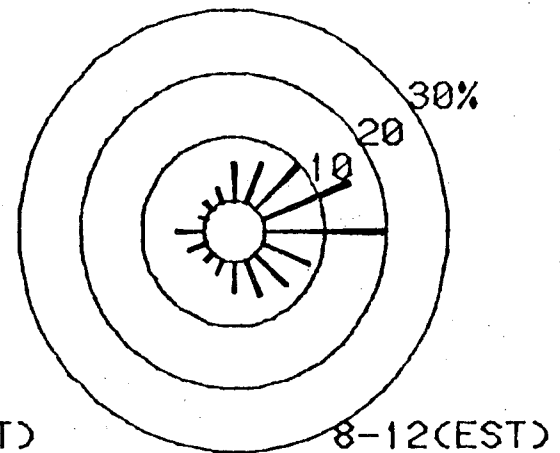
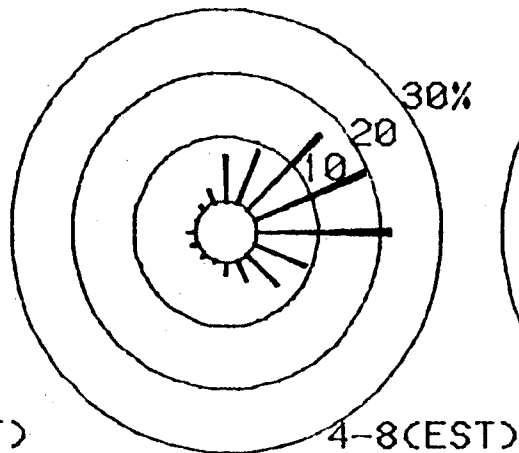
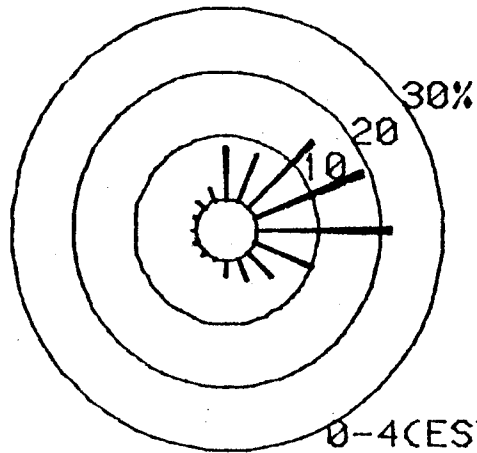
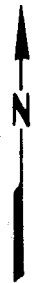


SUMMER SEASONS (1970 through 1974)

HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE B-3
DIURNAL WIND ROSES FOR SUMMER

DIURNAL WIND DIRECTION ROSES

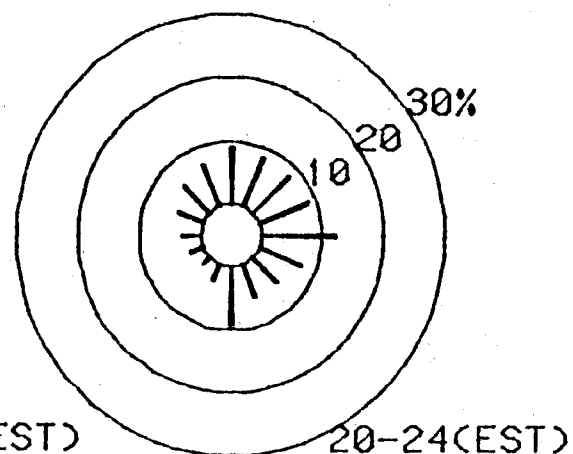
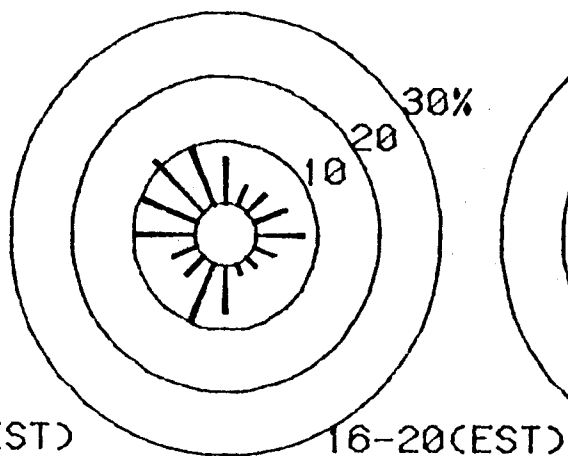
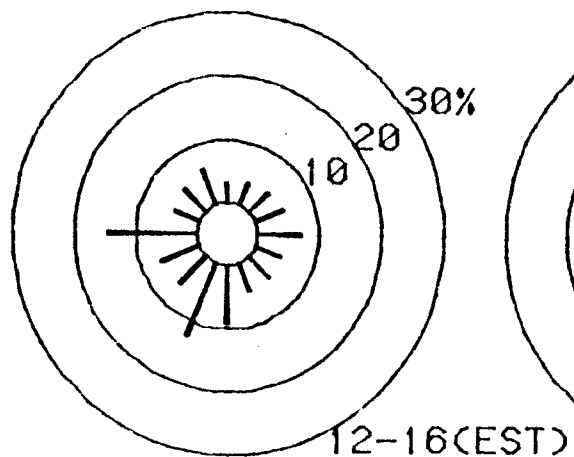
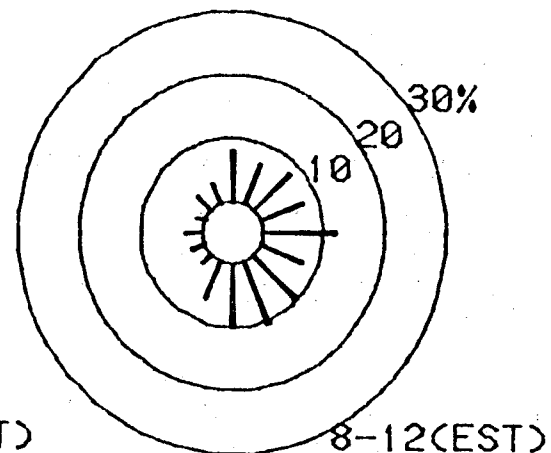
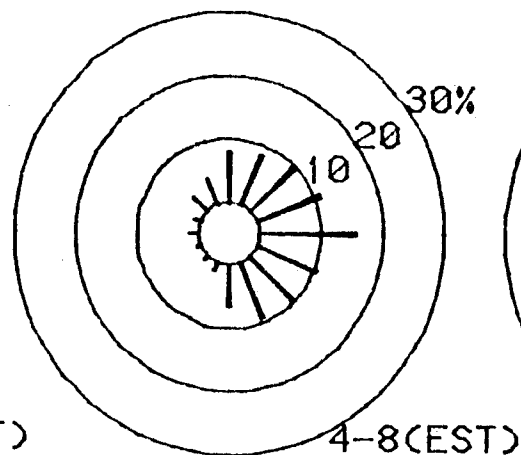
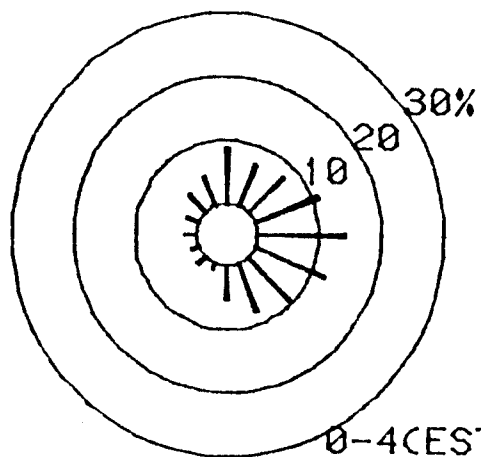


FALL SEASONS (1970 through 1974)

HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE B-4
DIURNAL WIND ROSES FOR FALL

DIURNAL WIND DIRECTION ROSES



WINTER SEASONS (1970 through 1974)

HILLSBOROUGH COUNTY
ENERGY RECOVERY PROJECT

FIGURE B-5
DIURNAL WIND ROSES FOR WINTER

STABILITY/WIND
FREQUENCY DISTRIBUTIONS

Table B-7

METEOROLOGY FOR TAMPA INTERNATIONAL AIRPORT
HILLSBOROUGH COUNTY RESOURCE RECOVERY PROJECT

STABILITY WIND ROSE

STABILITY CLASS A

FROM JAN. 1 1970 THROUGH DEC. 31 1974

DIRECTION	+-----WIND SPEED CLASSES (MPS)-----+						TOTAL	AVERAGE WIND SPEED
	0-2	2-3	3-5	5-8	8-11	>11		
N	0.00	0.08	0.00	0.00	0.00	0.00	0.08	0.00
NNE	0.00	0.29	0.00	0.00	0.00	0.00	0.29	0.45
NE	0.00	0.42	0.00	0.00	0.00	0.00	0.42	0.95
ENE	0.00	0.61	0.00	0.00	0.00	0.00	0.61	0.91
E	0.00	0.84	0.00	0.00	0.00	0.00	0.85	1.00
ESE	0.01	0.67	0.00	0.00	0.00	0.00	0.67	1.68
SE	0.00	0.40	0.00	0.00	0.00	0.00	0.41	2.19
SSE	0.00	0.19	0.00	0.00	0.00	0.00	0.19	2.88
S	0.00	0.23	0.00	0.00	0.00	0.00	0.24	1.17
SSW	0.00	0.05	0.00	0.00	0.00	0.00	0.05	6.31
SW	0.00	0.12	0.00	0.00	0.00	0.00	0.13	0.80
WSW	0.00	0.11	0.00	0.00	0.00	0.00	0.11	1.57
W	0.01	0.23	0.00	0.00	0.00	0.00	0.24	0.77
WNW	0.00	0.19	0.00	0.00	0.00	0.00	0.20	1.32
NW	0.00	0.47	0.00	0.00	0.00	0.00	0.47	0.50
NNW	0.00	0.49	0.00	0.00	0.00	0.00	0.49	1.12
TOTAL	0.05	5.40	0.00	0.00	0.00	0.00	5.45	1.21
AVG SPD	1.40	1.39	0.00	0.00	0.00	0.00	1.21	1.21

Table B-8

METEOROLOGY FOR TAMPA INTERNATIONAL AIRPORT
HILLSBOROUGH COUNTY RESOURCE RECOVERY PROJECT

STABILITY WIND ROSE

STABILITY CLASS B

FROM JAN. 1 1970 THROUGH DEC. 31 1974

DIRECTION	+-----WIND SPEED CLASSES (MPH)-----+						TOTAL	AVERAGE WIND SPEED
	0-2	2-3	3-5	5-8	8-11	>11		
N	0.01	0.01	0.03	0.00	0.00	0.00	0.06	2.84
NNE	0.01	0.05	0.12	0.00	0.00	0.00	0.18	3.12
NE	0.01	0.05	0.13	0.00	0.00	0.00	0.19	3.20
ENE	0.01	0.04	0.19	0.00	0.00	0.00	0.24	3.27
E	0.02	0.08	0.33	0.00	0.00	0.00	0.42	3.32
ESE	0.03	0.06	0.18	0.00	0.00	0.00	0.27	3.07
SE	0.02	0.06	0.24	0.00	0.00	0.00	0.32	3.30
SSE	0.01	0.05	0.24	0.00	0.00	0.00	0.30	3.28
S	0.01	0.04	0.28	0.00	0.00	0.00	0.33	3.44
SSW	0.01	0.04	0.28	0.00	0.00	0.00	0.33	3.56
SW	0.01	0.04	0.39	0.01	0.00	0.00	0.44	3.63
WSW	0.00	0.05	0.53	0.00	0.00	0.00	0.59	3.65
W	0.02	0.09	0.81	0.01	0.00	0.00	0.94	3.66
WNW	0.01	0.02	0.12	0.01	0.00	0.00	0.15	3.48
NW	0.01	0.02	0.04	0.00	0.00	0.00	0.06	2.99
NNW	0.01	0.03	0.07	0.00	0.00	0.00	0.11	3.02
TOTAL	0.20	0.70	3.99	0.04	0.00	0.00	4.93	3.43
AVG SPD	1.60	2.56	3.77	5.62	0.00	0.00	3.43	3.43

Table B-9

METEOROLOGY FOR TAMPA INTERNATIONAL AIRPORT
HILLSBOROUGH COUNTY RESOURCE RECOVERY PROJECT

STABILITY WIND ROSE

STABILITY CLASS C

FROM JAN. 1 1970 THROUGH DEC. 31 1974

DIRECTION	+-----WIND SPEED CLASSES (MPS)-----+						TOTAL	AVERAGE WIND SPEED
	0-2	2-3	3-5	5-8	8-11	>11		
N	0.01	0.02	0.08	0.03	0.00	0.00	0.14	3.98
NNE	0.01	0.06	0.33	0.15	0.00	0.00	0.56	4.23
NE	0.02	0.06	0.42	0.18	0.00	0.00	0.67	4.24
ENE	0.03	0.10	0.63	0.32	0.00	0.00	1.08	4.24
E	0.02	0.16	1.02	0.47	0.01	0.00	1.68	4.27
ESE	0.02	0.12	0.63	0.30	0.00	0.00	1.07	4.25
SE	0.02	0.09	0.59	0.29	0.00	0.00	0.99	4.30
SSE	0.02	0.08	0.60	0.32	0.00	0.00	1.03	4.34
S	0.06	0.08	0.48	0.33	0.01	0.00	0.96	4.34
SSW	0.04	0.05	0.52	0.37	0.01	0.00	0.99	4.52
SW	0.01	0.05	0.48	0.22	0.00	0.00	0.77	4.28
WSW	0.01	0.09	0.69	0.36	0.00	0.00	1.16	4.36
W	0.03	0.09	1.44	1.36	0.05	0.00	2.97	4.85
WNW	0.04	0.04	0.27	0.22	0.02	0.00	0.59	4.55
NW	0.02	0.04	0.20	0.14	0.01	0.00	0.41	4.40
NNW	0.01	0.03	0.19	0.15	0.01	0.00	0.39	4.73
TOTAL	0.39	1.17	8.56	5.21	0.14	0.01	15.48	4.43
AVG SPD	1.45	2.49	4.17	5.71	8.72	13.17	4.43	4.43

Table B-10

METEOROLOGY FOR TAMPA INTERNATIONAL AIRPORT
HILLSBOROUGH COUNTY RESOURCE RECOVERY PROJECT

STABILITY WIND ROSE

STABILITY CLASS D

FROM JAN. 1 1970 THROUGH DEC. 31 1974

DIRECTION	+-----WIND SPEED CLASSES (MPS)-----+						TOTAL	AVERAGE WIND SPEED
	0-2	2-3	3-5	5-8	8-11	>11		
N	0.01	0.05	0.20	0.33	0.03	0.00	0.63	5.12
NNE	0.05	0.17	0.68	1.00	0.04	0.00	1.94	4.89
NE	0.04	0.22	0.87	1.58	0.08	0.00	2.79	5.10
ENE	0.05	0.34	1.28	1.43	0.07	0.00	3.18	4.75
E	0.10	0.61	2.12	2.53	0.10	0.00	5.46	4.77
ESE	0.09	0.32	1.12	1.18	0.04	0.00	2.75	4.60
SE	0.05	0.21	0.90	1.13	0.02	0.00	2.32	4.76
SSE	0.06	0.22	0.92	1.05	0.04	0.00	2.30	4.74
S	0.07	0.24	0.96	1.28	0.12	0.01	2.67	5.01
SSW	0.04	0.14	0.61	1.03	0.10	0.00	1.92	5.24
SW	0.02	0.14	0.42	0.44	0.02	0.00	1.04	4.63
WSW	0.03	0.11	0.54	0.62	0.04	0.00	1.33	4.88
W	0.03	0.22	1.11	2.71	0.12	0.01	4.20	5.38
WNW	0.05	0.11	0.55	1.12	0.22	0.04	2.08	5.73
NW	0.04	0.12	0.64	1.22	0.24	0.03	2.30	5.68
NNW	0.03	0.10	0.58	1.13	0.22	0.01	2.07	5.67
TOTAL	0.76	3.32	13.51	19.79	1.50	0.12	39.00	5.05
AVG SPD	1.43	2.46	4.05	6.33	9.32	12.58	5.05	5.05

Table B-11

METEOROLOGY FOR TAMPA INTERNATIONAL AIRPORT
HILLSBOROUGH COUNTY RESOURCE RECOVERY PROJECT

STABILITY WIND ROSE

STABILITY CLASS E

FROM JAN. 1 1970 THROUGH DEC. 31 1974

DIRECTION	+-----WIND SPEED CLASSES (MPS)-----+						TOTAL	AVERAGE WIND SPEED
	0-2	2-3	3-5	5-8	8-11	>11		
N	0.01	0.06	0.18	0.04	0.00	0.00	0.29	3.61
NNE	0.04	0.24	0.50	0.12	0.00	0.00	0.90	3.52
NE	0.06	0.32	0.83	0.14	0.00	0.00	1.36	3.48
ENE	0.07	0.72	1.24	0.17	0.00	0.00	2.21	3.32
E	0.16	1.07	2.07	0.28	0.00	0.00	3.58	3.33
ESE	0.10	0.58	1.02	0.20	0.00	0.00	1.90	3.36
SE	0.06	0.33	0.74	0.10	0.00	0.00	1.23	3.38
SSE	0.04	0.32	0.59	0.06	0.00	0.00	1.00	3.23
S	0.04	0.32	0.49	0.06	0.00	0.00	0.90	3.20
SSW	0.03	0.13	0.28	0.02	0.00	0.00	0.46	3.28
SW	0.02	0.18	0.25	0.00	0.00	0.00	0.45	3.03
WSW	0.04	0.11	0.25	0.04	0.00	0.00	0.44	3.33
W	0.07	0.17	0.49	0.08	0.00	0.00	0.82	3.38
WNW	0.06	0.18	0.38	0.05	0.00	0.00	0.66	3.15
NW	0.07	0.28	0.62	0.04	0.00	0.00	1.01	3.18
NNW	0.03	0.20	0.48	0.06	0.00	0.00	0.77	3.37
TOTAL	0.89	5.20	10.41	1.46	0.00	0.00	17.96	3.33
AVG SPD	1.41	2.44	3.94	5.43	8.75	0.00	3.33	3.33

Table B-12

METEOROLOGY FOR TAMPA INTERNATIONAL AIRPORT
HILLSBOROUGH COUNTY RESOURCE RECOVERY PROJECT

STABILITY WIND ROSE

STABILITY CLASS F

FROM JAN. 1 1970 THROUGH DEC. 31 1974

DIRECTION	+-----WIND SPEED CLASSES (MPS)-----+						TOTAL	AVERAGE WIND SPEED
	0-2	2-3	3-5	5-8	8-11	>11		
N	0.02	0.17	0.08	0.00	0.00	0.00	0.28	2.49
NNE	0.12	0.60	0.20	0.00	0.00	0.00	0.92	2.36
NE	0.14	0.93	0.34	0.00	0.00	0.00	1.40	2.39
ENE	0.26	1.72	0.58	0.00	0.00	0.00	2.56	2.40
E	0.39	2.50	0.96	0.00	0.00	0.00	3.85	2.42
ESE	0.21	1.15	0.48	0.00	0.00	0.00	1.84	2.40
SE	0.15	0.57	0.24	0.00	0.00	0.00	0.95	2.34
SSE	0.12	0.47	0.28	0.00	0.00	0.00	0.87	2.45
S	0.12	0.45	0.19	0.00	0.00	0.00	0.75	2.38
SSW	0.03	0.14	0.06	0.00	0.00	0.00	0.23	2.45
SW	0.07	0.20	0.10	0.00	0.00	0.00	0.37	2.36
WSW	0.10	0.20	0.09	0.00	0.00	0.00	0.38	2.24
W	0.10	0.18	0.14	0.00	0.00	0.00	0.42	2.31
WNW	0.11	0.28	0.12	0.00	0.00	0.00	0.52	2.32
NW	0.16	0.57	0.25	0.00	0.00	0.00	0.98	2.34
NNW	0.12	0.56	0.19	0.00	0.00	0.00	0.87	2.33
TOTAL	2.22	10.68	4.28	0.01	0.00	0.00	17.19	2.39
AVG SPD	1.38	2.43	3.27	5.65	0.00	0.00	2.39	2.39

EXHIBIT C

REFINED MODEL ANALYSIS

EXHIBIT C

Refined Model Analysis

Model Parameters

The Industrial Source Complex Short Term (ISCST) Model was used along with the options listed in Table C-1. Based on the screening analysis (Exhibit A), the worst-case condition (i.e. causing maximum impacts) was identified as the 110% load case. Therefore, source parameters defining facility operation at that load condition (Table C-2) were input to the model in the refined analysis.

The receptor grid was based on results of the screening modeling runs and preliminary sequential (hour-by-hour) modeling runs. Receptors were located at downwind distances of 129m (nearest receptor allowed in the ISC run due to the height of the building), 200 m, 300 m, 400 m, 500 m, 600 m, and every kilometer from 1 km to 10 km located along radials placed every 10°. This arrangement isolated the maximum concentrations (within a 100 m fine grid) as well as established the significant impact areas (SIAs). Additional rings located at 700 m, 800 m, and 900 m, were modeled for 1972 to locate the limits of the 24-hour SIA for SO₂. Special receptors were located at the boundary of the Chassahowitzka National Wilderness Area (nearest Class I area) and the SO₂ nonattainment area in Pinellas County.

Meteorological Data

Surface and upper air data obtained from DER and recorded at the Tampa International airport for the years 1970 through 1974 was used as model input. DER identified a three day period (172, 173 and 174) in 1972 that could produce substantial ground level concentrations, if these concentrations are excessive an alternative could be discussed.

TABLE C-1
Refined Analysis
ISC Model Inputs and Options

Dispersion Parameter	Rural Mode
Building Downwash	Employed
Plume Rise	Transitional plume rise
Anemometer height	6.7 m
Meteorological Data Base	Hour-by-hour observations taken between 1970-1974 (5 years), Tampa surface data and Tampa upper air data*
Receptor Locations	129 m, 200 m, 300 m, 400 m, 500 m, 600 m, and every kilometer from 1 km to 10 km**
All Other Options	Default
Building Configuration	A three tiered structure will be used, the largest part of the structure, the boiler building will be used to define building characteristics in the model
Width	51.5 m
Length	22.9 m
Height	42.7 m
Maximum Projected Width	56.4 m
Equivalent length/width (m)***	49.9 m

*Obtained from DER.

**For 1972 receptors were placed at 700 m, 800 m and 900 m to define the limit of the 24-hour SO₂ SIA.

***The width/length dimension is the dimension of the width and length of a fictitious building whose area is equal to that of a circle whose diameter is the maximum projected width listed above.

TABLE C-2
STACK PARAMETERS USED IN REFINED MODEL ANALYSIS

Base Elevation	12.1 meters
Stack Height	67.0 meters
Effective Stack Diameter	3.5 meters
Exit Velocity*	16.82 m/s
Exhaust Temperature*	494 ⁰ K
Building Height	42.7 meters
Building Width	51.5 meters
Building Length	22.9 meters
Maximum Projected Width	56.4 meters
Equivalent Length/Width	49.9 meters

*Based on the worst case boiler operating condition as defined in screening analysis.

Air Quality Impact

Sequential (hour-by-hour) modeling was performed to determine the highest, second-highest (HSH) short-term pollutant impact and highest annual pollutant impacts. These values are contained in Section 7.0 of the PSD application and were used throughout the air quality impact analysis. These impacts were compared with the significant impact levels adopted by FDER/EPA. Pollutant impacts that were less than significant were added to measured HSH short-term pollutant levels or highest annual monitored pollutant levels recorded from nearby monitors to determine the total future concentration to be compared with the NAAQS and FAAQS. For pollutant impacts that were significant, interactive source modeling of other existing facilities was performed to determine their contribution to ambient background levels. Based on the refined modeling analysis, the SIA for SO_2 and NO_x was established. The SIA is defined as a circular area whose radius is equal to the greatest distance to which the refined modeling shows the facility's emissions will have a significant impact.

An increment analysis for SO_2 was conducted. Since the area is classified as nonattainment for TSP, no TSP increment analysis was performed. The proposed source along with other SO_2 increment consuming sources were modeled and the results were compared to PSD Class II increments. No increment is consumed outside the SIA.

In addition to assessing the impacts of all the PSD pollutants, a special analysis was done for HCl. This analysis included projecting facility HCl emission rates and ambient impacts.

Emission Inventory

The SO_2 emission inventory used for the additional source modeling was derived from the Pinellas County Resource Recovery Facility and AMAX phosphate applications. Discrepancies between these two sources were resolved through the 1982 source inventory received from Hillsborough Co. Environmental Protection Commission (HCEPC). The inventory listed in Table C-3 includes the SO_2 sources within 30 km and several large sources within 50 km of the proposed site.

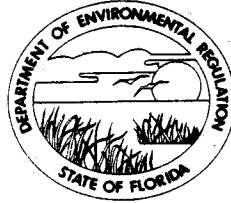
TABLE C-3
EMISSION INVENTORY

Source *	X (km)	Y (km)	SO ₂ (g/s)	Stack hgt. (m)	Temp. (°C)	Exit Vel. (m/s)	Stack dia. (m)
<u>PSD Sources</u>							
Pinellas RRF 1-3	335.20	3084.1	31.5	49.1	505	26.8	2.37
McKay Bay RRF	360.00	3091.9	21.4	45.7	500	21.3	1.91
TECO Big Bend	361.90	3075.0	6002.2	149.4	426	15.6	7.00
<u>NAAQS SOURCES</u>							
FPC Bartow	342.4	3082.7	722.2	91.4	408	44.0	3.35
FPC Higgins	336.5	3098.5	286.7	53.0	422	10.4	3.81
FPC Anclote #1	324.9	3119.0	1631.9	152.1	416	50.0	3.66
FPC Anclote #2	324.9	3119.0	816.0	152.1	416	28.3	3.66
TECO Hooker Pt. #1)	358.0	3091.0	41.30	85.4	402	18.2	3.40
TECO Hooker Pt. #2)	358.0	3091.0	41.30	85.4	402	18.2	3.40
TECO Hooker Pt. #3)	358.0	3091.0	57.00	85.4	397	11.5	3.70
TECO Hooker Pt. #4)	358.0	3091.0	57.00	85.4	397	11.5	3.70
TECO Hooker Pt. #5	358.0	3091.0	84.50	85.4	402	18.2	3.40
TECO Hooker Pt. #6	358.0	3091.0	107.80	85.4	436	17.9	2.90
TECO Gannon #1	360.0	3087.5	174.2	93.3	438	22.5	3.70
TECO Gannon #2	360.0	3087.5	174.2	93.3	438	32.4	3.10
TECO Gannon #3	360.0	3087.5	198.2	93.3	427	35.4	3.20
TECO Gannon #4	360.0	3087.5	260.0	93.3	443	24.6	2.90
TECO Gannon #5	360.0	3087.5	316.6	93.3	415	20.6	4.50
TECO Gannon #6	360.0	3087.5	526.4	93.3	415	23.7	5.40
General Portland	358.0	3090.6	101.0	44.3	473	6.6	4.72
Gardiner	363.4	3082.4	413.60	29.4	333	9.1	2.10
Gardiner	363.4	3082.4	-210.26	36.5	344	11.8	2.00

*Sources within 30 km of site.

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

May 22, 1984

Mr. Donald M. Pompelia
Camp, Dresser and McKee, Inc.
One Center Plaza
Boston, Massachusetts 02108

Re: Hillsborough County Resource Recovery Facility

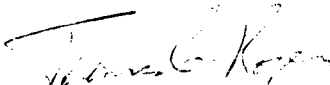
Dear Mr. Pompelia:

Enclosed is the permit application, DER Form 17-1.202(1),
you requested.

I have reviewed your modeling protocol for the refined
analysis and it appears to satisfy our modeling requirements. In
addition to the specific modeling requirements be sure to address
all of the preconstruction review requirements contained in rules
17-2.500(5) and 17-2.510(4), Florida Administrative Code.

Please call me at (904)488-1344 or write if you have any
questions.

Sincerely,


Thomas Rogers
Meteorologist

TR/s
enclosure

cc: Larry George

EXHIBIT D

AMBIENT MONITORING DATA

Exhibit D
Ambient Monitoring Data

For pollutants subject to New Source Review, ambient air quality monitoring may be required to define background concentrations. These ambient levels are then used as a basis for establishing whether the proposed emissions contribute to the violation of ambient air quality standards. Sources may be exempt from air quality monitoring if the impact of a given pollutant falls below the de minimis concentration (17.2500(3)(e)). A refined analysis was done using the Industrial Source Complex (ISC) dispersion model and sequential (hour-by-hour) meteorological data over a 5-year period to identify the pollutants which exceeded these guidelines. From this analysis the highest, second-highest concentrations were compared to the appropriate de minimis concentration levels (Table D-1). Pollutants whose concentrations exceeded the guideline are SO₂, lead, and fluorides

Among other activities, the HCEPC is responsible for monitoring air quality data within the County. HCEPC runs 65 monitoring stations and receives information from other private monitors totaling an air quality network of 83 stations, many of which monitor for more than one pollutant. Ambient monitors for all the criteria pollutants are within 12 km of the site (Table D-2). The measurement method for each pollutant is listed in Table D-3.

Three SO₂ monitors are located within 10 km of the site. Two of these sites, Brandon and Highway 41, are bubbles which sample for 24 hours every sixth day. The monitor at the HCEPC office is a continuous monitor. Concentrations recorded here are much higher and considered more reliable than the bubbler data.

Lead is monitored at 6 sites within Hillsborough County. Of these sites Orient Rd. is the closest to the proposed site. Concentrations reported at this station are the second-highest recorded in the County for 1983.

TABLE D-1
De MINIMIS MONITORING GUIDELINE

<u>Pollutant</u>	<u>Averaging Time</u>	<u>Highest 2nd-Highest Concentration (ug/m³)</u>	<u>De Minimis Monitoring Guideline (ug/m³)</u>
Total Suspended Particulates	24-hour	3.26	10
Sulfur Dioxide	24-hour	16.9**	13
Carbon Monoxide	8-hour	16.3	575
Nitrogen Oxides	Annual*	1.04	14
Lead	24-hour	0.32**	0.1
Mercury	24-hour	0.035	0.25
Beryllium	24-hour	8.8×10^{-5}	5.0×10^{-4}
Fluorides	24-hour	0.405**	0.25
Vinyl Chloride	24-hour	Negligible	15
Total Reduced Sulfur	1-hour	"	10
Reduced Sulfur Compounds	1-hour	"	10
Hydrogen Sulfide	1-hour	"	0.04

*The annual concentration is based on the highest annually ave. conc.

**Concentration exceeds the de minimis monitoring guideline.

TABLE D-2

AMBIENT AIR MONITORING DATA FOR HILLSBOROUGH COUNTY

SITE State	ID CO.	SITE NAME	TOTAL SUSPENDED PARTICULATES ($\mu\text{g}/\text{m}^3$)					
			Annual (GM)		24-Hour			
			1982	1983	1982		1983	
					High	2nd High	High	2nd High
1800 082	82	Orient Road	53	54	149	126	132	115
			54	53	166	117	138	115
4360 024	86	311 S. 22nd St.	53	55	133	91	92	83
0370 001	7	Brandon (Rainbow Tr.)	31	--	98	65	--	--
0370 002	7	Brandon	--	33	--	--	86	86
1800 083	93	Highway 41	38	43	96	85	174	113
4360 051	115	Hooker's Point (Lehman)	56	--	169	135	--	--
4360 062	115	Hooker's Point (Maritime)	--	58	--	--	141	90
4360 002	1	Health Dept.	53	56	116	104	90	85
			52	54	110	96	91	78
4360 035	63	Davis Island						
4360 060	122	Seminole H&E School	45	52	74	63	81	78
4440 001	5	Temple Terrace	35	48	361	151	232	196

TABLE D-2 (Cont.)

AMBIENT AIR MONITORING DATA FOR HILLSBOROUGH COUNTY

SITE		ID	SITE NAME	OZONE (ppm)											
State	CO.	1-Hour				Exceedences									
		1982		1983											
		High		2nd High	High	2nd High	High	2nd High							
4360	035	63	Davis Island	.102	.095	.145	.143	0	3						
4360	055	119	Beach Park	.115	.110	.128	.118	0	1						
				CARBON MONOXIDE (mg/m ³)											
				1-Hour				8-Hour							
				1982		1983		1982		1983					
				High	2nd High	High	2nd High	High	2nd High	High	2nd High				
				4360	052	120	NCEPC	11	10	12	11	6	6	7	5
				4360	035	63	Davis Island	7	4	7	7	3	3	3	3
4360	056	121	Hillsborough Building	14	11	12	11	7	6	7	7				
4360	060	122	Seminole High School	11	11	13	10	9	8	8	6				
				LEAD (ug/m ³)											
				Calendar Quarter											
				1982			1983								
				0.3			0.8								
				0.2			-								
				-			0.6								
				0.4			0.4								
1800	082	82	Orient Road	0.3			0.8								
4360	051	115	Hooker's Point (Lehman)	0.2			-								
4360	062	115	Hooker's Point (Maritime)	-			0.6								
4360	002	1	Health Department	0.4			0.4								
4360	035	63	Davis Island	0.2			0.3								
4360	060	122	Seminole Heights School	1.1			1.1								

TABLE D-2 (Cont.)

AMBIENT AIR MONITORING DATA FOR HILLSBOROUGH COUNTY

SITE State	ID CO.	SITE NAME	SULFUR DIOXIDE ($\mu\text{g}/\text{m}^3$)									
			Annual		24-Hour				3-Hour			
			1982	1983	1982		1983		1982		1983	
					1	2	1	2	1	2	1	2
0870 001	7	Brandon	6	3	37	24	10	8	--	--	--	--
1800 083	93	Highway 41	8	8	52	31	76	31			--	--
			9	8	55	39	76	31			--	--
4360 052	120	HCEPC (5135) (170)	21		116	105			545	461		
			25	16	60	38	108	86	147	144	527	493
4360 051	115	Hooker's Point (Lehman)	24	--	117	97	--	--	452	327	--	--
4360 021	81	906 Jackson Street	24	--	113	113	--	--	517	453	--	--
4360 035	63	Davis Island	25	21	103	88	85	77	376	334	327	291
			NITROGEN OXIDES									
			Annual									
			1982	1983								
0370 001	7	Brandon	22	23								
4360 052	120	HCEPC	40	35								
4360 051	115	Hooker's Point (Lehman)	30	--								
4360 055	119	Beach Park	25	29								

TABLE D-3

AIR POLLUTION MEASUREMENT METHODS

<u>Parameter</u>	<u>Method or Reference</u>
Carbon Monoxide	Title 40 Code of Federal Regulations (40 CFR), Part 50, Appendix C Beckman Model 866; EPA No. RFCA-0876-12
Dust (Microscopy)	EPC - Nikon Polarization Microscope
Dustfall	Journal of Air Pollution Control Association July 66, Vol. 16, No. 7
Nitrogen Dioxide:	
Bubbler	EPA No. EQN-1277-026 page 62971 Federal Registry Vol. 42
Continuous	40 CFR, Part 50, Appendix F 1. Monitor Labs Model 8440; EPA No. RFNA-0677-021 2. Bendix Model 8101-B Analyzer
Ozone	40 CFR, Part 50 Appendix D 1. Bendix Model 30002; EPA No. RFOA-0176-007 2. Dasibi Model 1003 AH; EPA No. EQOA-0577-019
Sulfur Dioxide:	
Bubbler	40 CFR, Part 50, Appendix A
Continuous	1. Thermo Electron Model 43; EPA No. QSA-0276-009 2. Philips Model PW9755; EPA No. EQSA-0676-010
Suspended Particulate:	
Total	40 CFR, Part 50, Appendix B
Sulfates	EPC - Turbidimetric Method
Lead	40 CFR, Part 50, Appendix G

SOURCE: Environmental Quality; Hillsborough County Environmental Protection Commission; 1981.

No ambient air data for fluorides are monitored by the HCEPC. There are no sources of fluorides in the vicinity of the site so background concentrations are considered small. The HCEPC does have a program which measures fluoride concentrations in grass. The sampling areas are primarily located in eastern Hillsborough County 30 to 50 km from the proposed site. Fluoride concentrations in grass near the proposed site is expected to be near background levels and below concentrations considered unsafe.

The data from these monitors are believed to be sufficient to establish the baseline concentrations in the vicinity of the proposed site and to evaluate whether the proposed emissions violate any ambient air quality standards.

Stack Height Analysis

Hillsborough County Energy Recovery Facility

APPENDIX 10.16

STACK HEIGHT ANALYSIS AND RECOMMENDATIONS

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1.0 SUMMARY

Based on the analysis presented in this appendix, supplemented by the air quality analysis contained in the PSD application (Appendix 10.1.5 of the Application for Power Plant Site Certification), it has been determined that a 220 foot stack is feasible for the proposed energy recovery facility. The analysis contained here and in the PSD application examines the aerodynamic downwash issues and the groundlevel concentrations of pollutants associated with the proposed facility. The analyses show that neither downwash nor pollutant concentrations will be a problem at the facility with a 220 foot stack.

Overview

The development of a resource recovery facility in Hillsborough County includes the design of a stack for discharging exhaust gases to the atmosphere. A principal feature of stack design is the selection of an acceptable stack height to avoid unacceptable impacts on ambient air quality. As a rule-of-thumb, if the stack height is equal to or greater than 2.5 times the principal onsite structures, aerodynamic downwash effects are not encountered and unacceptable impacts on air quality due to these effects are avoided. However, the stack height can be less than the rule-of-thumb height if an evaluation shows the lower stack height will avoid unacceptable impacts.

The regional topography in the vicinity of the site for the proposed facility is relatively flat. Tall structures can have a significant visual effect. The stack for the facility has been designed with the intent of minimizing air quality impacts while avoiding excessive visual impacts. As a result, a less than the rule-of-thumb height has been selected.

The USEPA has a standard set of atmospheric dispersion models that are recommended for use in demonstrating compliance with established air quality standards and guidelines. The EPA recommended model for stack

heights less than the above 2.5 times ratio is the Industrial Source Complex (ISC) model (EPA, 1978 & 1983). ISC is used in this analysis to assess and compare the impacts from a stack which does not conform to good engineering practice (GEP) guidelines of 2.5 times the principal onsite structures with that of a GEP stack. Other factors, including economic and aesthetic considerations, should be judged against actual pollutant increases/decreases. The sensitivity of ground level concentration impacts to stack height, especially under the influence of turbulence caused by nearby structures, suggests that a more refined analysis beyond the ISC model be applied to verify the ISC model results.

Basis of Analysis

Along with the recommended ISC modeling analyses, additional analyses were conducted in order to provide a reasonable degree of confidence in the suitability of the selected stack height. This report summarizes the analyses that have been performed to evaluate the impact of facility emissions on ambient air quality levels for the chosen stack height of 67 meters (220 feet) above grade level (agl). The report contains two methods which have been applied in evaluating impacts, one, the standard Industrial Source Complex (ISC) computer model, the other, a method developed by Halitsky (1976).

The ISC model is regarded as state-of-the-art in estimating ground-level concentrations via Gaussian dispersion assumptions. Subroutines within the model invoke various algorithms depending upon the stack height to building height ratio to address the increased turbulence which is likely to occur from a non-GEP stack. These algorithms modify the standard dispersion coefficients, σ_y (S_y) and σ_z (S_z), as a function of downwind distance. These dispersion coefficients, in turn, dictate the rate of expansion and dilution of the plume, thereby affecting ground level concentrations.

The Halitsky approach is similar in that the standard Gaussian dispersion coefficients are also modified as a function of downwind distance. However, the modification is based on algorithms developed

from site specific structure dimensions (Halitsky, 1976). ISC also analyzes the structure dimensions but invokes one of three generic algorithms based on the structure classification (either squat or tall) or the stack placement in relation to the facility (USEPA, 1979).

ISC is often regarded as the regulatory model of choice in downwash applications. However, verification of the model results to this point is incomplete. The comparison to the Halitsky model is being made to assure that the ISC at least provides a conservative estimate.

The advantages and shortcomings of each model, as well as a description of the algorithms used is presented herein. The actual algorithms utilized as well as the respective input parameters, are presented in Attachment A.

The models have not been compared for all possible conditions likely to occur at the proposed site. Instead, several meteorological conditions that will likely cause the greatest facility related impacts on short-term concentration patterns were used as the basis for comparing model results.

Findings

Using EPA recommended screening techniques, it was shown that the plume will clear the cavity region, thereby limiting the increase in ground level impacts to wake-related turbulence. A downwash analysis on the wake region using the USEPA recommended ISC computer model has been performed to evaluate the potential ground level impacts of the resource recovery facility proposed for Hillsborough County. Due to the sensitivity of ground level impacts to stack height, especially under the influence of structure-related turbulence, a more refined analysis was included to insure the conservativeness and accuracy of the ISC analysis. The refined analysis included algorithms suggested by Halitsky (1976) for comparative purposes.

The downwash analysis was completed using a number of options available in the algorithms. The results were then compared to assess the overall effect these options have on ground level impacts. A set of four meteorological conditions representing worst-case short-term events were selected for ambient data input. If a large degree of variability between the models resulted, a more refined analysis would be necessary. A comparison was also made between the impacts from a GEP and a non-GEP stack with the ISC computer model. These results as well as the results of the other comparisons are made below.

Based on the overall results, the ISC model utilized in both the refined stack analysis, as well as the full grid analysis of the facility found in the main text, was found to be the most conservative method for this level of detail. The Halitsky analysis, which used more realistic algorithms based on structure dimensions, resulted in lower ground level impacts in the four cases studied.

The purpose of the stack height analysis is to provide the technical foundation for determining the implications of a stack height at less than GEP. The analysis compared two methods of assessing downwash -- ISC and Halitsky. It also compared the predicted relative ground level concentrations of a 220 foot stack to those of a 375 foot stack which would have been the design height of a "rule-of-thumb" GEP stack.

This stack height analysis was performed without consideration of actual pollutant emission rates and groundlevel concentrations. It showed on a comparative basis that the use of the standard ISC model would be a conservative method of assessing downwash. The use of the ISC model in the detailed air quality analyses which was performed using estimates of actual pollutant emission rates and predicted groundlevel concentrations has shown that there is no problem with downwash.

In order to determine the actual impacts of a 220 foot stack, detailed modeling and a comprehensive air quality analysis that includes other major sources must be performed. The detailed air quality assessment is presented in Appendix 10.1.5 "Prevention of Significant Deterioration" of the Application for Power Plant Site Certification.

2.0 TECHNICAL EVALUATION

2.1 Location of Influential Structures

The proposed Hillsborough County resource recovery facility is located on a 50.4 acre parcel of land bordered on the east by Faulkenburg Road, to the south by the Seaboard System Railroad, and to the west by Tampa Electric Company Power Lines. The site is zoned C-U, Community Unit District, and is classified on the Horizon 2000 Land Use Plan Map as Public/Semi-Public.

Onsite, the tallest structure will be the proposed facility's stack at 67 meters agl, while the tallest structures associated with the proposed facility are 42.7 meters agl. A wastewater treatment plant is to be co-located on the site but it will have structures no greater than 2 stories in height. For aesthetic purposes, the proposed site is planned to be landscaped on all sides with trees.

Office buildings, light industries and light industrial/business parks are located offsite and to the east of Faulkenburg Road and the south of the Seaboard System Railroad. Scattered residential units are presently situated to the immediate east of Faulkenburg Road, north of the railroad. The tallest offsite structures of significant size are associated with the Tampa Central Park Office Building Complex located approximately 1,100 meters to the south-southwest.

The tallest structure in this complex is about 12 stories high. The proposed site location is well outside the zone where structural turbulence from this complex is significant. Therefore, the onsite structures were the only structures of interest in this analysis.

2.2 Impact Analysis

The environmental impact from the facility air emissions on the ambient air quality of the surrounding community will depend primarily on the diffusion characteristics of the facility surroundings and the facility design. These features primarily include stack

height, exit diameter, temperature and velocity and the interaction of the plume with turbulence generated by onsite structures and the surrounding surface cover. Aside from the buoyant and momentum properties of the exhaust plume, the stack height plays the primary role in determining the level and location of plume impact. Generally, the higher the stack, the further away from the facility the maximum ground level impacts are located. This is due to the fact that most of the pollutants are being released higher into the atmosphere. The resulting diffusion pattern places impacts further away from a facility as well as decreases concentrations prior to impact.

The accepted conservative rule-of-thumb on stack design is to construct the stack so that:

$$H_g = H + 1.5(L)$$

Where H_g = Good engineering practice (GEP) stack height.
 H = Height of the principal structure or nearby principal structure.
 L = Lesser dimension (height or width) of the structure or nearby structure.

The GEP rules adopted by the EPA (1981) have been successfully challenged by the Sierra Club and others in court and at present some of the issues involved in the stack height regulations have been remanded to EPA for further study or definition. The final ruling may be retroactive to all stacks constructed since 1970. However, it has been recommended to use current GEP guidelines until the issue is resolved (USEPA, 1984).

The FDER has also adopted guidelines for modeling stack heights. According to FDER, any stack height above 2 times the principal structure height is basically considered out of the zone of structure related downwash and can be modeled by a standard technique (FDER, 1983).

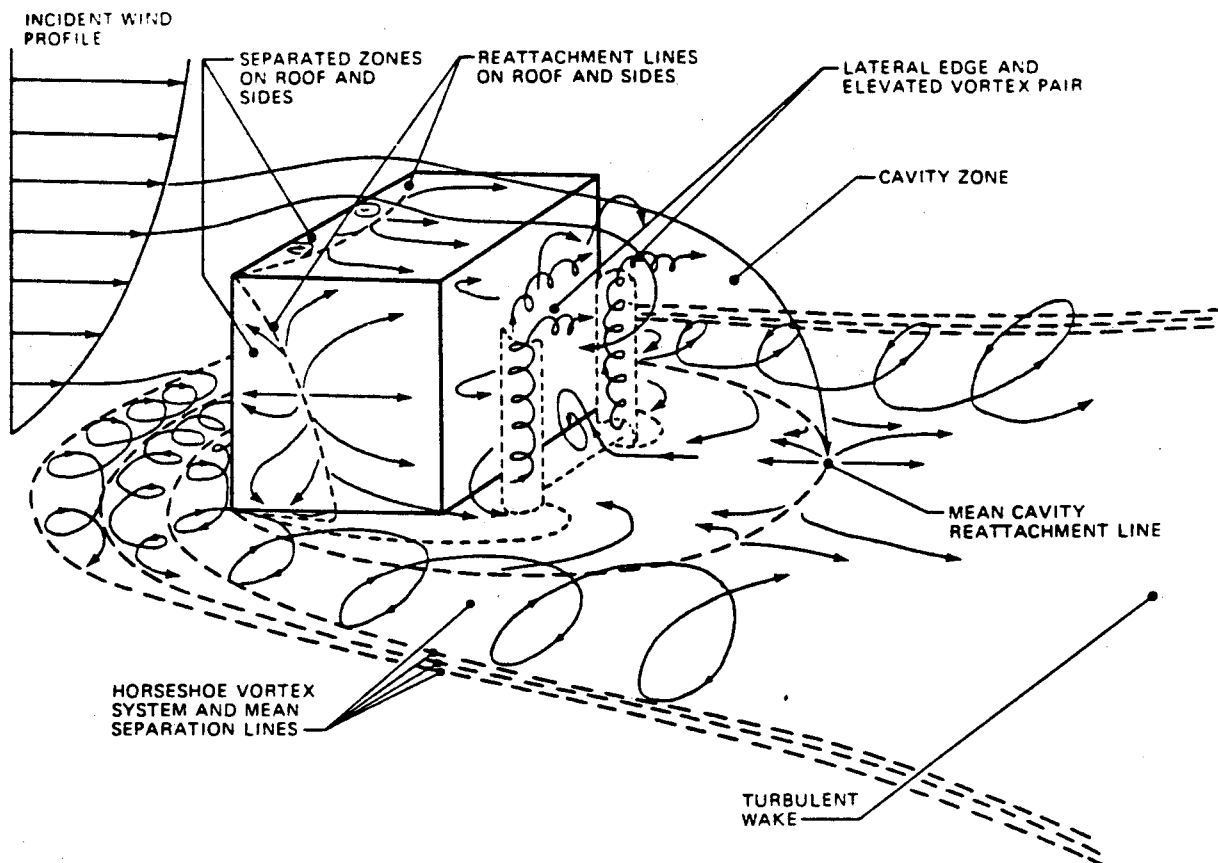
The Hillsborough County resource recovery facility is proposed with a stack height of 67 meters (220 feet). The tallest facility building proposed onsite is the boiler room which has a roofline elevation of 42.7 meters agl. Applying the current EPA GEP guideline of 2.5 times the height of the tallest structure would mean a GEP stack height of 107 meters. The current design is 1.6 times the boiler house height, or 39.6 meters below the EPA GEP guidelines, and 18.3 meters below the FDER GEP guidelines.

Two regions of potential ground level pollutant impact should be analyzed when a stack does not conform with GEP. The first area is the cavity region, up to $3(L)$ downwind, where (L) is the lesser of the building height or projected width, and the second is the wake region; $3(L)$ to $10(L)$ downwind. These regions as well as other building induced flow characteristics are shown in Figure 2-1. If significant building induced turbulence affects plume dispersion, an even more refined analysis will be necessary.

Cavity and wake-related impacts can be assessed either theoretically by applying equations based on the laws of physics and thermodynamics to the stack or by physical/fluid modeling. The latter approach involves the construction of a scale model of the facility. For this analysis, the theoretical approach will be taken and if substantial impacts are indicated the more refined physical/fluid modeling approach may be warranted.

2.1.1 Cavity Analysis

The building induced turbulence can be expected to occur within the recirculating cavity region. If the plume becomes entrained within this region, ground level impacts would increase. Excessive ground level concentrations typically will not result when:



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FIGURE 2-1
ILLUSTRATION OF THE WIND
FIELD SURROUNDING A RECTANGULAR
BLOCK STRUCTURE

- o The emission point is well above the disturbed flow.
- o The plume rise is sufficiently great to keep a significant part of the effluent outside the area of disturbed flow.
- o The wind direction places the stack outside the area of disturbed flow.

To determine if the emission point is well above the disturbed flow, the vertical extent of the cavity region must be calculated. Current guidance suggests the vertical extent of the cavity is approximated by:

$$(1) \quad h_c = H + 0.5(L) \quad (\text{EPA 1983})$$

where;

h_c = Vertical extent of cavity region.

H = Height of the principal structure or nearby principal structure.

L = Lesser dimension (height or width) of the principal structure or nearby structure.

Substituting in the appropriate values for the proposed facility.

$$h_c = 64.0(\text{m})$$

Since the proposed stack height is greater than the cavity height, it may be assumed using EPA guidelines (EPA, 1977), that the maximum impacts will occur beyond the cavity region.

The downwind extent of the cavity can be determined by current guidelines (EPA, 1983). For short buildings ($Y/H < 2$), the cavity length (X_r) extends to;

$$(2) \quad X_r = Y + \frac{(A)(W)}{1.0 + B(W/H)} \quad (\text{EPA, 1983})$$

where;

H = Building height (meters)

Y = Along wind building dimensions
(49.9 meters)

W = Crosswind building dimensions
(49.9 meters)

$$A = -2.0 + 3.7 (Y/H)^{-1/3}$$

$$B = -0.15 + 0.305 (Y/H)^{-1/3}$$

Substituting in the appropriate values for the Hillsborough facility;

$$X_r = 114.8 \text{ (meters)}$$

The cavity is therefore predicted to extend 114.8 meters from the downwind edge of the facility.

Although the stack release point is above the maximum turbulent zone a more refined analysis is needed to determine the effects that atmospheric conditions will have on plume rise. To determine such effects the critical wind speed (u_c) must first be determined. The critical wind speed is the speed, based on stack exit parameters, that downwash will occur (EPA, 1977). Neutral atmospheric conditions will be assumed in this assessment.

The critical wind speed can be approximated by:

$$(3) \quad u_c = \frac{(udh)}{hs} \quad (\text{EPA, 1977})$$

where: hs = stack height

$$\begin{aligned} udh &= 21.4F^{3/4} \text{ when } F < 55 \text{ m}^4/\text{sec}^3 \\ &= 38.7F^{3/5} \text{ when } F \geq 55 \text{ m}^4/\text{sec}^3 \end{aligned}$$

$$(4) \text{ and: } F = \frac{g}{4} V_s d^2 \frac{T_s - T_a}{T_s}$$

where: g = Acceleration of gravity (9.8 m/sec^2)

T_a = Ambient temperature (assume 298°K)

V_s = Stack gas exit velocity (16.82 m/sec)

d = Inner stack diameter (3.5 m)

T_s = Stack gas temperature (494°K)

Substituting in the appropriate values:

$$F = 200.2 \text{ m}^4/\text{sec}^3$$

$$\begin{aligned} \text{thereby: } udh &= 38.7F^{3/5} \\ &= 930.2 \end{aligned}$$

$$\text{and: } u_c = 13.9 \text{ m/sec}$$

The characteristics of the plume leaving the proposed Hillsborough County resource recovery facility (high exit velocity leaving the stack) indicate that momentum forces will dominate plume rise during the initial phases of plume history. In relation to the momentum forces, buoyancy doesn't start to affect plume history until the plume is beyond the cavity region. This is taken into consideration later on in this analysis with the incorporation of both buoyancy and momentum forces into the plume rise algorithm for both the ISC and Halitsky analyses.

The momentum plume rise (hm) is calculated from:

$$(5) \quad h_m = \frac{3F_m (x)}{b^2 u_c^2}^{1/3} \quad (\text{AMS, 1975})$$

Where: $b = (1/3 + u_c/V_s)$ (equal to 1.16)
 u_c = Critical wind speed (13.9 m/sec)
 x = Downwind distance (assume $X=2$
building heights downwind; 85 meters)
(EPA, 1979)

$$F_m = \frac{T_a}{T_s} V_s^2 \frac{d}{4}^2 \quad (\text{see equation (4) for definition of remaining terms; (EPA, 1979)})$$

$F_m = 522.7$

Substituting in the appropriate values:

$$h_m = 8.00 \text{ (m)}$$

Adding the plume rise (due to momentum) to the physical stack height, the plume centerline height at two building heights downwind for the critical wind speed is equal to:

$$h_p = h_s + h_m$$
$$h_p = 75.0 \text{ (m)}$$

Under worst-case conditions (neutral atmospheric conditions and wind speed at the critical level (13.9 m/sec)) it is demonstrated that the plume centerline will be above the structure wake cavity with a stack height of 67 meters.

2.2.2 Wake Analysis

Although the plume centerline has been predicted to rise above the cavity region, high concentrations can still result if a portion of the plume becomes trapped within the cavity. The plume centerline height has been previously determined to equal 75 meters at two building heights downwind with winds at the critical speed. Assuming a neutral stability, the vertical sigma of the plume would be approximately 4 meters (USDOH, 1970). The visible edge of the plume has often been assumed to coincide roughly with the point at which the concentration falls to 10 percent of its axial value. The distance of this edge from the plume centerline is estimated to equal 2.14 times the vertical sigma value (Slade, 1968) or 8.6 meters in the Hillsborough case. Subtracting this value from the plume centerline height of 75 meters (at two building heights downwind), the resultant value equals 66.4 meters. At this height 90 percent of the plume would be above the cavity region with a safety factor of 2.4 meters. Therefore, high concentrations from partial plume entrainment are not expected to occur.

Although the trajectory of the plume centerline has been predicted via theoretical equations to clear the region of maximum building-related turbulence, the cavity, the analysis must be refined further to indicate whether any portion of the plume below the centerline is entrained into the turbulent wake. The ISC computer model (EPA, 1979) and a method put forth by Halitsky (1976) were chosen for the refined analysis. A detailed analysis of the cavity region by theoretical application has not been developed to the same extent as that of the wake region. The outcome of the wake analysis should indicate if an in-depth analysis, possibly involving physical/fluid modeling, is needed for the wake region.

The two models of choice are discussed in generic terms below. Algorithms utilized, as well as their input values, are presented in greater detail in attachment A.

2.2.2.1 ISC Model Description

The Industrial Source Complex (ISC) dispersion model combines and enhances various dispersion model algorithms into a set of two computer programs that can be used to assess the air quality impact of emissions from the wide variety of sources. The ISC short-term model (ISCST), an extended version of the Single Source (CRSTER) model, is designed to calculate concentration or deposition values for time periods of 1,2,3,4,6,8,12 and 24 hours. If used with a year of sequential hourly meteorological data, ISCST can also calculate annual concentration values.

The ISC model programs can be applied to point area and volume sources. The steady-state Gaussian plume equation for a continuous source is used to calculate ground level concentrations. The generalized Briggs plume-rise equations, including the momentum terms, are used to calculate plume rise as a function of downwind distance (EPA, 1979). Procedures suggested by Huber and Snyder are used to evaluate the effects of the aerodynamic wakes and eddies formed by buildings and other structures on plume dispersion (EPA, 1979). A wind-profile exponent law is used to adjust the observed mean wind speed from the measurement height to the emission height for the plume rise and concentration calculations. Procedures utilized by the Single Source (CRSTER) Model are used to account for variations in terrain height over the receptor grid. The Pasquill-Gifford curves are used to calculate lateral (S_y) and vertical (S_z) plume spread. The ISC model has rural and urban options. In the rural mode utilized in this analysis, rural mixing heights and the S_y and S_z values for the indicated stability category are used in the calculations.

When a downwash application is indicated, the ISCST model is utilized. According to USEPA guidelines (EPA, 1979), when used in the downwash mode, ISC is to be run with gradual plume rise (GPR) activated (plume rise at each downwind distance is computed), and no stack tip downwash (STD) (stack related turbulence is ignored).

In this analysis, ISC was run in four configurations or modes. The first mode was that recommended in EPA guidelines (with GPR and no STD). The second mode was run with STD incorporated and no GPR and the third mode assumed no building wake turbulence but included gradual plume rise and no stack tip downwash. The first two modes were included to determine the significance that the options chosen would have in the downwash calculations, while the third was included as a control case. The later case would indicate the differences in concentrations that would result by not utilizing the wake analysis equations, thereby testing the actual significance of these algorithms. The fourth mode was run to indicate ground level impacts from a GEP stack at 375 feet agl. This run included the use of the gradual plume rise option and no stack tip downwash.

In evaluating wake effects, the first step in the procedure used by ISC is to calculate the plume rise due to momentum at a distance of two building heights downwind from the stack. If the plume height, given by the sum of the stack height and the momentum rise at a distance of two building heights, is greater than either 2.5 building height ($2.5 h_b$) or the sum of the building height and 1.5 times the projected building width ($h_b + 1.5 h_w$), the plume is assumed to be unaffected by the wake. (ISC assumes a projected width (h_w) by assigning a circle of area equal to the horizontal width of the building, with the diameter of the circle being the projected width). Otherwise, the plume is assumed to be affected by the wake and the program modifies the dispersion coefficients (S_z and/or S_y) according to the plume height to building height ratio and placement of the stack in relation to the main structure (the user must determine this location and choose one of 2 algorithms by invoking the proper option) (EPA, 1979). The algorithms utilized in the ISC analysis are presented in Attachment A. Input parameters, receptors utilized and general model information are presented in Table 2-1.

INPUT PARAMETERS, RECEPTOR CONFIGURATION AND
COMPUTATION MODE OF THE ISC COMPUTER
PROGRAM USED IN THE DOWNWASH ANALYSIS

COMPUTATIONAL MODE:

MODEL VERSION - VERSION 82340 FROM UNAMAP 5, DECEMBER 1982
MODE - RURAL
OPTIONS AVAILABLE - GPR (GRADUAL PLUME RISE)
- STD (STACK TIP DOWNWASH)

RECEPTOR CONFIGURATION:

- ASSUME ZERO TERRAIN
- 8 RECEPTORS @ 250,500,750,1000,
1500,3000,5000, and 10,000 METERS
DOWNWIND

INPUT PARAMETERS:

STACK HEIGHT - 67 METERS (ABOVE GRADE LEVEL)
EFFECTIVE STACK DIAMETER - 3.5 METERS
EXIT GAS TEMPERATURE - 494 DEGREES KELVIN
EXIT GAS VELOCITY - 16.82 METERS/SECOND
FACILITY ELEVATION - ASSUMED @ ZERO METERS
INPUT METEOROLOGY - AMBIENT TEMPERATURE; 298 DEGREES KELVIN
- MIXING HEIGHT; 5000 METERS
- STABILITY/WIND; A/3.0 METERS/SECOND
D/5.0 METERS/SECOND
D/10.0 METERS/SECOND
D/15.0 METERS/SECOND
- WIND PROFILE EXPONENTS;
A STABILITY = 0.10
D STABILITY = 0.25
ANEMOMETER HEIGHT - ASSUMED @ 10 METERS (ABOVE GRADE LEVEL)

TABLE 2-1

INPUT PARAMETERS, RECEPTOR CONFIGURATION
AND COMPUTATIONAL MODE OF THE ISC MODEL
USED IN THE DOWNWASH STUDY

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One of the primary drawbacks of the ISC model is the limitation of how close to the structure concentration estimates will be predicted. ISC will supply concentration estimates to within 3 building heights or 100 meters downwind of the structure, whichever is greater. The dispersion values supplied by the Pasquill-Gifford curves begin at 100 meters; this is the primary reason why the ISC model cannot predict impacts within the cavity region. (The cavity, as predicted by equation (2), extends to 114.8 meters downwind.)

2.2.2.2 The Halitsky Model for Determining Structure Related Turbulence

The Halitsky approach (Halitsky, 1976) is based on the results of a wind tunnel study, as well as field study of a nuclear power reactor complex in the mid-western United States. The Halitsky model was chosen because it is based on a comprehensive study using both wind tunnel and field data.

The meteorological parameters observed during the field study by Halitsky included the mean wind speed and direction, the standard deviation (both horizontal and vertical) of the wind direction, and the temperature difference at various elevations. These observations were recorded both upwind and downwind of the facility during various times of the testing period. The wind tunnel simulation was comprised of a 1 to 96 scale model of the facility and was limited to neutral stabilities.

The relationship of the building configuration to observed mean velocities, turbulence and wake boundaries were developed from the nuclear facility. These equations were then used to plot the horizontal and vertical turbulence excess due to the building, which occurred in addition to the ambient turbulence. These equations were modified for the Hillsborough County resource recovery facility, and by using the applicable Halitsky assumptions, were used to generate the predicted turbulent excess for the proposed facility.

This approach is somewhat similar to the one taken by ISC. However, the modification of the dispersion coefficients S_y and S_z is more building specific in the Halitsky approach. ISC assigns algorithms for the modification of S_y and S_z from a broader classification scheme.

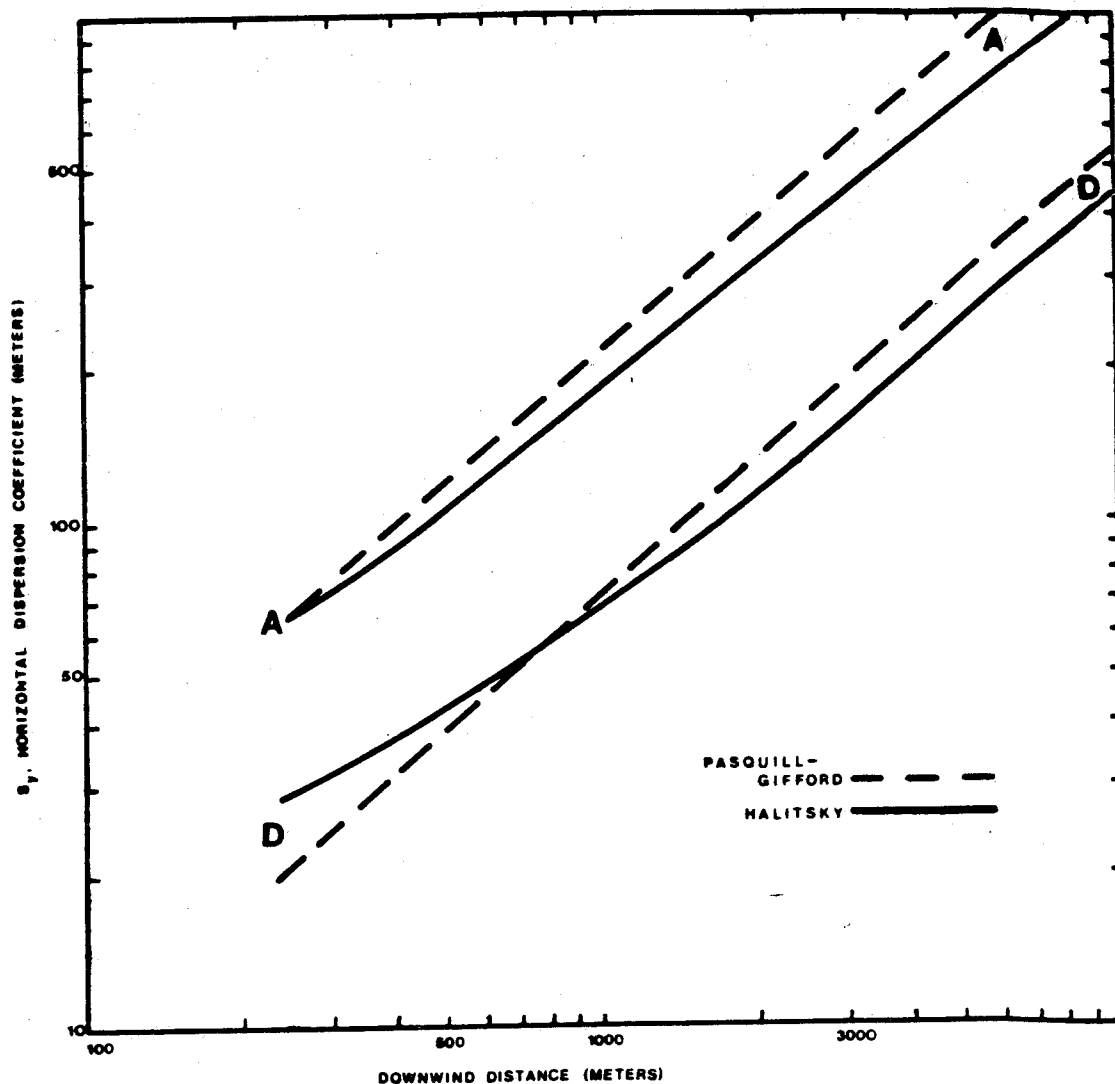
The proposed structure was modeled as an equivalent flat plate, perpendicular to the wind. The excess width from the shorter onsite structures was added to the width of the tallest structure, thereby creating a rectangular plate 42.7 meters high by 72.7 meters wide.

One of the assumptions used from the Halitsky study was that the plume distribution in the lateral direction (S_y) approached a parabolic rather than a Gaussian distribution. This assumption was based on field data collected by Halitsky. Since no field data existed for the vertical distribution (S_z), a Gaussian spread was assumed. ISC assumes a Gaussian distribution for both cases.

The standard Pasquill-Gifford diffusion curves were modified to account for building-related turbulence using Halitsky equations, adjusted for the proposed facility. These adjustments are shown in Figures 2-2 and 2-3 for the S_y and S_z curves, respectively. As can be seen from both figures, the curves are amplified in-close. This relative increase in diffusion is due to the influence of the building and decreases with downwind distance. The curves predicted for the Hillsborough County resource recovery facility cross the standard Pasquill-Gifford curves further downwind for the S_y values. This crossover is due to the assumption of parabolic rather than Gaussian diffusion rates in the lateral direction.

Using these new curves, the standard Gaussian model was utilized to predict downwind concentrations with the modified S_y and S_z values.

The predictions for the Halitsky method were computed with and without the stack downwash algorithm utilized in the ISC analysis. Concentrations were predicted at the downwind distances for the same meteorological conditions that were modeled in ISC (Table 2-1).



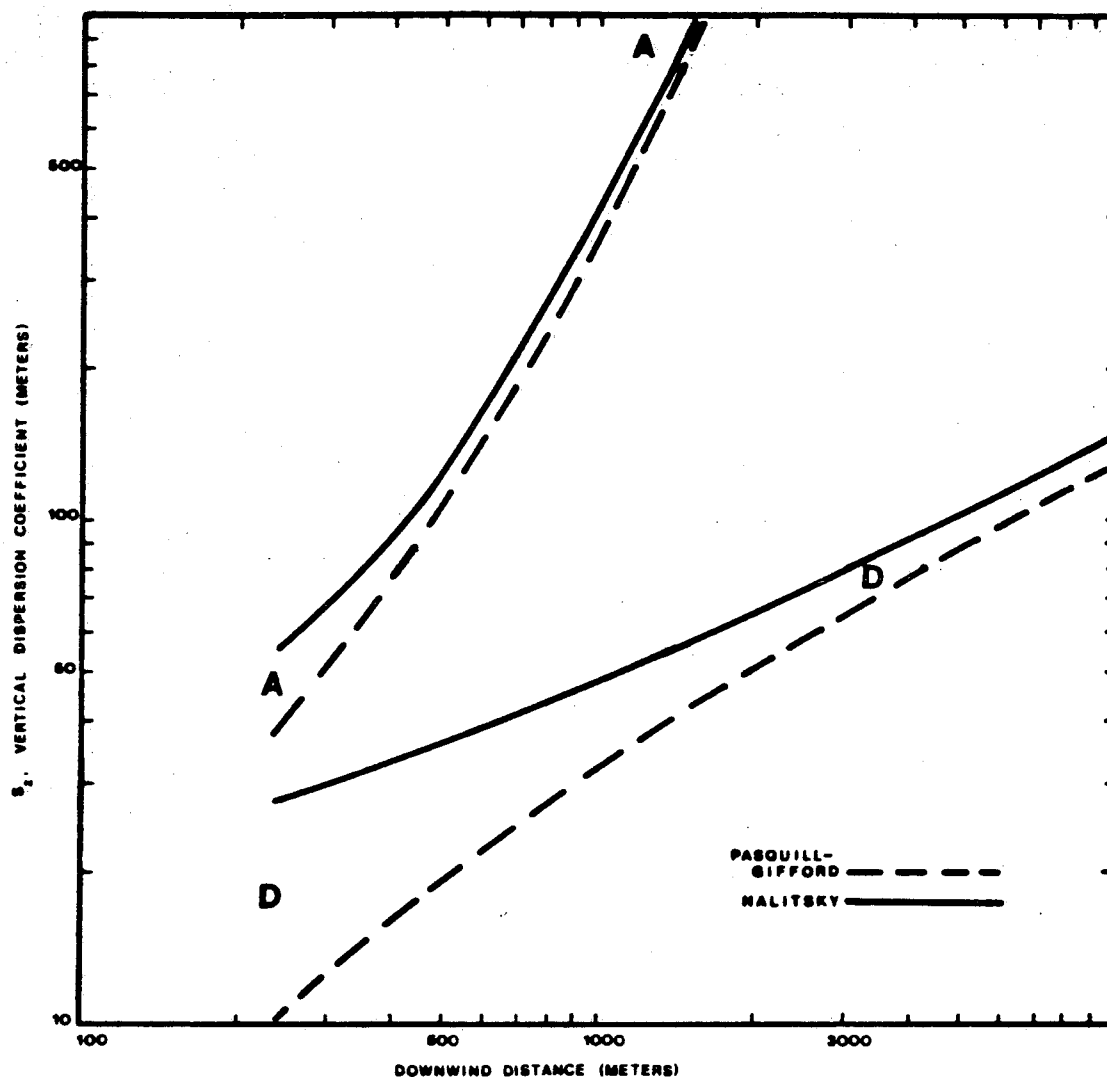
LETTERS REPRESENT STABILITY CLASS

LETTER	STABILITY CLASS
A	VERY UNSTABLE
D	NEUTRAL

FIGURE 2-2
STANDARD PASQUILL - GIFFORD HORIZONTAL
DISPERSION CURVES MODIFIED DUE TO THE
PROPOSED HILLSBOROUGH FACILITY
(MODIFICATIONS FOR A & D STABILITES ONLY)

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LETTERS REPRESENT STABILITY CLASS

LETTER	STABILITY CLASS
A	VERY UNSTABLE
D	NEUTRAL

FIGURE 2-3

STANDARD PASQUILL - GIFFORD VERTICAL
DISPERSION CURVES MODIFIED DUE TO THE
PROPOSED HILLSBOROUGH FACILITY
(MODIFICATIONS FOR A & D STABILITES ONLY)

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2.2.3 Comparison and Analysis of ISC and Halitsky Results

The results of the two model comparison are presented in Table 2-2. The models were run using identical algorithms except for those algorithms which modified the turbulence in the wake of the structure. A unitized emission rate of one gram per second was applied to both models yielding normalized concentrations that are directly comparable.

The first comparison of note is the Halitsky results incorporating and not incorporating the stack tip downwash (STD) algorithm. When the stack exit velocity is great, STD is not expected to occur in light wind speed cases. Based on the proposed Hillsborough County resource recovery facility exit velocity, the STD algorithm indicates no STD for the 3.0 and 5.0 meter per second cases. In the two situations in which STD was used (the 10 and 15 meter per second wind speed cases), the concentrations for the stack tip downwash case were 50 percent higher at the maximum, with both cases gradually reaching parity downwind.

For the three non-GEP ISC cases, for all simulated meteorological conditions, the concentrations in-close varied to different degrees. However, as downwind distance increased, the differences in concentrations decreased to a point of convergence in certain cases. This is to be expected as the variations in option choice tends to be magnified in-close due to the effects of building related turbulence.

A comparison of results from the two ISC cases, one with GPR and no STD and the other without GPR but incorporating STD illustrates that substantial differences are possible in predicted impacts in-close by choosing different options. The differences are most apparent for the D stability cases. The cases with GPR show higher predicted concentrations in-close over the non-GPR case. The GPR algorithm gradually elevates the plume height until a final height is reached (at 991 meters downwind for the Hillsborough County case). The final

NORMALIZED GROUND LEVEL CONCENTRATIONS FOR A 67 METER (220') STACK HALITSKY AND ISC METHODS (grams per cubic meter)

STABILITY A		DOWNWIND DISTANCE (METERS)							
		250	500	750	1000	1500	3000	5000	10000
	H	174	234	285	329	329	329	329	329
(Reference wind speed = 3.0 m/sec)	H'	*	*	*	*	*	*	*	*
	S _Z	55	122	264	471	1089	4678	5000**	5000**
	S _Y	60	101	140	177	247	442	685	1277
	X	1.81x10 ⁻⁷	1.14x10 ⁻⁶	1.34x10 ⁻⁶	8.31x10 ⁻⁷	3.14x10 ⁻⁷	4.27x10 ⁻⁸	2.58x10 ⁻⁸	1.38x10 ⁻⁸
	X'	*	*	*	*	*	*	*	*
	ISC ^a	1.23x10 ⁻⁹	6.23x10 ⁻⁷	1.14x10 ⁻⁶	7.15x10 ⁻⁷	2.62x10 ⁻⁷	4.14x10 ⁻⁸	2.62x10 ⁻⁸	1.45x10 ⁻⁸
	ISC ^b	***	5.64x10 ⁻⁸	9.13x10 ⁻⁷	7.15x10 ⁻⁷	2.62x10 ⁻⁷	4.14x10 ⁻⁸	2.62x10 ⁻⁸	1.45x10 ⁻⁸
	ISC ^c	1.01x10 ⁻⁹	6.23x10 ⁻⁷	1.14x10 ⁻⁶	7.15x10 ⁻⁷	2.62x10 ⁻⁷	4.14x10 ⁻⁸	2.62x10 ⁻⁸	1.45x10 ⁻⁸
	ISC ^d	3.17x10 ⁻¹²	2.42x10 ⁻⁷	9.01x10 ⁻⁷	6.40x10 ⁻⁷	2.46x10 ⁻⁷	3.92x10 ⁻⁸	2.49x10 ⁻⁸	1.37x10 ⁻⁸

- H - Stack Height for Halitsky (H' = stack height for Halitsky W/STD).
X - Estimated Concentration for Halitsky (X' = estimated concentration for Halitsky W/STD).
ISC^a - ISC Computer Model W/GPR - No STD.
ISC^b - " " " W/STD - No GPR.
ISC^c - " " " W/GPR - No STD, No Downwash Analysis.
ISC^d - " " " W/GEP Stack, GPR - No STD.
STD - STACK TIP DOWNWASH.
GRP - GRADUAL PLUME RISE.
* - H'=H therefore X'=X.
** - Assumed Equal to 5000 (M).
*** - Value Less than 10⁻¹⁸.

TABLE 2-2

COMPARISON OF NORMALIZED MAXIMUM
GROUND LEVEL CONCENTRATIONS
BETWEEN THE HALITSKY METHOD AND ISC COMPUTER MODEL
AT SELECTED RECEPTORS FOR A 220 FOOT STACK
(FOR A STABILITY AND 3 METER/SECOND WINDS)

NORMALIZED GROUND LEVEL CONCENTRATIONS FOR A 67 METER (220') STACK
HALITSKY AND ISC METHODS
(grams per cubic meter)

DOWNWIND DISTANCE (METERS)

STABILITY D		250	500	750	1000	1500	3000	5000	10000
	H	143	187	223	255	255	255	255	255
(Reference wind speed = 5.0 m/sec)	H'	*	*	*	*	*	*	*	*
	S _Z	27	35	42	49	59	82	106	152
	S _Y	27	40	53	65	90	157	241	449
	X	4.54x10 ⁻¹¹	1.75x10 ⁻¹¹	1.34x10 ⁻¹¹	1.71x10 ⁻¹¹	6.58x10 ⁻¹⁰	2.44x10 ⁻⁸	8.66x10 ⁻⁸	1.42x10 ⁻⁷
	X'	*	*	*	*	*	*	*	*
	ISC ^a	5.74x10 ⁻⁷	5.36x10 ⁻⁷	1.86x10 ⁻⁷	8.65x10 ⁻⁸	1.28x10 ⁻⁷	2.33x10 ⁻⁷	2.75x10 ⁻⁷	2.24x10 ⁻⁷
	ISC ^b	4.42x10 ⁻⁹	4.32x10 ⁻⁸	6.29x10 ⁻⁸	8.65x10 ⁻⁸	1.28x10 ⁻⁷	2.33x10 ⁻⁷	2.75x10 ⁻⁷	2.24x10 ⁻⁷
	ISC ^c	***	5.00x10 ⁻¹⁸	2.33x10 ⁻¹⁴	1.26x10 ⁻¹²	5.48x10 ⁻¹⁰	6.01x10 ⁻⁸	1.76x10 ⁻⁷	2.12x10 ⁻⁷
	ISC ^d	***	***	1.00x10 ⁻¹⁸	1.92x10 ⁻¹⁵	1.11x10 ⁻¹¹	1.12x10 ⁻⁸	6.71x10 ⁻⁸	1.30x10 ⁻⁷

- H - Stack Height for Halitsky (H' = stack height for Halitsky W/STD).
X - Estimated Concentration for Halitsky (X' = estimated concentration for Halitsky W/STD).
ISC^a - ISC Computer Model W/GPR - No STD.
ISC^b - " " " W/STD - No GPR.
ISC^c - " " " W/GPR - No STD, No Downwash Analysis.
ISC^d - " " " W/GEP Stack, GPR - No STD.
STD - STACK TIP DOWNWASH.
GRP - GRADUAL PLUME RISE.
* - H'=H therefore X'=X.
** - Assumed Equal to 5000 (M).
*** - Value Less than 10⁻¹⁸.

TABLE 2-2 (continued)

COMPARISON OF NORMALIZED MAXIMUM
GROUND LEVEL CONCENTRATIONS
BETWEEN THE HALITSKY METHOD AND ISC COMPUTER MODEL
AT SELECTED RECEPTORS FOR A 220 FOOT STACK
(FOR D STABILITY AND 5 METER/SECOND WINDS)

GROUND LEVEL CONCENTRATIONS FOR A 220' STACK FROM
HALITSKY AND ISC METHODS
(grams per cubic meter normalized from a 1 gram per second release rate)

DOWNWIND DISTANCE (METERS)

STABILITY D		250	500	750	1000	1500	3000	5000	10000
(Reference wind speed = 10 m/sec)	H	91	104	116	125	125	125	125	125
	H'	88	101	113	122	122	122	122	122
	S _Z	27	35	42	49	59	82	106	152
	S _Y	27	40	53	65	90	157	241	449
	X	9.26×10^{-8}	1.72×10^{-7}	1.97×10^{-7}	2.41×10^{-7}	3.96×10^{-7}	4.81×10^{-7}	3.86×10^{-7}	2.07×10^{-7}
	X'	1.34×10^{-7}	2.20×10^{-7}	2.38×10^{-7}	2.80×10^{-7}	4.38×10^{-7}	5.06×10^{-7}	3.99×10^{-7}	2.09×10^{-7}
	ISC ^a	1.58×10^{-6}	1.44×10^{-6}	8.10×10^{-7}	5.42×10^{-7}	5.05×10^{-7}	4.19×10^{-7}	3.15×10^{-7}	1.73×10^{-7}
	ISC ^b	1.55×10^{-7}	6.84×10^{-7}	6.31×10^{-7}	6.05×10^{-7}	5.52×10^{-7}	4.43×10^{-7}	3.27×10^{-7}	1.76×10^{-7}
	ISC ^c	***	2.62×10^{-12}	4.71×10^{-10}	4.31×10^{-9}	5.15×10^{-8}	2.57×10^{-7}	2.80×10^{-7}	1.75×10^{-7}
	ISC ^d	***	***	6.93×10^{-14}	1.33×10^{-11}	1.58×10^{-9}	5.70×10^{-8}	1.17×10^{-7}	1.11×10^{-7}

H - Stack Height for Halitsky (H' = stack height for Halitsky W/STD).
X - Estimated Concentration for Halitsky (X' = estimated concentration for Halitsky W/STD).
ISC^a - ISC Computer Model W/GPR - No STD.
ISC^b - " " " W/STD - No GPR.
ISC^c - " " " W/GPR - No STD, No Downwash Analysis.
ISC^d - " " " W/GEP Stack, GPR - No STD.
STD - STACK TIP DOWNWASH.
GPR - GRADUAL PLUME RISE.
*** - Value Less Than 10^{-18} .

TABLE 2-2 (continued)

COMPARISON OF NORMALIZED MAXIMUM
GROUND LEVEL CONCENTRATIONS
BETWEEN THE HALITSKY METHOD AND ISC COMPUTER MODEL
AT SELECTED RECEPTORS FOR A 220 FOOT STACK
(FOR D STABILITY AND 10 METER/SECOND WINDS)

GROUND LEVEL CONCENTRATIONS FOR A 220' STACK FROM
HALITSKY AND ISC METHODS
(grams per cubic meter normalized from a 1 gram per second release rate)

DOWNWIND DISTANCE (METERS)

STABILITY D		250	500	750	1000	1500	3000	5000	10000
(Reference wind speed = 15 m/sec)	H	83	92	99	106	106	106	106	106
	H'	77	86	93	100	100	100	100	100
	S _Z	27	35	42	49	59	82	106	152
	S _Y	27	40	53	65	90	157	241	449
	X	1.62×10^{-7}	2.99×10^{-7}	3.68×10^{-7}	3.99×10^{-7}	4.97×10^{-7}	4.45×10^{-7}	3.14×10^{-7}	1.52×10^{-7}
	X'	3.09×10^{-7}	4.60×10^{-7}	5.12×10^{-7}	5.18×10^{-7}	5.89×10^{-7}	4.87×10^{-7}	3.31×10^{-7}	1.56×10^{-7}
	ISC ^a	1.70×10^{-6}	1.50×10^{-6}	9.39×10^{-7}	6.78×10^{-7}	5.63×10^{-7}	3.84×10^{-7}	2.58×10^{-7}	1.28×10^{-7}
	ISC ^b	5.60×10^{-7}	1.11×10^{-6}	9.12×10^{-7}	7.96×10^{-7}	6.42×10^{-7}	4.17×10^{-7}	2.72×10^{-7}	1.32×10^{-7}
	ISC ^c	1.00×10^{-18}	6.80×10^{-11}	4.72×10^{-9}	2.59×10^{-8}	1.27×10^{-7}	2.92×10^{-7}	2.49×10^{-7}	1.32×10^{-7}
	ISC ^d	***	1.80×10^{-17}	1.26×10^{-12}	1.20×10^{-10}	4.96×10^{-9}	7.15×10^{-8}	1.10×10^{-7}	8.59×10^{-8}

- H - Stack Height for Halitsky (H' = stack height for Halitsky W/STD).
X - Estimated Concentration for Halitsky (X' = estimated concentration for Halitsky W/STD).
ISC^a - ISC Computer Model W/GPR - No STD.
ISC^b - " " " W/STD - No GPR.
ISC^c - " " " W/GPR - No STD, No Downwash Analysis.
ISC^d - " " " W/GEP Stack, GPR - No STD.
STD - STACK TIP DOWNWASH.
GPR - GRADUAL PLUME RISE.
*** - Value Less Than 10^{-18} .

TABLE 2-2 (continued)

COMPARISON OF NORMALIZED MAXIMUM
GROUND LEVEL CONCENTRATIONS
BETWEEN THE HALITSKY METHOD AND ISC COMPUTER MODEL
AT SELECTED RECEPTORS FOR A 220 FOOT STACK
(FOR D STABILITY AND 15 METER/SECOND WINDS)

plume height is based on an algorithm presented in the attachment and is equal to the plume height set in the non-GPR case. Since the plume height in-close for the non-GPR is higher than the case with GPR, concentrations are lower. The predicted normalized concentrations for the two runs converge when the gradual plume rise height in the GPR case equals the final plume height in the non-GPR case.

The aforementioned results are mainly applicable for the D stability cases when atmospheric dispersion is limited and turbulence-related impacts are due to structural influences. The ISC concentrations for the A stability case are very close indicating that strong atmospheric turbulence (as in the case for A stability) dominates the building-related turbulence. The effects of the GPR option are fully realized here when a comparison is made between the ISC run with STD and no GPR and the ISC run with no building wake effects but with GPR. The latter run indicates that for this case, the strong dispersion associated with the A stability case plus the GPR option causes impacts greater (in-close) than the former case which utilized the downwash option and no GPR. This case demonstrates the variability which can result in using these models in a limited short-term case-by-case basis.

The results from the ISC run for a facility with a GEP stack indicate concentration estimates lower than all of the other runs performed (Halitsky included). The concentration difference between the GEP and non-GEP stack height runs is greatest in-close (from about 300 to 700 meters) with lessening differences with increasing downwind distance. Comparing the GEP/non-GEP ISC runs with the same options (GPR-no STD) the differences at the maximum point of impact for all input meteorological conditions shows the non-GEP stack yielding concentration impacts 88 percent greater than the GEP case. As presented in the PSD appendix (Appendix 10.1.5), the second maximum impact of the 24 hour SO_2 value is only 6.5 percent of the standard using the non-GEP stack. The economic and aesthetic offsets can justify the increase in predicted impacts.

The final comparisons of the ISC and Halitsky runs is for the 10 and 15 meter per second wind speed cases. The Halitsky results lie between the ISC wake and no wake cases and then converges with them beyond 3,000 meters. The approximate differences in predicted concentrations impacts, based on a one gram per second unitized emissions rate, is one order of magnitude. These differences occur from the inner boundary of 250 meters out to 1,500 meters after which convergence begins.

For the 5 meter per second D stability case, the same results emerge; relatively large differences in-close with convergence further downwind. In-close, the difference between ISC and Halitsky (both using GPR) is approximately 5 orders of magnitude. In this case, light winds and neutral stability do little to dilute the plume. The primary dilution comes about from the building-related turbulence and thereby highlights the differences in the algorithms used in these two approaches. The ISC results are the more conservative of the two.

2.2.4 Analysis of Actual Worst-Case Meteorological Conditions in Hillsborough County

The ambient conditions expected to cause the maximum downwash-related impacts are expected to occur during limited meteorological events in Hillsborough County. A program called STEADY was applied to identify periods of persistent meteorological conditions which may potentially cause maximum ground level impacts.

The STEADY program (CDM, 1977), requires input ranges for wind speed, wind direction and stability, individually or in any combination. Furthermore, input information is needed on the duration that the specified condition is to last before being considered persistent as well as the number of excursions allowed from the input range.

Since the proposed facility and stack axis is orientated in an east to west direction, a range of winds from these two quadrants were screened for persistence. Using 1974 meteorological data recorded at Tampa/St. Petersburg Airport as an average case year (based on the full grid analysis in the main text) previous computer runs, winds between 240° and 300° , as well as 60° and 120° were checked for persistence (with no allowable excursions outside the range) over 24 hours or more. No limits were imposed on wind speed or the stability.

For the year 1974, there were 6 episodes during which winds blew from the east for 24 or more consecutive hours. The maximum duration was 34 hours while the minimum was 26 hours. Of the 178 total hours of the six episodes, not one hour exceeded the critical wind speed of 13.9 meters per second (the wind speed at which downwash could occur) during the specified direction for the specified duration. Out of the total year this persistent event occurred 2.0 percent of the time.

Winds blew from the west, with the same 24-hour persistence (or greater) during 3 episodes in 1974. The greatest duration was 34 hours while the least was 31 hours. During the 3 episodes, recorded wind speed never blew in excess of the critical wind speed. Winds with a 24-hour or greater persistence blew from the west 1.1 percent of the time that year. The total percentage of the year in which the wind blew between 240° and 300° , and 60° and 120° for 24 or more hours was 3.1 percent.

From the screening of actual meteorological data it is evident that persistent worst-case conditions, from a viewpoint of continued potential downwash from the proposed facility, are not too common. However, shorter events with winds from the aforementioned quadrants and in excess of the critical wind speed are likely. These short-term events were analyzed via the Halitsky and ISC methods and no significant impacts were noted. As noted above, the chance of the modeled short term events extending into persistent events in the Tampa Bay area is remote based on 1974 conditions.

3.0 CONCLUSIONS

Using EPA recommended screening techniques, it was shown that the plume will clear the cavity region, thereby limiting the increase in ground level impacts to wake-related turbulence. A downwash analysis on the wake region using the USEPA recommended Industrial Source Complex (ISC) computer model has been performed to evaluate the potential ground level impacts of the resource recovery facility proposed for Hillsborough County. Due to the sensitivity of ground level impacts to stack height, especially under the influence of structure-related turbulence, a more refined analysis was included to insure the conservativeness and accuracy of the ISC analysis. The refined analysis included algorithms suggested by Halitsky (1976) for comparative purposes.

The downwash analysis was completed using a number of options available in the algorithms. The results were then compared to assess the overall effect these options have on ground level impacts. A set of four meteorological conditions representing worst-case short-term events were selected for ambient data input. If a large degree of variability between the models resulted, a more refined analysis would be necessary. A comparison was also made between the impacts from a GEP and a non-GEP stack with the ISC computer model. These results as well as the results of the other comparisons are summarized below.

The results of the two model comparison and GEP/non-GEP comparison indicated:

- o Overall, the predicted concentrations from the two models were similar. In the one case where a large degree of variability existed, the ISC model proved the most conservative.
- o The Halitsky model predicted concentrations that were lower in the D stability cases, and only slightly higher in the A stability case.

- o The various options selected resulted in differences in close, but with convergence occurring soon after the turbulence zones were cleared. The EPA recommended options did yield the most conservative results.
- o The maximum short-term concentration predicted from the four worst-case input conditions yielded values just slightly below the maximum short-term values obtained in the analysis using a full year of meteorological data obtained from Tampa/St. Petersburg Airport (see results in main text).
- o A screening analysis performed on 1974 Tampa Bay/St. Petersburg meteorological data indicates that persistent conditions likely to result in maximum ground level concentrations are uncommon in the Hillsborough area, and are likely to occur approximately 3 percent of the time for an average case year.
- o As presented in the PSD appendix (Appendix 10.1.5), the second maximum impact of the 24-hour SO_2 value is only 6.5 percent of the standard using the non-GEP stack.

Based on the overall results, the ISC model utilized in both the refined stack analysis, as well as the full grid analysis of the facility described in the main text, was found to be the most conservative method for this level of detail. The Halitsky analysis, which used more realistic algorithms based on structure dimensions, resulted in lower ground level impacts in the four cases studied.

Due to model limitations which restricted the inner boundary of the analysis to the wake region, and the variability between the models within this region, the results should not be looked upon as absolute. However, due to the relative consistency between the results of the ISC and Halitsky analyses and since the predicted worst-case concentrations are below a level of concern, additional analyses on the stack height issue do not appear warranted.

The purpose of the stack height analysis is to provide the technical foundation for determining the implications of a stack height at less than GEP. This analysis compared two methods of assessing downwash--ISC and Halitsky. It also compared the predicted relative ground level concentrations of a 220 foot stack to those of a 375 foot GEP stack.

Based on the analysis presented in this appendix, supplemented by the air quality analysis contained in the PSD application (Appendix 10.1.5 of the Application for Power Plant Site Certification), it has been determined that a 220 foot stack is feasible for the proposed energy recovery facility. The analysis contained here and in the PSD application examines the aerodynamic downwash issues and the ground-level concentration of pollutants associated with the proposed energy recovery facility. The analyses show that neither downwash nor pollutant concentrations will be a problem at the facility with a 220 foot stack.

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ATTACHMENTS

- A - LISTING AND DESCRIPTION OF ALGORITHMS USED IN DOWNWASH ANALYSIS.
- B - MEMO FROM STEPHEN PERKINS (USEPA) REGARDING CONSENSUS DOWNWASH MODELING POLICY.

ATTACHMENT A

EQUATIONS UTILIZED IN STACK DOWNWASH ANALYSIS:

A) GROUND LEVEL CONCENTRATION ALONG CENTERLINE UNDER THE PLUME;

GAUSSIAN PLUME DISTRIBUTION

$$\frac{ISC}{x} = \frac{Q}{\pi u S_z S_y} e^{-\frac{(-H)^2}{2 S_z^2}} \quad (1) \quad (EPA, 1979)$$

where;

H = Plume height (meters).

S_z = Vertical plume spread (meters).

S_y = Horizontal plume spread (meters).

u = Average wind speed at stack height (meters/second).

Q = Emission rate (normalized at 1 gram/second).

x = Ground level concentration (meters³/seconds⁴).

HALITSKY > SAME AS (1).

B) WIND SPEED ADJUSTMENT AT STACK HEIGHT;

LOG WIND PROFILE

$$\frac{ISC}{u(h)} = \frac{u_1}{(Z_1)^P} \quad (2) \quad (EPA, 1979)$$

where;

h = Emission height (meters).

Z = Wind system measurement height (10 meters).

u₁ = Average wind speed at measurement height (meters/second).

P = Wind profile exponent.

u(h) = Average wind speed at emission height (meters/second).

Value of P; (EPA, 1979)

Pasquill Stability Category

Wind Profile Exponent - P

A	0.10
B	0.15
C	0.20
D	0.25
E	0.30
F	0.30

HALITSKY - SAME AS (2).

- SAME VALUES of P.

C) CALCULATION OF S_y AND S_z VALUES (EPA, 1979);

$$\text{ISC} > S_y = 465.12(x) \text{ TAN (TH)} \quad (3)$$

where;

$$\text{TH} = 0.0175 (c-d \ln(x))$$

c&d = Coefficients which are stability dependent (listed in EPA, 1979 p. 2-27)

x = Downwind distance (Kilometers).

$$S_z = a(x)^b \quad (4)$$

where;

a&b = Coefficients which are stability dependent (listed in EPA, 1979 p. 2-28 & 2-29).

x = Downwind distance (Kilometers).

ISC classifies the proposed facility as a "squat" building, modifying S_y & S_z as follows (EPA, 1979);

$$S_Y' = 0.35h_w + 0.067(x-3h_b) \quad \text{for } 3h_b < x < 10h_b \quad (3a)$$

$$S_Y' = (x + X_Y) \quad \text{for } x \geq 10h_b \quad (3b)$$

where;

x = Downwind distance (Kilometers).

$$X_Y = \frac{(0.35h_w + 0.5h_b)^{1/q}}{p} - 0.01h_b$$

h_w = Building width (diameter of circle of equal horizontal building area in meters).

h_b = Building height (meters).

p&q = Stability dependent coefficients listed in EPA, 1979 p. 2-32.

$$S_Z' = 0.7h_b + 0.067(x-3h_b) \quad \text{for } 3h_b < x < 10h_b \quad (4a)$$

$$S_Z' = (x + X_Z) \quad \text{for } x \geq 10 h_b \quad (4b)$$

where;

x = Downwind distance (kilometers)

$$X_Z = \frac{(1.2h_b)^{1/b}}{a} - 0.01h_b$$

a&b = Stability derived coefficients listed in EPA, 1979 p. 2-28, 2-29.

h_b = Building height (meters).

$$\text{HALITSKY} > S_Y = Y_b / \sqrt{10} \quad (\text{Halitsky, 1976}) \quad (5)$$

where;

$Y_b = 36.35 + 2.5 c (x)^d$
 c&d = Coefficients which are stability dependent (listed in EPA, 1979 p. 2-27).
 x = Downwind distance (kilometers).

$$S_Z = Z_b/2.5 \quad (\text{Halisky, 1976}) \quad (6)$$

where;

$Z_b = 42.7 + 2.5 a(x)^b$
 a&b = Stability dependent coefficients listed below.
 x = Downwind distance (kilometers).

a & b - calculated from lines fitted to Pasquill-Gifford equations.

<u>DOWNWIND DISTANCE (km)</u>	<u>STABILITY = A</u>		<u>STABILITY = D</u>	
	<u>a</u>	<u>b</u>	<u>a</u>	<u>b</u>
.25	221	.94	71	.95
.50	220	.94	70	.95
.75	214	.94	69	.95
1.0	209	.94	68	.95
1.5	205	.94	68	.95
3.0	194	.94	65	.95
10.0	194	.94	65	.95

Equations $Y_b + Z_b$ derived from Halitsky data modified for the proposed Hillsborough facility.

D) ALGORITHM USED TO CALCULATE PLUME HEIGHT AS A FUNCTION OF DOWNWIND DISTANCE:

BRIGGS PLUME RISE (GRADUAL PLUME RISE)

$$\underline{ISC} \rightarrow dh = \left(\frac{3F_m(x)}{B_j^2(u)^2} + \frac{3F(x)^2}{2B_i(u)^3} \right)^{1/3} \quad (\text{EPA, 1979}) \quad (7)$$

where;

F_m = (see equation (5) in appendix).

F = (see equation (4) in appendix).

u = Average wind speed at emission height (meters/second).

B_j = $(Y_3 + \frac{u}{V_s})$ where V_s = Exit velocity (meters/second).

u = Average wind speed at stack height in meters/second).

B_i = 0.6

x = Downwind distance.

The calculation to determine the downwind distance of final height;

$$\underline{ISC} \rightarrow x' = 3.5x^* \quad (\text{for } F > 0) \quad (\text{EPA, 1979}) \quad (8)$$

where;

$$x^* = 34F^{2/5} \quad (\text{for } F > 55 \text{ meters}^4/\text{seconds}^3)$$

x' = Distance to final height (meters).

HALITSKY $\rightarrow$ same as (7) and (8).

E) ALGORITHM USED TO ASSESS STACK TIP DOWNWASH (EPA, 1979);

$$\underline{ISC} \rightarrow h' = h \quad \text{if } V_s \geq 1.5 u(h) \quad (9)$$

$$h' = h + 2[V_s/u(h) - 1.5]d \quad \text{if } V_s < 1.5u(h) \quad (10)$$

where;

h' = Adjusted stack height (meters).

h = Original stack height (meters).

$u(h)$ = Wind speed at stack height (meters/second).

V_s = Stack exit velocity (meters/second).

d = Diameter (meters).

HALITSKY > same as (9) and (10).

ATTACHMENT B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: March 16, 1983

SUBJECT: Consensus Downwash Modeling Policy

FROM: Stephen S. Perkins ^{SP} Eric Chasanoff
Region I Region II

TO: Regional Modeling Contacts, Regions III-X

As requested at the Denver Modeling meeting, we have been working on the development of a consensus downwash policy. A draft policy was distributed for comment on November 5, 1982. Written comments were received from three Regional Offices and OAQPS. The remaining regions were contacted by telephone.

We have synthesized all the comments and have attached our final proposal for a downwash modeling policy. At the suggestion of OAQPS, we have presented the policy in the form of revisions to the Workshop Summary Report (WSR). The comments received on the policy aspects of the November draft were almost unanimously favorable. As a results, the proposed revisions to the WSR are almost identical to the first section of the draft.

The comments received on modifications to ISC were not nearly as unanimous. Given the range of comments received, we believe that further discussion of any modifications is warranted. We recommend that OAQPS establish a working group to prioritize and evaluate refinements to ISC. Since these further discussions are necessary, we have decided not to include the issue of modifications to ISC as part of EPA's current technical guidance.

ATTACHMENT C

APPENDIX C

BUILDING DOWNWASH SCREENING PROCEDURES

When a GEP analysis indicates that a stack is less than the GEP height, the following screening procedures should be applied to assess the potential for air quality problems. The building downwash screening procedure is divided into two major areas of concern. Within the cavity region (up to 3L downwind (L = the lesser of the building height or projected width), a series of simple hand calculations can be used. Within the wake region (3L to 10L downwind), the ISC model can be used in a screening mode. Details on both procedures are provided below.

Cavity Region

The cavity effects screening procedure consists of four sequential steps.

Step 1. Compare the stack height to the cavity height. Calculate the cavity height h_c :

$$h_c = H + 0.5(L)$$

where H = Height of structure (m)

L = Lesser dimension (height or projected width) of structure (m)

If the stack height is greater than or equal to the cavity height, then it may be assumed that maximum impacts will be dominated by the wake effects, and no further cavity analysis is required. Proceed to perform the wake effects analysis. If the stack height is less than the cavity height, proceed to Step 2.

Step 2. Estimate the momentum plume rise for windy neutral atmospheric conditions. First compute the momentum flux F_m :

$$F_m = (T_a/T_s) v^2 d^2/4$$

where T_a = Ambient air temperature ($^{\circ}\text{K}$) (assume 293°K)

T_s = Stack exit temperature ($^{\circ}\text{K}$)

v = Stack exit velocity (m/s)

d = Stack inner diameter (m)

Next, compute the momentum plume rise h_m :

$$h_m = \left[\frac{3F_m(x)}{b^2 u^2} \right]^{1/3}$$

where $b = (1/3 + u/v_s)$

u = Critical wind speed (m/s) (assume 7.5 m/s)

x = Downwind distance (m) (assume 2 building heights downwind)

The plume height can be calculated by adding the momentum plume rise to the stack height. If the plume height is greater than or equal to the cavity height calculated in Step 1, then it may be assumed that maximum impacts will be dominated by the wake effects and no further cavity analysis is required. Proceed to the wake effects analysis. If the stack height is less than the cavity height, proceed to Step 3.

Step 3. Estimate the downwind extent of the cavity. Compute the cavity length X_r :

For short buildings ($Y/H < 2$)

$$X_r = Y + \frac{(A)(W)}{1.0 + B(W/H)}$$

For long buildings ($Y/H \geq 2$)

$$X_r = \frac{1.75(W)}{1.0 + 0.25(W/H)}$$

where H = Building height (m)

Y = Alongwind building dimension (m)

W = Crosswind building dimension (m)

$$A = -2.0 + 3.7(Y/H)^{-1/3}$$

$$B = -0.15 + 0.305(Y/H)^{-1/3}$$

Next, compare the cavity length to the closest distance to the plant property line. Only consider plant property to which public access is precluded. If the cavity does not exceed this distance, then it may be assumed that cavity effects will not impact ambient air, and no further cavity analysis is required. Proceed to the wake effects analysis. If the cavity extends beyond plant property, proceed to Step 4.

Step 4. Estimate impacts within the cavity. "Worst case" impacts can be estimated by the following simple approximation:

$$X = \frac{O}{1.5(A)(u)}$$

where O = Emission rate (g/s)

A = Cross-sectional area of building normal to wind (m^2)

u = Wind speed (m/s)

For u , one should choose the lowest wind speed likely to result in entrainment of most or all of the pollutant into the cavity. If no data are available from which the minimum speed can be estimated, assume a worst case wind speed of 3 m/s.

This concludes the cavity effects screening procedure. Proceed to the wake effects analysis. The above procedures are considered to be conservative. If the conservative estimate proves unacceptable, an applicant may wish to consider a field study or fluid modeling demonstration to show maintenance of the NAAQS or PSD increments within the cavity. If such options are pursued, prior agreement on the study plan and methodology should be reached between the applicant and the Regional Office.

Wake Region

Wake effects screening can be performed with ISC using a set of representative "worst case" meteorological conditions. The procedure consists of three steps.

Step 1. Determine the "worst case" building dimensions for input to the model. To model "worst case" conditions, care should be taken to use the same critical building dimensions (maximum projected width and/or height) that give the greatest height in the GEP analysis. The way ISC is constructed, the user inputs a building length and width, instead of the projected width used in the GEP analysis. The model calculates an area based on this length and width and then determines the diameter of a circle with equal area. This so called "effective diameter" (D) is used in all other model calculations as the projected width of the

building. Thus ISC assumes:

$$(L)(W) = (\pi/4) D^2$$

To model the projected width determined in the GEP analysis, set D equal to the projected width and solve the above equation assuming $L = W$. The calculated value should then be used as inputs to ISC for L and W.

Step 2. Calculate maximum hourly concentrations using ISC. The following procedures should be followed:

A. Use the wake effects option with building dimensions determined in Step 1, transitional plume rise ($ISW(24)=2$), and no stack tip downwash ($ISW(25)=1$).

B. With the source at the center of the grid, place receptors downwind along a single radial. Receptors should be spaced no more than 100 m apart within 2000 m of the source. Additional receptors may be needed on a case specific basis to ensure prediction of the maximum concentration.

C. A set of representative "worst case" meteorological conditions should be used in conjunction with the model option that reads hourly data in card image format ($ISW(19)=2$). A temperature of 293 °K, a mixing height of 5000 m, and a wind direction along the line of receptors should be used for each hour. At a minimum, the following combinations of stability class and wind speed should be modeled:

<u>Stability Class</u>	<u>Wind Speed (m/s)</u>
A	1, 3
B	1, 3, 5
C	1, 3, 5, 10
D	1, 3, 5, 10, 15
E	1, 3, 5
F (rural only)	1, 3

Step 3. Obtain concentration estimates for the averaging times of concern. The maximum 1-hour concentration is the highest of the concentrations estimated in Step 2. The ratio between a longer-term maximum concentration and a 1-hour maximum will necessarily be site-specific and should be based on considerations of source characteristics, local climatology and topography.