State of Florida

DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee	
To: Mike Harley	Loctn.:
To:	Loctn.:
To:	Loctn.:
From:	Date:

TO: Power Plant Siting Review Committee

FROM: Hamilton S. Oven, Jr. HSO

DATE: October 31, 1978

SUBJECT: Pinellas County Resource Recovery Project - Plant Siting Application PA 78-11

Attached hereto is a copy of Pinellas County's application for Power Plant Site Certification of their Resource Recovery Project. Please review the application pursuant to IMM 5.8.1 and be prepared to discuss its completeness at a meeting to be held on November 7, 1978, at 1:30 p.m. in room 403, Twin Towers Office Building.

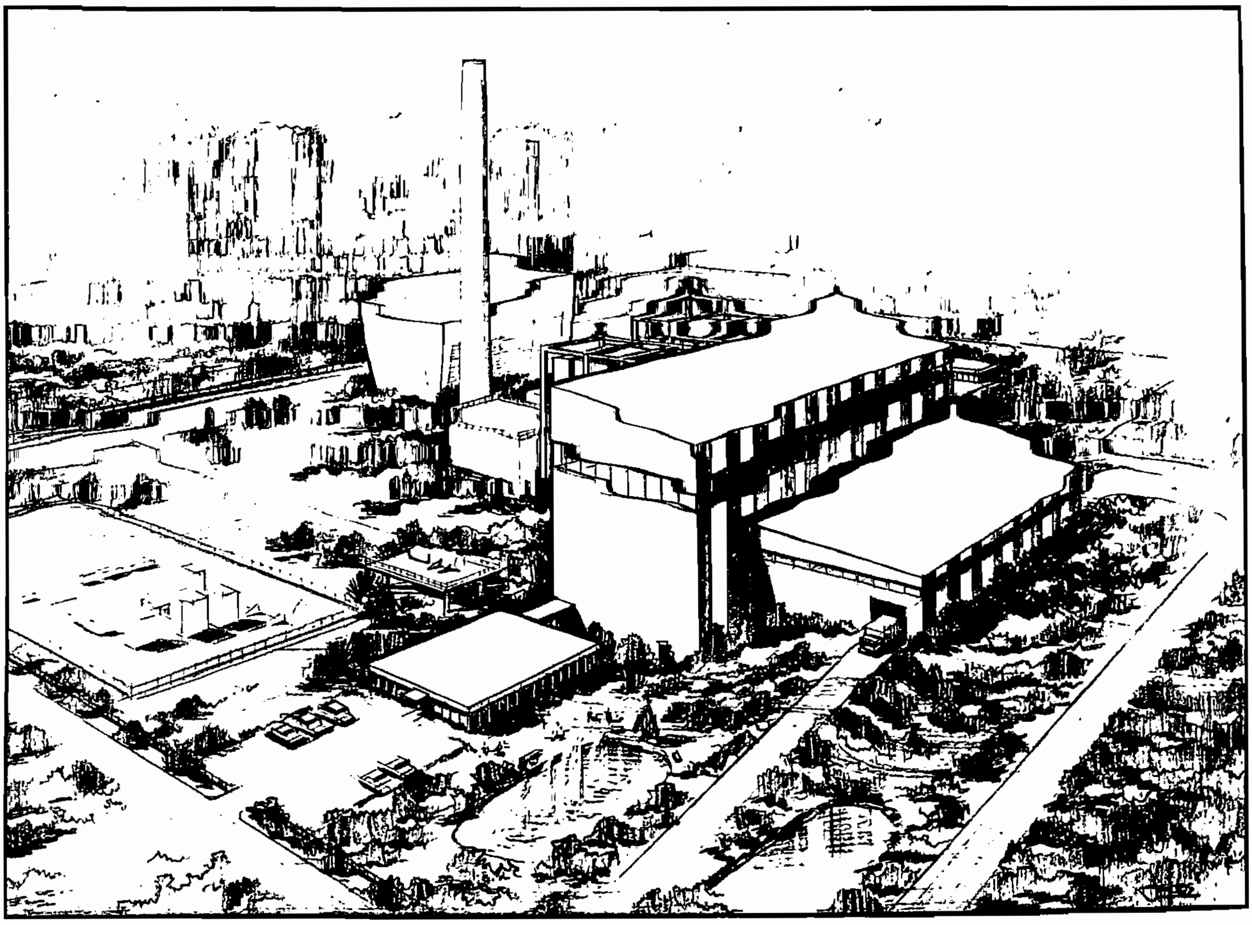
HSOjr/mk
Attachment

NOV 1978
BUREAU
AQM

H6 - Rev 7/76

Pinellas County, Florida

Resource Recovery Program



Application For

Power Plant Siting Certification

OCTOBER, 1978

BOARD OF COUNTY COMMISSIONERS
PINELLAS COUNTY, FLORIDA
315 HAVEN STREET
CLEARWATER, FLORIDA 33516

October 23, 1978

State of Florida
Department of Environmental Regulation
2562 Executive Center Circle East
Montgomery Building
Tallahassee, FL 32301

ATTN: Mr. Hamilton Oven

Re: Application for Power Plant Siting Certification (PPSC)

Gentlemen:

The document enclosed herewith is Pinellas County's application for an electrical power plant siting certification, submitted in accordance with Florida Department of Environmental Regulation Chapter 17-17 Rules.

Hopefully, the information contained herein provides all that is necessary to permit a thorough evaluation of our application. If, however, you find that additional data is required, please contact me at your earliest convenience.

Sincerely,

D. F. Acenbrack, Director
Solid Waste Management

ACE:ltl
Enclosure

WARRANT PAYABLE AT
CENTRAL PLAZA BANK
AND TRUST COMPANY
ST. PETERSBURG, FLORIDA

BOARD OF COUNTY COMMISSIONERS
PINELLAS COUNTY CLEARWATER, FLORIDA

IMPREST FUND

63-697 / 631

NUMBER 353843

APPROVED IN OPEN SESSION

VOID IF NOT CASHED WITHIN SIXTY DAYS

DATE		AMOUNT
10/1978	PAY	$ ****25,000.00

PAY TO THE ORDER OF

DEPARTMENT OF ENVIRONMENTAL REGULATION

BOARD OF COUNTY COMMISSIONERS SEAL PINELLAS COUNTY FLORIDA

ATTEST:

CLERK CIRCUIT COURT EX-OFFICIO CLERK
OF THE BOARD OF COUNTY COMMISSIONERS

CHAIRMAN OF THE BOARD OF COUNTY COMMISSIONERS

[redacted]

$25,000 Check which is application fee to accompany Power Plant Siting Application as per Florida Department of Environmental Regulation, Chapter 17-17 Rules.

APPLICATION FOR CERTIFICATION

OF PROPOSED

RESOURCE RECOVERY - ELECTRICAL

GENERATING FACILITY

PREPARED FOR

PINELLAS COUNTY, FLORIDA

BY

HENNINGSON, DURHAM & RICHARDSON

WITH TECHNICAL ASSISTANCE FROM:

UOP, INC.

PINELLAS COUNTY DEPARTMENT OF SOLID WASTE

OCTOBER 1978

PERTINENT APPLICANT INFORMATION

Applicant's Official Name: Address:	Pinellas County 315 Haven Street Clearwater, Florida 33516
Name and Title of Business Head:	Charles Rainey, Chairman of Board of County Commissioners
Name and Title and Address of Representative Responsible for Obtaining Certification:	Gene Jordan, Director Public Works and Utilities 315 Haven Street Clearwater, Florida 33516
Site Location:	County - Pinellas Nearest Incorporated City - Pinellas Park Latitude and Longitude - 27°52′ N 82°40′ W
Name Plate Generating Capacity of Proposed Facility:	50 megawatts

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

Professional Engineer Submitting Application

Name: R. Lee Torrens

Florida Registration Number: 21274

Date: 10/25/78

Signature: R Lee Torrens

Address and Phone Number: Post Office Box 12744
Pensacola, Florida 32575
(904) 432-2481

(SEAL)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (con't)

LIST OF FIGURES

CHAPTER 1 - none

CHAPTER 2

LIST OF FIGURES (con't)

CHAPTER 1

PURPOSE OF THE PROPOSED FACILITY AND ASSOCIATED TRANSMISSION

1.0 Background

Under an Act of the Legislature in 1975, the Board of County Commissioners increased its responsibility from handling only the unincorporated areas to solid waste disposal activities to all of Pinellas County. Early in 1976, the search for a resource recovery solution started with a feasibility study which gathered data of existing conditions and developed alternative solutions to the countywide disposal problem. Under the same legislation, a Solid Waste Technical Management Committee (TMC) was established. Members are technically qualified representatives from designated municipalities. To date the TMC has been instrumental in providing guidance to the Board of County Commissioners towards implementation of a total resource recovery system. Basic philosophy used in the program has been to provide a system which is technically and managerially sound, economically acceptable, environmentally acceptable, and financable. In short, the solution was to minimize landfill requirements at a reasonable cost to the County residents. Based on recommendations of the study, the County Commission invited private firms to indicate an interest in contracting for disposal of county refuse.

On March 1, 1977, a Request for Qualifications (RFQ) was issued. Of the 22 respondents, a list of 7 firms were offered a Request for Proposals (RFP). Technical guidelines were provided with the RFP outlining certain design criteria, solid waste characteristics and certain baseline guaranteed solid waste quantities. Upon selection of a single contractor to negotiate with, these technical parameters would be refined and optimized during negotiations.

Following a two month evaluation of each firm's proposal, the Board of County Commissioners unanimously agreed to begin negotiations with UOP, Inc., which offered a mass burning, electrical generation system.

Pinellas County will contract with UOP, Inc. to design, construct and operate the resource recovery plant for 20 years. UOP, Inc. guarantees the capacity of the facility and will receive an operating fee to operate the plant for 20 years (with escalation factors). In turn, the County will guarantee the delivery of a minimum quantity of solid waste for 20 years (i.e. 530,000 tons per year). Penalties will be paid by either party under terms of the contracts, for failure to meet these guarantees or others stated in the contracting agreements. Any wastes processed above the guaranteed levels and below the capacity of the facility will be processed for the prescribed operating fee. The County will receive and disperse all revenues received (i.e. recovered materials revenues, electrical revenues, tipping fee) to pay all costs associated with the operation of the facility (i.e. debt service, UOP operating fee, County incurred costs, and utilities). Performance of the system above the levels as guaranteed by UOP will mean profit sharing by UOP and the County. Performance below levels guaranteed by UOP is offset by UOP making up lost revenues due to below-guarantee performance.

The County will guarantee a minimum quantity of solid waste, which is somewhat below the total quantity available. It is anticipated that operating levels of the facility (i.e. tons per year) will always be above the guaranteed level. Therefore, the plant will operate somewhere between the guaranteed level of 530,000 tons per year and the plant capacity of 766,500 tons per year. The higher the plant useage, the lower the tipping fee to users of the facility. In this document, where discussions involve areas of potential adverse impact (i.e. air quality impacts) a plant capacity or maximum system operation sequence was included. In areas where positive impacts are discussed (i.e. savings of energy, materials) the guaranteed minimum performance levels were assumed. Therefore, this document is conservative in those areas.

At present, the County is pursuing specific interlocal agreements with the collection entities involved in the County for solid waste delivery commitments despite the fact that the local act (reference Section 1.0) mandates the County's enforceable responsibility in the matter of solid waste disposal throughout the County.

1.1 System Reliability and Demand

The system offered by UOP and presently under negotiation with Pinellas County is a mass-burning/electrical generation configuration. The UOP facility utilizes waterwall combustion units incorporating the Martin combustion system; UOP is the licensee of the Martin system of Germany which has numerous systems operating in Europe, many generating electricity. In fact, the seven largest individual mass fired boiler units in Europe (ranging in size from 660 TDP to 1320 TPD) employ the Martin process. The two boiler, 1050 TPD unit capacity system (total capacity 14,000 tons per week) proposed for Pinellas County falls well within Martin system capabilities. The main proprietary portion of the system is a precision tooled, reverse reciprocating stoker grate made of cast chrome steel. From the dependability standpoint, there appears to be an advantage with this type of grate as the frequent unscheduled outages common to other types are markedly reduced; indeed, these grates have demonstrated remarkable service life at the Chicago Northwest facility where Martin units have been employed since 1971.

As proposed by UOP and specified by Pinellas County, UOP would design, construct, test, operate and maintain the resource recovery facility under the supervision of the County's Public Works and Utilities Department. Overall responsibility for the project (other than contractural covenants accepted by UOP) ultimately resides with the Board of County Commissioners. As previously stated, the Board has responsibility for all solid waste disposal throughout Pinellas County via an Act of Legislature which became law in June 1975. Collection, however, is still the responsibility of each municipality. (Eleven Pinellas cities have municipal collection systems and 25 private collectors serve remaining areas.).

Regarding system financing, the County Commission had directed that both public and private financing of the system be explored. Public financing means that revenues from the sale of electricity and recovered materials would be combined with the disposal charges to pay for the bonds and contractor's operating fee. Under private financing, the revenues would be paid to the lending agency. Under this latter arrangement, the County would not own the system at the end of the 20-year contract period. Preliminary assessment of both financing methods has indicated that the County should actively pursue public financing through use of revenue bonds, under which the facility would become a County property. (Tax considerations may necessitate private ownership of the electrical production equipment.)

1.1.1 Load Analysis/Solid Waste Characterization

In 1977, approximately 570,600 tons of solid waste were generated in Pinellas County by an estimated population of 770,000 people, thus demonstrating an average per capita generation rate of 4.06 lb/cap/day (570,600 TPY x 2000 lbs/ton /

770,000 capital / 365 days/year = 4.06 lb/cap/day). Seasonal distribution of this waste generation is indicated below:

Spring Mar/May	28.4%
Summer June/Aug	24.2%
Fall Sept/Nov	24.2%
Winter Dec/Feb	23.2%

There are eleven municipal collection systems and approximately 25 private haulers. Disposal is currently handled by four sanitary landfills, a private operated landfill and six debris pits (see Table 1.1.1). All sites which handle only non-putrescible material are privately owned. Based on scale data obtained from the Toytown and Bridgeway Acres sanitary landfills for 1977, these two landfills received 84.4 percent of that year's solid waste from Pinellas County. The data further reveals that March and August are the peak months for solid waste disposal (11.1% and 9.2% of the annual total, respectively), while the load for January (7.0% of the total) represents the minimum disposal month.

1.2 Other Objectives

Primary reasons for developing the resource recovery plant are the rapidly accelerating costs and undesirable ecologic consequences resulting from conventional solid waste

TABLE 1.1.1

SOLID WASTE INVENTORY

Landfill	1977 Quantities Tons/Year	% Total	Source of Data
Toytown	334,840	58.7	City of St. Petersburg
Bridgeway Acres	146,761	25.7	Pinellas County (Wells Bros.) Weighed Data
Largo	48,000	8.4	City of Largo Estimated
Tarpon Springs	11,000	1.9	City of Tarpon Springs Estimated
Windish	30,000	5.3	Cities of Dunedin, Safety Harbor, private haulers. Estimated.
TOTAL	570,601	100.0	

landfilling in Pinellas County. Generation of electricity represents the most feasible approach to implementing such recovery operations, even though the derived power is a secondary benefit. Ultimately, most of the solid waste generated by the ever-growing population of Pinellas County will be converted to electricity via the UOP process; an additional benefit centers on the recovery from the boiler residue of such recyclable materials as aluminum, ferrous metals, heavy non-ferrous metals and aggregate. A discussion of the quantities of recovered energy and materials is found in Chapter 7.

1.3 Consequences of Delay

Negotiations have begun for both construction of the 70-80 million dollar UOP system and for contractural plant operation for a 20 year period. A contract with Florida Power Corporation for the purchase of all electrical energy produced and fed into its grid is being finalized.

The question then arises as to which tasks are critical so as to minimize potential delays of the entire program. To address this concern, a computer based Critical Path Network (CPN) of tasks and times was employed to assist all parties in completing the numerous tasks on a timely basis. This is an obvious necessity when one considers the cost of delay. Conservative calculations indicate that, at a minimum, each day of delay beyond the scheduled Notice to Proceed date will cost

$12,000 due to the impact of inflation upon this capital intensive project.

Furthermore, landfill requirements need to be significantly curbed in order to both extend the useful life of existing disposal sites and to curtail condemnation of additional areas for subsequent landfill operations. Thus, in view of accelerating costs, the need to keep this project proceeding on schedule is of paramount importance.

CHAPTER 2

THE SITE

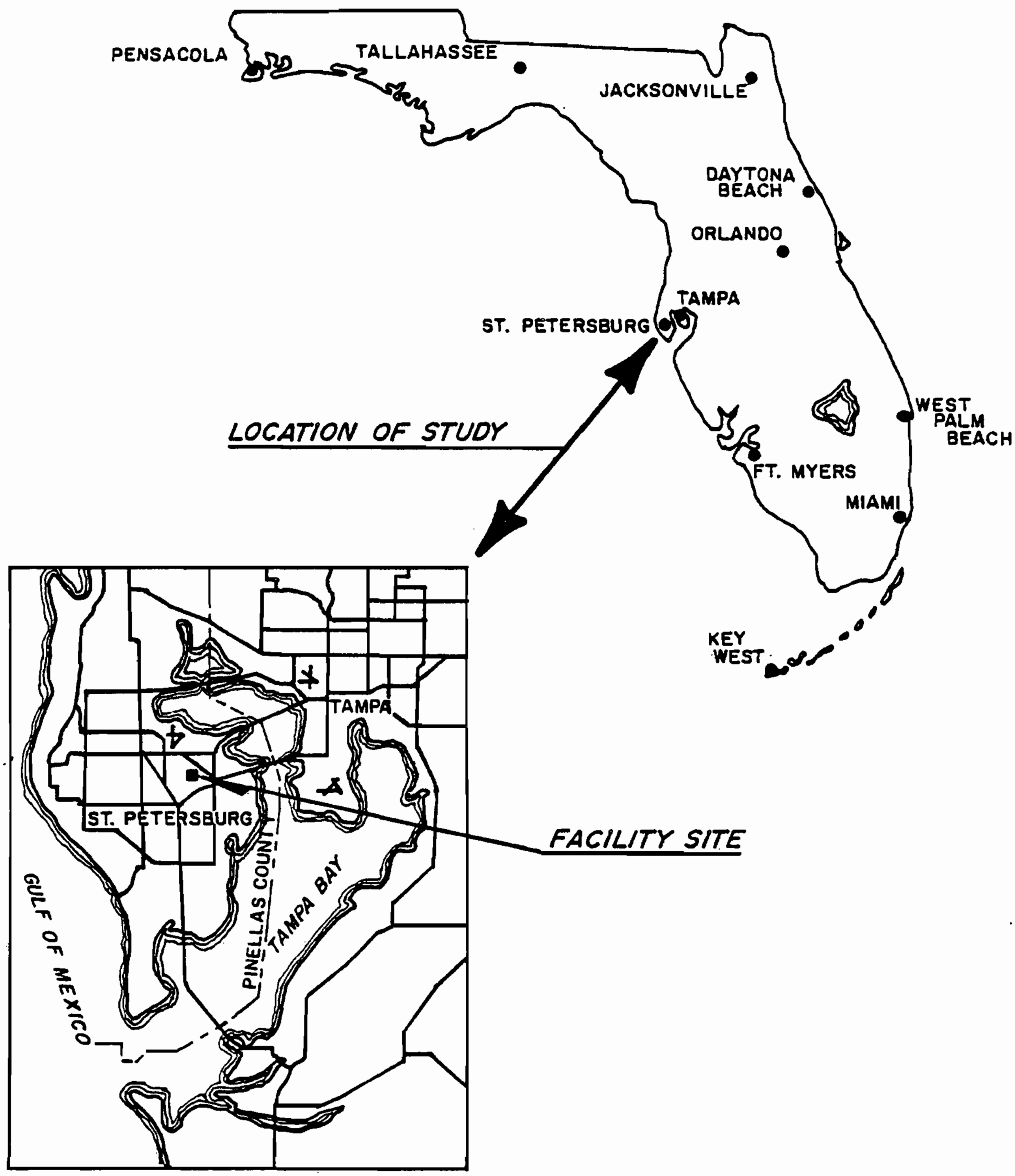
2.1 Site Location and Layout

2.1.1 Site Layout - The location of the proposed solid waste resource recovery facility relative to the State of Florida and to the Tampa Bay Region is illustrated in Figure 2.1.a. Figure 2.1.b details the plant facility perimeters, with abutting and adjacent properties. In addition, outlining topographic contours are snown.

2.1.2 Site Modifications - The Resource Recovery Plant site is located on approximately 20 acres, with the County's existing Bridgeway Acres Phase I landfill tract. The Phase I landfill site is situated in the northernmost 80 acres of a total 240 acres recently acquired by Pinellas County, located in the south 1/4 of the west 1/2 of Section 14, Township 30 south, Range 16 east. The segment to the south (160 acres) will become the active landfill after completion of the northern segment. Due to the necessity for uninterrupted activities, there will be a period of overlapping operations when both segments are active. This will only take place during the time of final phase-out of the northern segment.

The proposed electrical transmission line from the facility to the Florida Power Corporation Northeast Substation is shown in Figure 2.1.c.

FIGURE 2.1.a



The Location of the Study Area with Respect to the State of Florida, and the Tampa Bay Region.

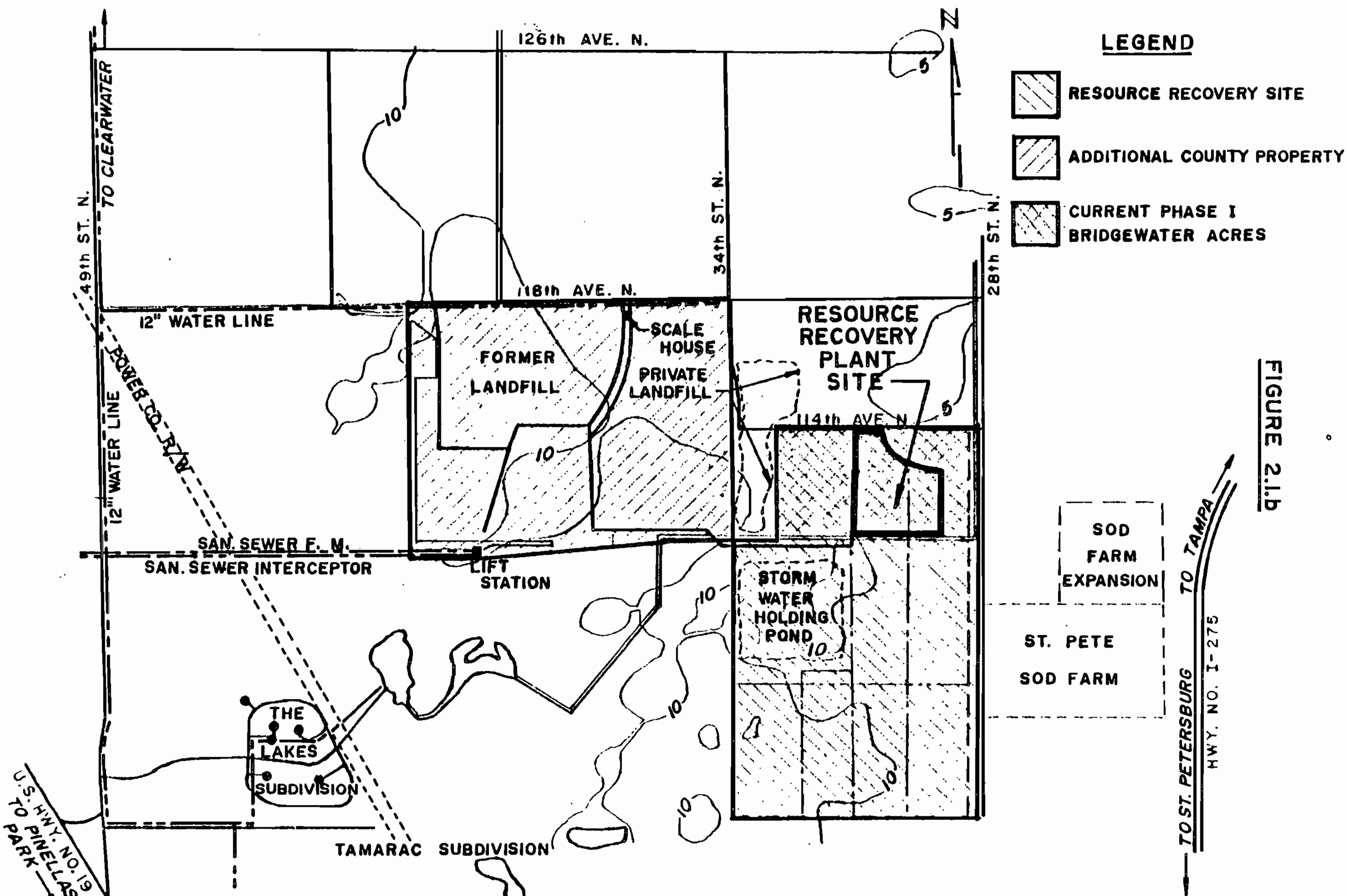
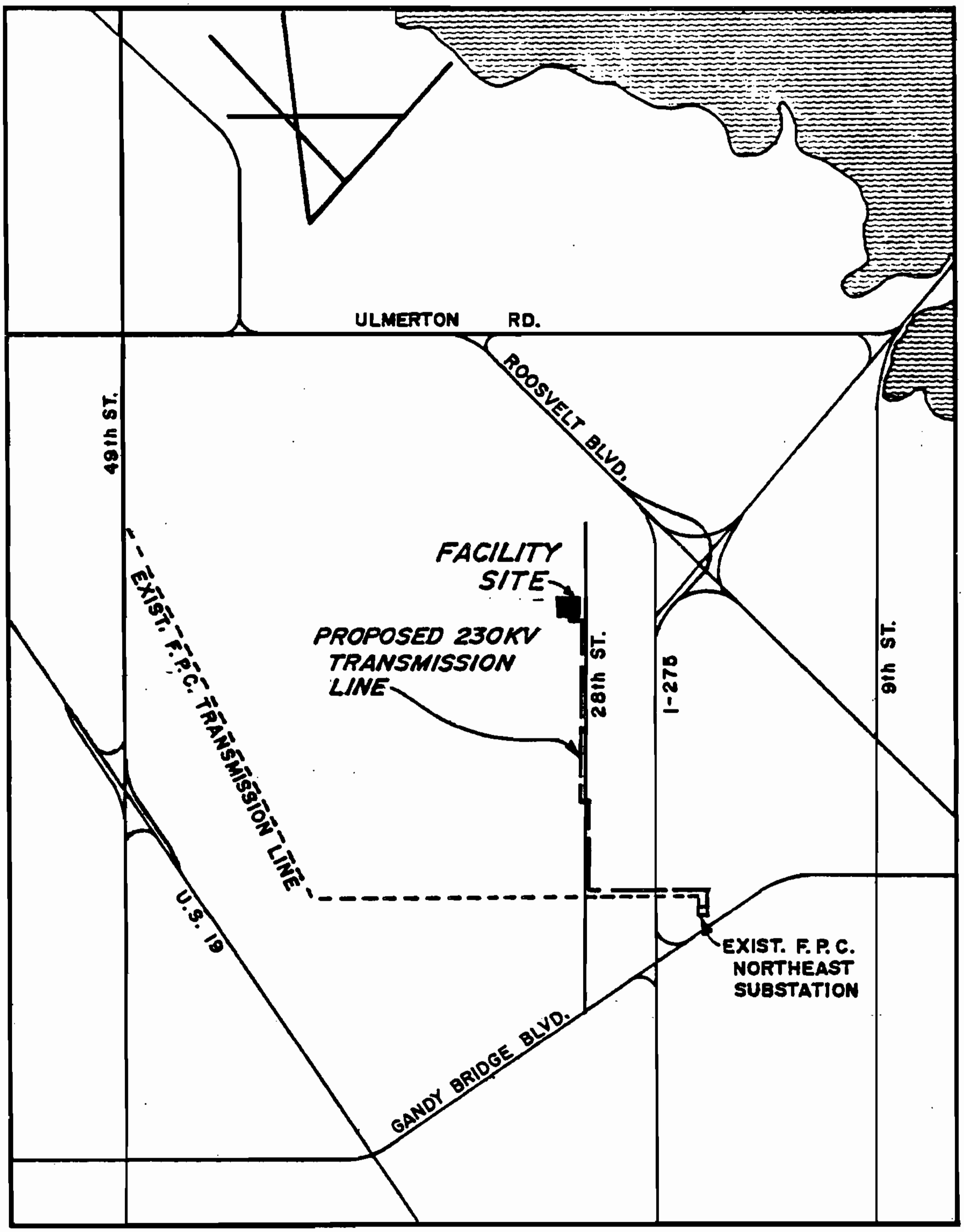


FIGURE 2.1.b

RESOURCE RECOVERY SITE

FIGURE 2.1.c



ELECTRICAL TRANSMISSION LINE ROUTING

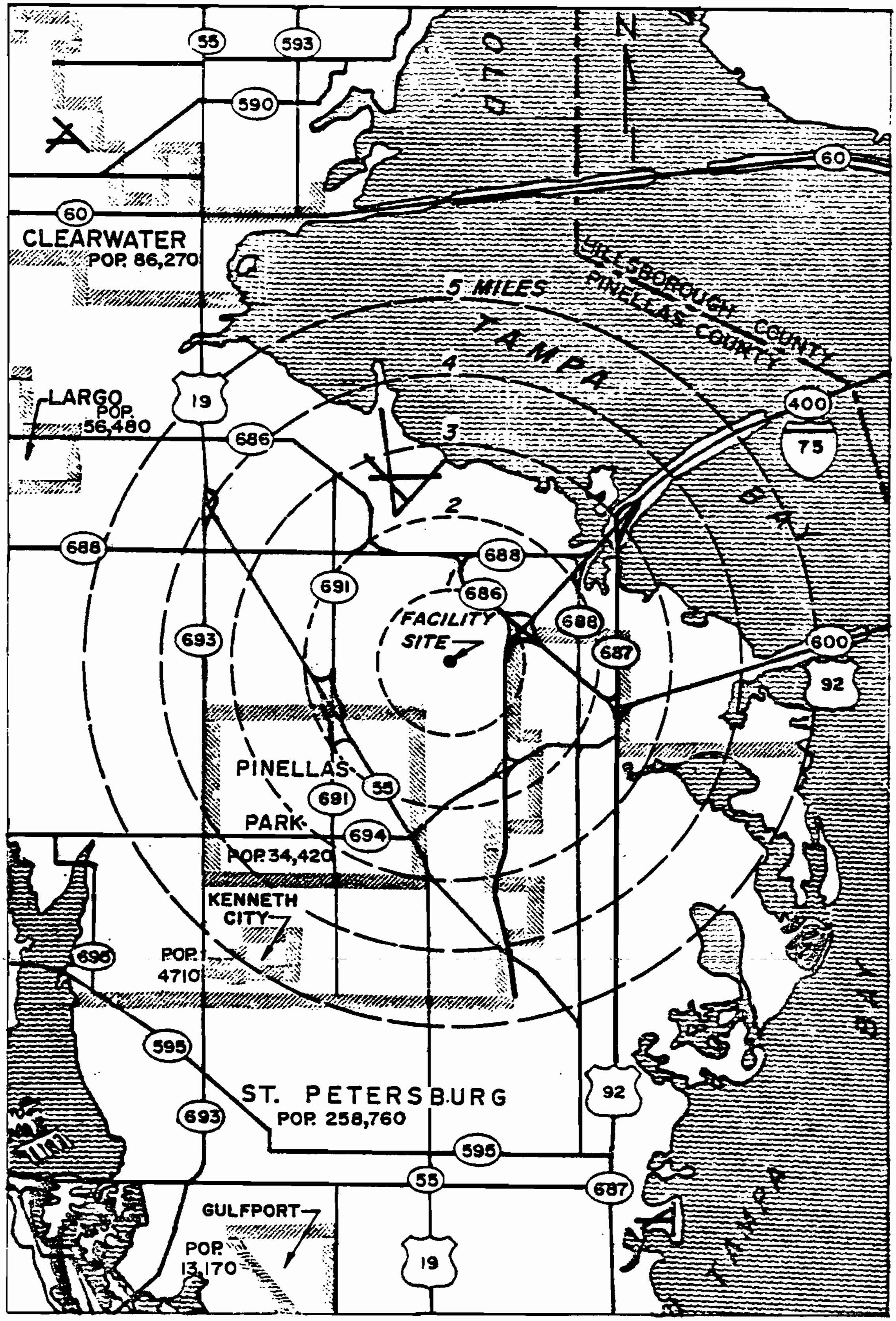
2.1.3 Existing and Proposed Uses - All of the on-site property (resource recovery facility site) is designated for solid waste management resource recovery purposes. The phased expansion of the current County landfill operation represents a logical extension of the recent operation, located on a contiguous 200 acre parcel of land to the west of the subject Phase I site. The Phase I site has been receiving refuse since July 1977.

Adjoining property to the immediate east of the phased landfill expansion areas is owned by the City of St. Petersburg, and is currently being used for an experimental sod farm utilizing treated sludge from the city's wastewater treatment plants.

2.2 Regional Demography, Land and Water Use

2.2.1 Demography - Pinellas County, one of the more densely populated of all Florida counties, includes the City of St. Petersburg and 4 adjacent municipalities. The 1970 census lists a population of 567,751 in Pinellas County; by 1976, the population had increased by 36 percent to an estimated 771,100. More than 70 percent of the population live within the incorporated areas of Pinellas County, which are concentrated along the coastline and southern half of the County. The northeastern portion of the County is sparsely populated and comprised of swampy wetlands and agricultural areas, while the central, southern and all coastal areas are predominantly developed as residential and municipal areas. The immediate study area for the proposed Resource Recovery Facility site is depicted in Figure 2.2.a, which encompasses a five-mile radius (50,240

FIGURE 2.2.a.



STUDY AREA

acres) centered on the site. Included in the study area are the City of Pinellas Park and portions of St. Petersburg, Largo and Kenneth City and unincorporated areas outlying from these municipalities. The resident populations of the incorporated areas are shown in Tables 2.2.a and 2.2.b, which depict component permanent and seasonal estimates. The inclusion of a weighted tourist population would approximate a total population. To further estimate the resident population of the study area, reference is made to a recent population forecast prepared by the Research and Special Studies Division of the Pinellas County Planning Department. Cursory analysis of delineated population distributions for 119 traffic analysis zones approximating the study area indicate a 1970 resident population of 117,200 and an extrapolated (projected) population for 1977 of 157,100; this, generally, reflects an average rate of growth. It is assumed, for purposes of this documentation, that any transient increase reflecting a localized tourist population would contribute little to total population estimate. The major concentrations of population in the study area are located in the vicinity of the City of St. Petersburg and neighboring municipalities, all within the southern half of the County.

2.2.2 Land Use - In comparison to the rest of Central Pinellas County, the immediate area surrounding the proposed facility site is virtually undeveloped (see Figure 2.2.2.a). The most proximal residential area is located roughly one mile to the southwest

TABLE 2.2.a COMPONENT POPULATION ESTIMATES
April 1, 1970 and April 1, 1977

	PERMANENT POPULATION		SEASONAL POPULATION		RESIDENT POPULATION		% Change
	1970	1977	1970	1977	1970	1977	1970-77
Belleair	2,962	3,710	258	320	3,220	4,030	25
Belleair Beach	952	1,920	83	170	1,035	2,090	102
Belleair Bluffs	1,910	3,210	166	280	2,076	3,490	68
Belleair Shore	124	80	11	70	135	150	11
Clearwater	52,074	79,370	4,528	6,900	56,602	86,270	52
Dunedin	17,639	28,970	1,534	2,520	19,173	31,490	64
Gulfport	9,730	12,120	846	1,050	10,576	13,170	25
Indian Rocks Beach	2,666	3,860	232	340	2,898	4,200	45
Indian Shores	791	1,750	69	150	860	1,900	121
*Kenneth City	3,862	4,330	336	380	4,198	4,710	12
*Largo	22,031	51,960	1,916	4,520	23,947	56,480	136
Madeira Beach	4,158	4,740	362	410	4,520	5,150	14
North Redington Beach	768	1,410	67	120	835	1,530	83
Oldsmar	1,538	2,390	134	210	1,672	2,600	56
*Pinellas Park	22,287	31,670	1,938	2,750	24,225	34,420	42
Redington Beach	1,583	1,790	138	160	1,721	1,950	13
Redington Shores	1,733	2,550	151	220	1,884	2,770	47
Safety Harbor	3,103	4,480	270	390	3,373	4,870	44
*St. Petersburg	216,232	237,600	18,803	20,660	235,035	258,260	10
St. Petersburg Beach	8,024	10,710	698	930	8,722	11,640	35
Seminole	2,121	5,430	184	470	2,305	5,900	156
South Pasadena	2,063	4,400	179	380	2,242	4,780	113
Tarpon Springs	7,118	11,920	619	1,040	7,737	12,960	68
Treasure Island	6,120	7,750	532	670	6,652	8,420	27
Total Incorporated	391,589	518,180	34,054	45,050	425,643	563,230	32
*Total Unincorporated	130,740	191,220	11,368	16,650	142,108	207,870	46
TOTAL COUNTY (PINELLAS)	522,329	709,400	45,422	61,700	567,751	771,100	36

*The five-mile study area encompasses portions of these municipalities

TABLE 2.2.b RESIDENT POPULATION DENSITIES
April 1, 1970 and April 1, 1977

	1970			1970		
	Population	Acreage	Persons Per Acre	Population	Acreage	Persons Per Acre
Belleair	3,220	1,206	2.7	4,030	1,206	3.3
Belleair Beach	1,035	310	3.3	2,090	310	6.7
Belleair Bluffs	2,076	263	7.9	3,490	263	13.3
Belleair Shore	135	43	3.1	150	43	3.5
Clearwater	56,602	9,031	6.3	86.270	13,696	6.3
Dunedin	19,173	4,472	4.3	31,490	5,467	5.8
Gulfport	10,576	1,512	7.0	13,170	1,512	8.7
Indian Rocks Beach	2,898	554	5.2	4,200	554	7.6
Indian Shores	860	247	3.5	1,900	247	7.7
*Kenneth City	4,198	319	13.2	4,710	357	13.2
*Largo	23,947	4,721	5.1	56,480	8,494	6.6
Madeira Beach	4,520	519	8.7	5,150	519	9.9
North Redington Beach	835	174	4.8	1,530	174	8.8
Oldsmar	1,672	1,939	.9-	2,600	2,793	.9+
*Pinellas Park	24,225	5,022	4.8	34,420	6,409	5.4
Redington Beach	1,721	213	8.1	1,950	213	9.2
Redington Shores	1,884	229	8.2	2,770	229	12.1
Safety Harbor	3,373	654	5.2	4,870	1,594	3.1
St. Petersburg	235,035	35,476	6.6	258,260	36,029	7.2
St. Petersburg Beach	8,722	1,285	6.8	11,640	1,285	9.1
Seminole	2,305	672	3.4	5,900	846	7.0
South Pasadena	2,242	321	7.0	4,780	321	14.9
Tarpon Springs	7,737	4,228	1.8	12,960	4,938	2.6
Treasure Island	6,652	876	7.6	8,420	876	9.6
Total Incorporated	425,643	74,286	5.7	563,230	86,976	6.5
Total Unincorporated	142,108	105,028	1.4	207,870	92,338	2.2
TOTAL COUNTY	567,751	179,314	3.2	771,100	179,314	4.3

*The five-mile study area encompasses portions of these municipalities SOURCE: Pinellas County Planning Council, 1977

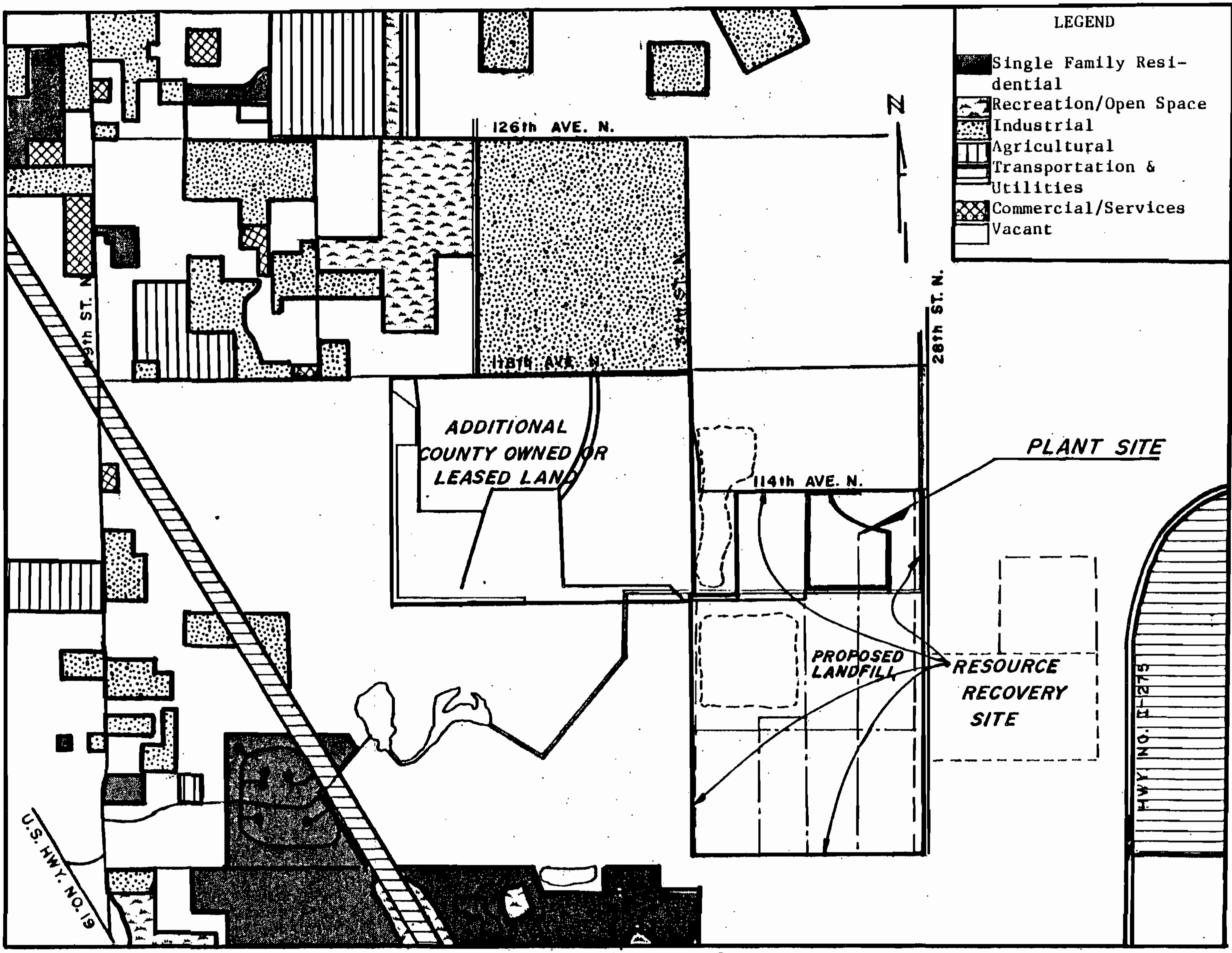


FIGURE 2.2.2.a

EXISTING LAND USE

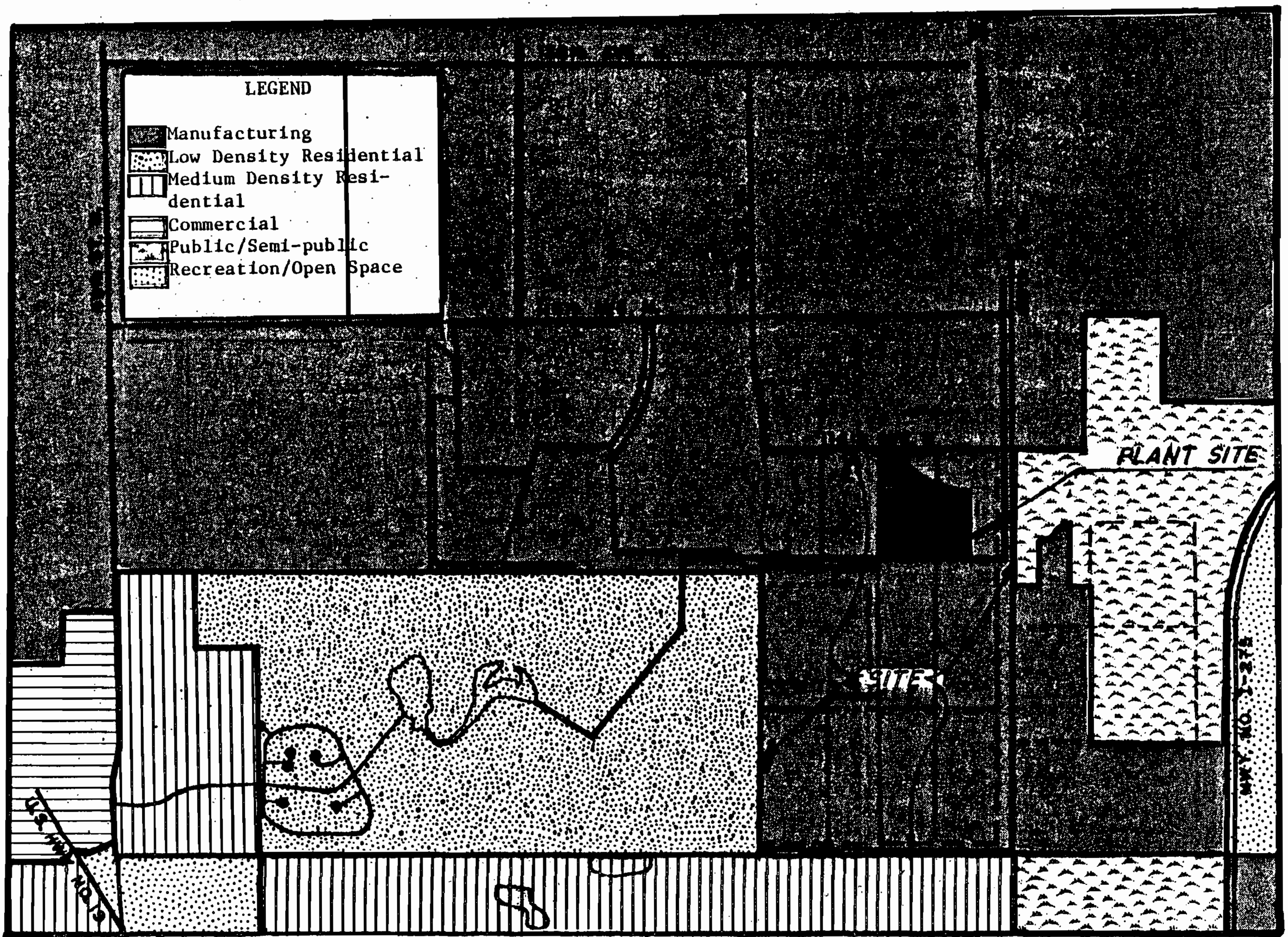
of the facility site in Pinellas Park; this represents the only significant population center to be impacted by facility construction and operation. Other land uses which characterize the immediate study area include:

- Light industrial complexes (boat manufacturing, aggregate, electronics, etc.) located along 118th Avenue North, to the northwest of the facility site.
- An abandoned shell quarry to the northeast.
- The St. Petersburg/Clearwater Airport is located approximately two and one-half miles northwest of the proposed facility (see Figure 2.2.a).
- An experimental sod farm where domestic wastewater sludges are applied is located directly east and south of the site (Figure 2.1.b).
- Former and existing landfills flank the facility site. A 200 acre tract to the west is a former County landfill phased out of putrescible landfill activities in the Fall of 1977; existing landfills occupy the area immediately surrounding the plant site (Phase I Bridgewater Acres), and the area just east of Interstate Highway 275.
- A storm drainage/environmental education center, Sawgrass Lake, is situated some two miles south of the proposed facility.
- Mangrove estuaries, designated as aquatic preserves in the Coastal Zone Management (CZM) Plan are located along the shorelines of Old Tampa Bay, over two miles northeast and five miles east of the facility site.

° The Florida Power Corporation Bartow Electrical Generation Plant is situated five miles east of the proposed facility on Weedon Island.

Outward from two miles of the study area more concentrated residential and commercial developments are encountered; to the south and west those areas of St. Petersburg, Largo and Kenneth City are encountered, as are the densely developed areas of Clearwater to the north.

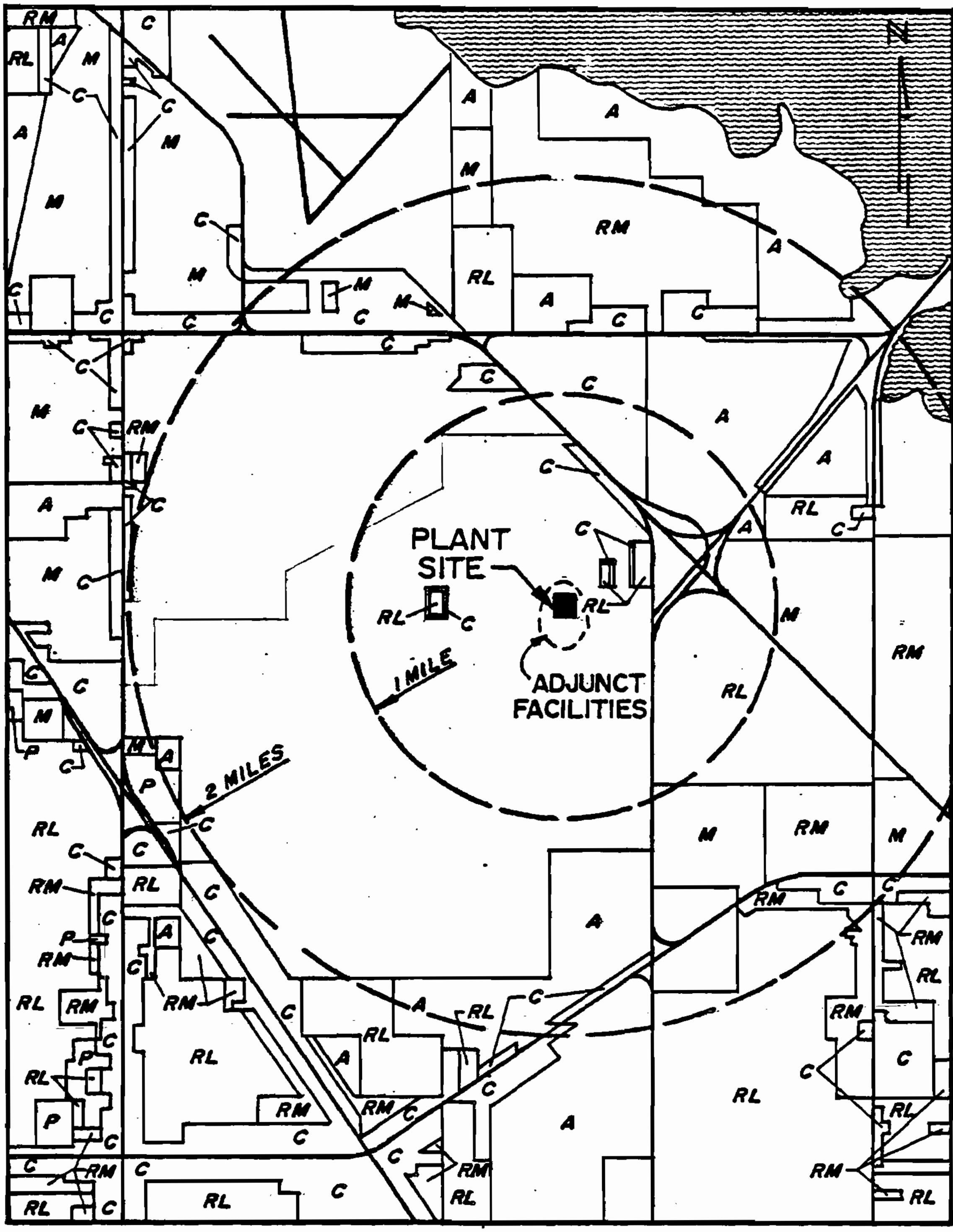
The Comprehensive Land Use Plan for this particular area indicates the primary land usage has been designated industrial, with industrial development occurring in a large part to the west and northwest. Residential development is occurring or is being anticipated to the south and to the southwest, with very limited construction to the northeast of this particular facility. The site location is within the major identified industrial area of Pinellas County. This Comprehensive Plan attempts to isolate this major industrial area from other residential uses; it is the intent of Pinellas County to continue to support and protect this industrial complex so as to prevent incompatible residential or commercial uses from occurring in this general vicinity. Figure 2.2.2.b highlights the Pinellas Comprehensive Land Use Plan in the immediate study area. The general zoning pattern which occurs in this area (see Figure 2.2.2.c) indicates almost exclusive industrial zoning designations; minor pockets of commercial and residential



PINELLAS COMPRENSIVE LAND USE PLAN

FIGURE 2.2.2.b

FIGURE 2.2.2.c



LEGEND

A–AGRICULTURAL C–COMMERCIAL M–MANUFACTURING, INDUSTRIAL
RL– LOW DENSITY RESIDENTIAL RM– MEDIUM DENSITY RESIDENTIAL
P– PUBLIC

ZONING IN THE STUDY AREA

zoning, presently in conflict with the Comprehensive Land Use Plan, will be rezoned to an industrial classification within the near future. While the zoning effected within a two-mile radius still contains a preponderance of industrial classification, many low lying areas are zoned agricultural. The present zoning which occurs within a five-mile radius of the facility site reflects the Comprehensive Land Use Plan for Pinellas County, and, as such, provides no conflict with the proposed facility. Existing and proposed road systems will allow access to this facility without the necessity for traveling through established or proposed residential areas.

2.2.3 Water Use - The major sources of water within the five-mile study area are from County and City well fields located very remote from the site.

All water now provided by the Pinellas County water system is obtained from wells tapping the Floridan Aquifer. These wells are located in the Eldridge-Wilde Well Field (northwest corner of Pinellas and adjoining Hillsborough Counties), East Lake Road Well Field (adjacent to Lake Tarpon in northern portion of the County) and several wells drilled by developers for their own projects during the water shortage of 1973 and subsequently turned over to the County. Potable water is also obtained from the Cypress Creek Well Field located in central Pasco County. Through its wholesale and retail service areas, this Pinellas system provides approximately one-half of the potable water needs for the County's population.

PAST AND PROJECTED AVERAGE DAILY WATER

DEMAND (MGD) FOR STUDY AREA MUNICIPAL SYSTEMS

	1970	1971	1972	1973	1975	1980	1990
Pinellas County	23.7	28.3	31.7	-	38.4	62.2	-
Town of Largo	1.7	1.2	1.8	2.1	2.5	3.5	4.5
City of Pinellas Park	1.9	2.2	-	-	3.0	3.3	-
City of Clearwater*	2.6	3.6	4.8	-	12.1	14.0	-
City of St. Petersburg	29.0	30.0	34.0	35.0	38.0	46.0	51.0

* From Clearwater well field only; total Clearwater water supply is supplemented by wholesale purchases from Pinellas County.

The St. Petersburg Water Department obtains its water supply from four well fields: the Cosme, Odessa and Section 21 well fields in Hillsborough County and the South Pasco Well Field over 3 miles further north. Water from a fifth well field, the Cypress Creek Well Field, will be available when a 42-inch connection to the South Pasco Well Field from the 84-inch Cypress Creek main is completed.

An inventory of permitted wells near the facility site (Section 14, Township 30 South, Range 16 East), as reported by the Southwest Florida Water Management District in January 1977, identifies 19 wells, including two abandoned public supply wells, eight irrigation wells, five domestic private wells and four miscellaneous wells used for mining or other purposes. The majority of the domestic wells were recorded in Section 10, located over half a mile northwest of the site. The wells in Section 12, 13, 22 and 24 of Township 30 South, Range 16 East, coincide with areas not developed for residential purposes, and it is thought that usage of these wells is unlikely.

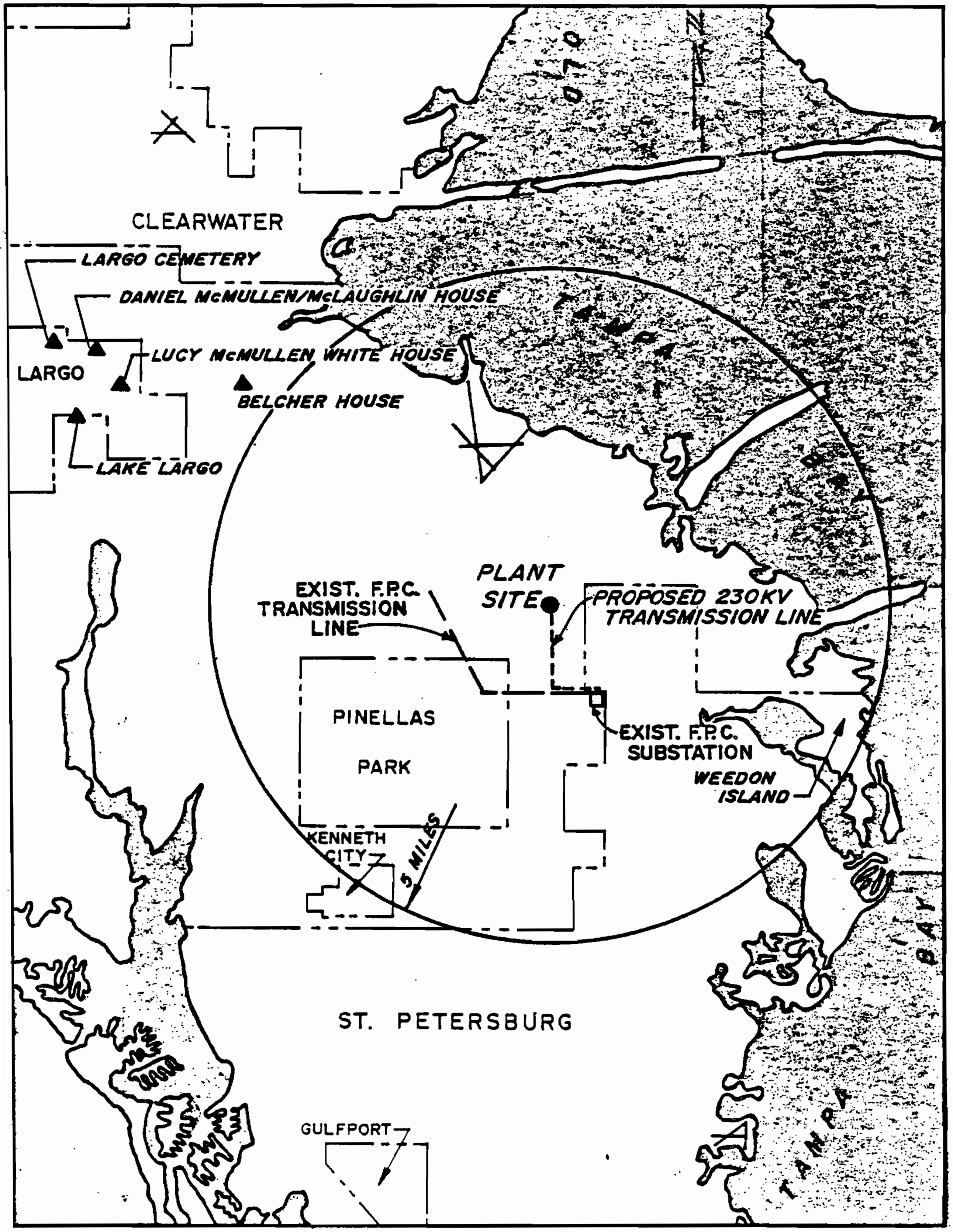
2.3 Regional Historic, Scenic, Cultural and National Landmarks

An indication of public interest in the history of Pinellas County is the compiled analysis of some 120 sites of historic or archaeological significance by the Pinellas Coastal Zone Management Citizens and Technical Advisory Committee. Those historical sites within the central Pinellas area and somewhat adjacent to the study area are shown on Figure 2.3.a.

As the site is a disturbed and transitional ecosystem typical to this region of Florida, it is not considered a scenic or natural landmark. The proposed transmission line right-of-way from the resource recovery facility to the hook-up with the existing FPC transmission line will pass through more of the same kind of system and will endanger no area or location of known historic, archaeological, cultural, scenic or natural significance.

From the foregoing, it appears that the proposed resource recovery plant auxiliary systems and associated electrical transmission facilities do not impact any sites of historic, archaeological or cultural value. A letter was written to the Florida Division of Archives, History and Records Management, Bureau of Historic Sites and Properties, requesting a confirmation in writing of this observation. The response received, provided as Appendix E, confirms that no historical or archaeological site will be disturbed by the project.

FIGURE 2.3.a



HISTORICAL SITES PROXIMATE TO THE STUDY AREA

2.4 Geology

2.4.1 Subterranean Geology - The subterranean geology suggests a stratigraphy created primarily by marine mechanisms. While information is not available for extreme depths, the shallow and intermediate formations are well documented via the loggings from a large number of wells situated throughout the central Pinellas County area. In general, the region is underlain by several hundred feet of solution-riddled limestone and dolomite that comprise the following formations in ascending order: Lake City limestone, Avon Park limestone, the Ocala Group, Suwannee limestone, Tampa Formation, and Hawthorn Formation. These formations range in age from the Eocene to Miocene Epochs. Collectively, they are referred to as the Floridan Aquifer which is the principal source of nearly all municipal, industrial, and agricultural water systems in the West Central Florida area. The aquifer is overlain by Pleistocene and Holocene deposits of sand, silt and clay of varying thickness. The more permeable beds form a subsurface reservoir called the shallow aquifer. Figure 2.4.a features a geologic cross-section in the vicinity of the proposed facility; Table 2.4.a augments this illustration with discussions of pertinent hydrogeologic characteristics.

Surficial deposits (to be discussed in more detail in Section 2.4.b) in the study area are composed of Holocene formations, derived from unconsolidated sand lenses of Pleistocene

FIGURE 2.4.a

GEOLOGIC CROSSECTION: VICINITY OF THE STUDY AREA

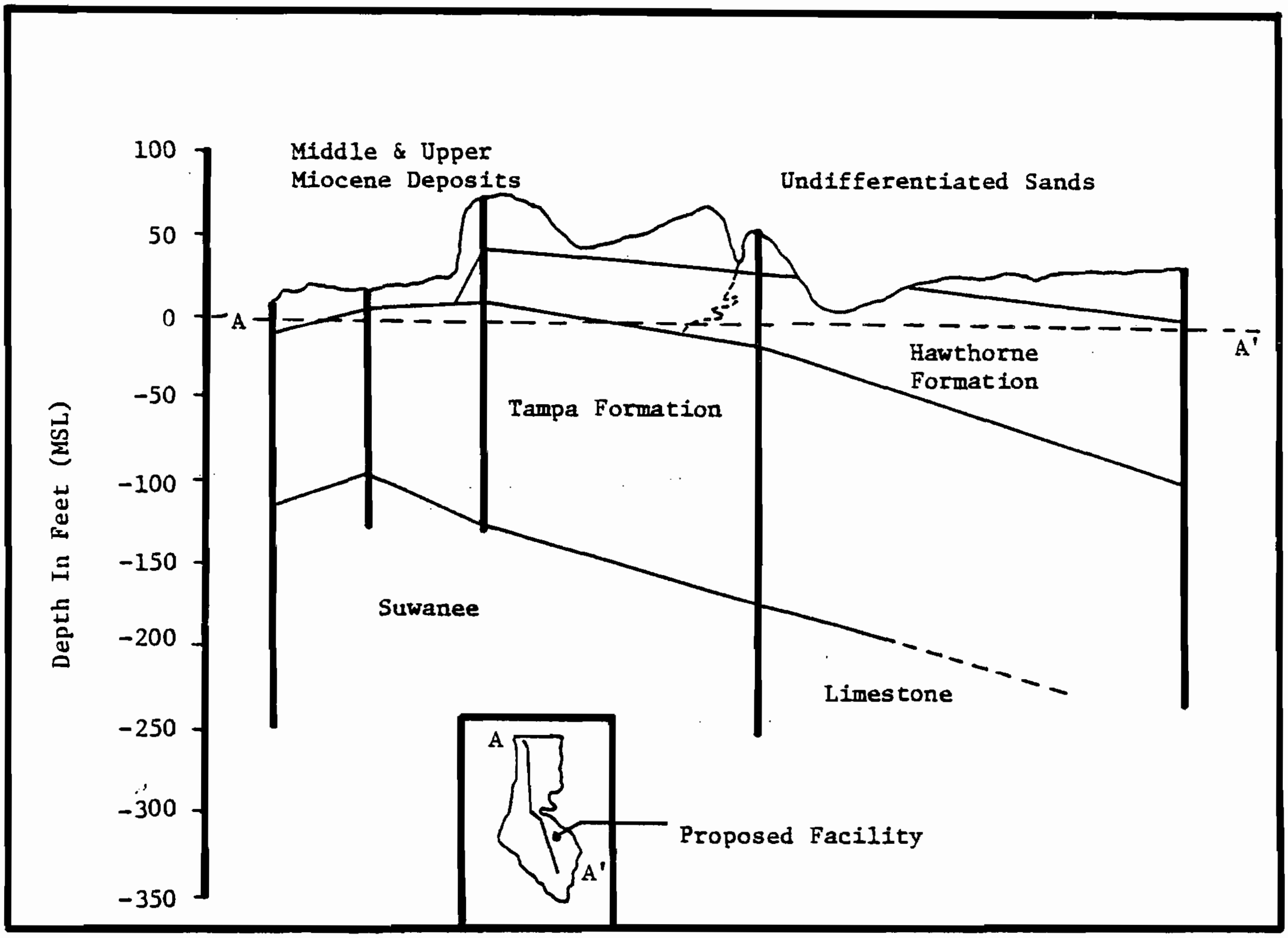


TABLE 2.4.a

SUBTERRANEAN HYDROGEOLOGIC CHARACTERISTICS

TYPICAL OF THE STUDY AREA

Geologic			Hydrologic	
Age	Name	Character of Material	Name	Water-Bearing Characteristics
Pleistocene and Holocene	Surficial deposits 0 - 90' [a]	Brown and gray fine sand; some gravel, clay and sandy clay	Water-table Aquifer	Unconfined. Depth to water generally less than 10 feet. Yields 5 to 250 gpm. Quality generally fresh; salty near shoreline, and estuaries.
Miocene	Hawthorn Formation 0 - 90'	Chiefly green clay & silt, with sand and stringers of limestone	Confining Deposits	Generally low permeability; in places includes beds of low permeability in surficial deposits; retards leakage of water between aquifers.
	Tampa LS 100'-150'	White to cream, sandy limestone, fossiliferous		Contains water under artesian pressure; some wells flow. Recharged mainly by leakage from Water-table Aquifer. Transmissivity ranges from low to high; yields range from several hundred gpm to 5,000 gpm, and specific capacities of wells range from 30 to 600 gpm/ft drawdown. Water quality ranges from fresh and moderately hard in inland areas to high saline near the shoreline. Also saline at depths from several hundred to about 1,500 feet in inland areas.
Oligocene	Suwanee LS 0 - 300'	White, yellow and brown fine gravel limestone with chert lenses		
Eocene	Ocala Gr 80'-500'	Yellow, gray, brown, soft limestone, foraminifera.		Upper part generally poor producer; lower part good producer.

[a] indicates depth of formation

Geologic			Hydrologic	
Age	Name	Character of Material	Name	Water-Bearing Characteristics
Eocene	Avon Park LS 50 - 500'	Cream to brown, soft limestone, some zones of brown hard dolomite, some gypsum.		Good water-bearing zone; water quality poor in places due to high chloride and sulfate content.
	Lake City LS 500'-1000'			Good water-bearing zone; water quality generally poor due to high chloride and sulfate content.
	Oldsmar LS	Dolomite and limestone, chert, and gypsum.		

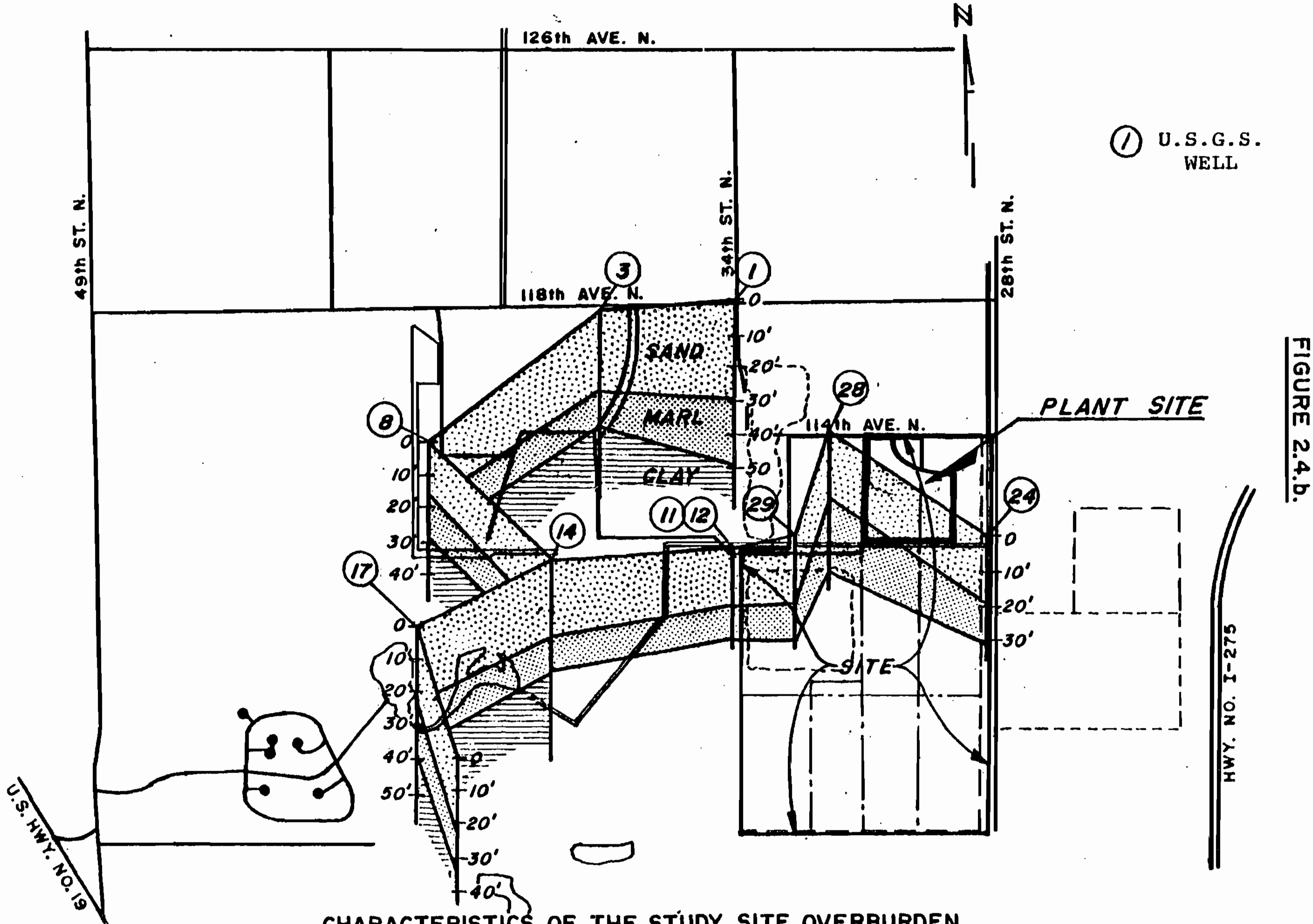
marine terraces. These Pleistocene zones overlay a highly permeable strata of marine sands and shells ranging in depth from two to fifty feet within the study area. Upper Miocene deposits of sandstone, limestone and clay do not prevail at the proposed facility site although they are very common around Clearwater and other more northerly locations. The dominant formations indigenous to the study site are certain middle Miocene components, primarily the Hawthorn formation. The material composition of this layer varies from hard sandstone to sandy clay; in some areas it is calcareous and impregnated with such irregularities as phosphate and chert fragments. Isolated beds of discontinuous sand are present in the Hawthorn formation but are somewhat impermeable due to a significant clay content. Generally, the Hawthorn layer thickens as you approach the southern tip of Pinellas County with depths ranging from fifty feet at Clearwater to ninety feet near St. Petersburg (Figure 2.4.a). Beneath the Hawthorn bed lies the Tampa formation, a hard sandy limestone stratum of lower Miocene age; the thickness of this layer averages 125 feet in the study area. Underlying the Tampa formation are Oligocene age limestones more consistent and of a purer grade than those of the Tampa group. The Suwannee formation limestones in Pinellas County range in thickness from a few feet in the north to 300 feet in the south. The upper surface is eroded with numerous pinnacles and valleys marking the interface with the overlying Tampa formation. Characteristically, the Suwannee limestone is a fine gravel limestone containing lenses of chert and can be expected to be hard and dense in some areas. This formation as well as the Tampa contain numerous solution channels. The Ocala Group limestones of the upper Eocene Age consist of three differentiable types of limestone: the Crystal River, Williston and Inglis formations. In the planning area, this entire group is a relatively thin 200 feet in thickness. Generally, the limestones of the Ocala group are soft and fossiliferous; in Pinellas County, they may contain coquina, be dolomitized or silicified, have either a pasty calcite matrix or a loosely cemented calcareous matrix, and may range from soft to medium-hard. Immediately below the Ocala group are Eocene Claiborn formations beginning at a depth of 600 feet and extending downward to 1600 feet. The associated limesones of this formation, in descending order, are the Avon Park and Lake City layers. Generally, the Claiborn group is quite fossiliferous and porous; the base of the Lake City limestone is delineated by a thick unit of porous, fine crystalline dolomite. The entire Claiborn is characterized by solution channels, boulder zones and solution cavities. Below the Claiborn group, the following formations are present:

- Lower Eocene Oldsmar limestone - 900-1100 feet thick; depth to 3200 feet.
- Paleocene Cedar Keys limestone - 1300 feet thick; depth to 4500 feet
- Upper Cretaceous Lawson limestone - Depth from 4500 feet.

2.4.2 Surficial Geology - The overburden typical of the proposed facility site is characterized by sand, marl and clay constitutents as shown in Figure 2.4.b. The sandy layer is composed of shells and fine sand grading to increased clay concentration at its lower bound. The marl/clay zone becomes cherty and much stiffer with depth and is variegated with phosphate pebbles and limestone fragments. The average thickness of the sand unit is 18 feet; that for the marl/clay unit is 42 feet. The depth to the bedrock in the study area undulates from 33 to 55 feet below the land surface.

Several factors are determinants of soil characteristics in the Pinellas area: topography, parent materials, plants and animals, climate and time.

Topography has played a major role in study area soil development. Where a sufficient gradient exists, stormwater runoff transports sand and soil particles downhill. During this occurrence the constituents are intermixed and, upon deposition, classification into coarse and fine grains occurs. In flatter,



CHARACTERISTICS OF THE STUDY SITE OVERBURDEN more low lying areas where upland runoff is slowed or retained, the suspended soil particles precipitate over the indigenous substrate, thus becoming the governing soil type. As the upland soils are much more subject to leaching, natural fertility in those areas is somewhat reduced.

The parent material of study area soils is basically silica sand derived from Pleistocene marine terraces.

Organic matter is added to the soil by dead and decaying plants and animals. Plants tend to stabilize soil surfaces while the burrowing and grazing activities of animals disrupts the substrate.

The very humid, subtropical climate of the area with its inherent abundant rainfall speeds the decomposition of soil borne organic matter and facilitates the chemical weathering of soil components; soluble minerals are readily transported, modified and redeposited under such physical conditions.

The importance of time in regional soil morphogenesis can be summarized by noting that the primary soil particle of the region, silica sand, was created by the very slow weathering of very durable quartz over millions of years.

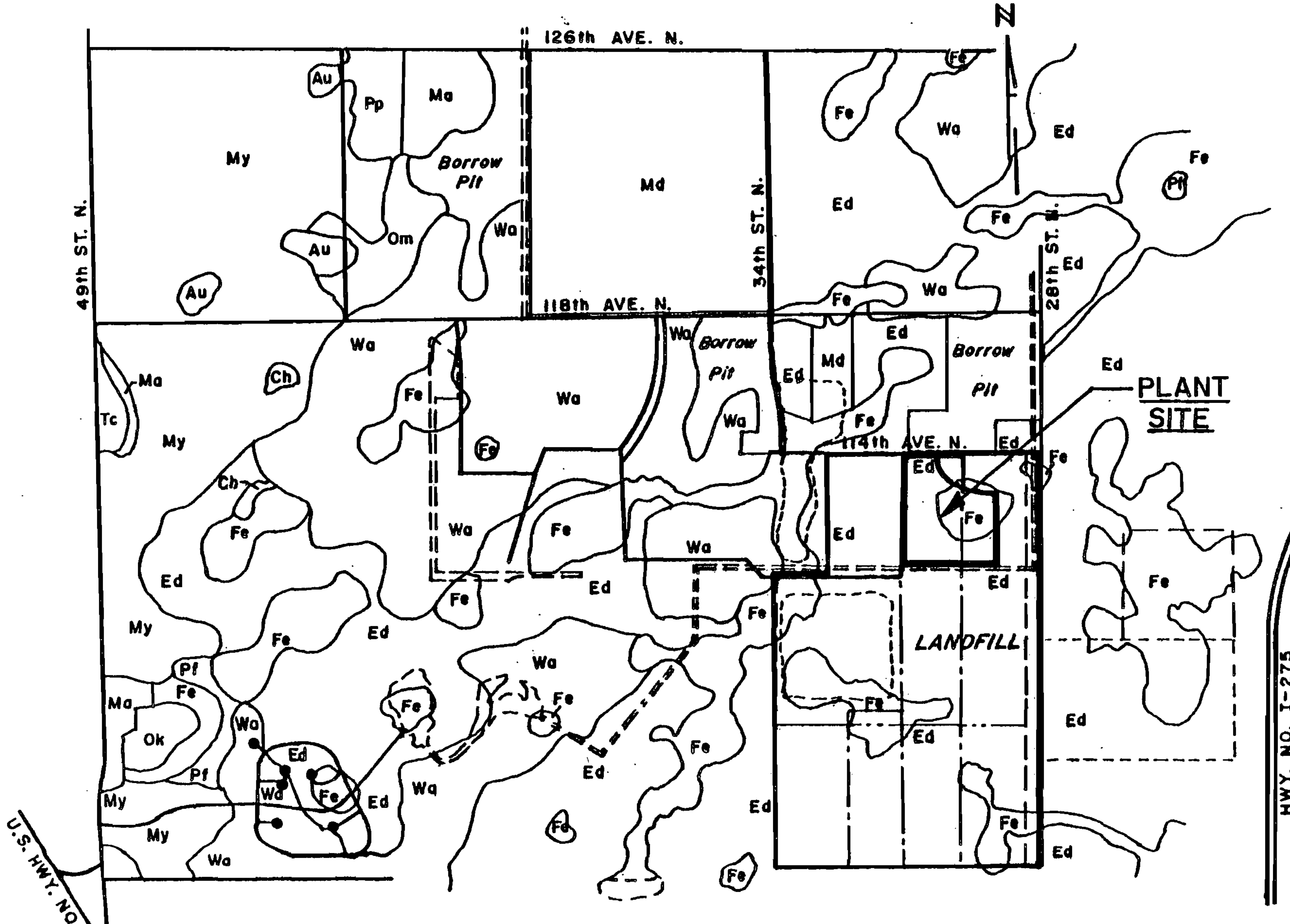
Basically, three distinct categories of soils exist within the study area. The sand-dominated and organic-dominated types are naturally occurring and mix only slightly; sand-dominated types typify higher terrain while low pockets and drainage basins are filled with the organic-dominated group.

The third category is man-made lands which are characterized as landfills, quarries and the like; the radical alterations inflicted on these areas preclude their consideration as natural entities.

With regard to the proposed facility and environs, the Felda and Eldred series dominate soil components. Figure 2.4.c outlines the soil series in the study area; Table 2.4.b features the pertinent characteristics of these two most prevalent soil series.

2.5 Hydrology

Surface Drainage - Drainage basins in the study area are typified by large bowl-like depressions delineated by low ridge lines. Runoff from the more upland areas flows in small shallow streams to larger conduits and, eventually, to the numerous contiguous bays which dot the region. Where little gradient exists (e.g., the area of the proposed facility) overland sheet flow of rainwater to shallow ponds is most common. The occurrence of water in these ponds depends to a larger extent on the water levels of the shallow aquifer. This water bearing strata is composed of Miocene clays and marls and is recharged entirely by water which has percolated through the soil column. Where a surface depression exceeds the depth to the seasonal high water table, an intermittent pond is formed; deeper depressions that pass the seasonal low water table achieve year-round permanence. Figure 2.5.a identifies the major surficial drainage features located in the study area.



SOIL SERIES OF THE STUDY AREA

FIGURE 2.4.C.
From S.C.S.

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, B or C, shows the slope. Most symbols without a slope letter are those of nearly level soils.

SYMBOL	NAME
Au	Astor soils
Ch	Charlotte fine sand
Ed	Elred fine sand
Fe	Felda fine sand, ponded
Ma	Man made land
Md	Man made land, sanitary fill
My	Myakka fine sand
Ok	Okeechobee muck
Om	Oldsmar fine sand
Pf	Pinellas fine sand
Pp	Pompano fine sand
Tc	Terra Ceia muck, moderately deep variant
Wa	Wabasso fine sand

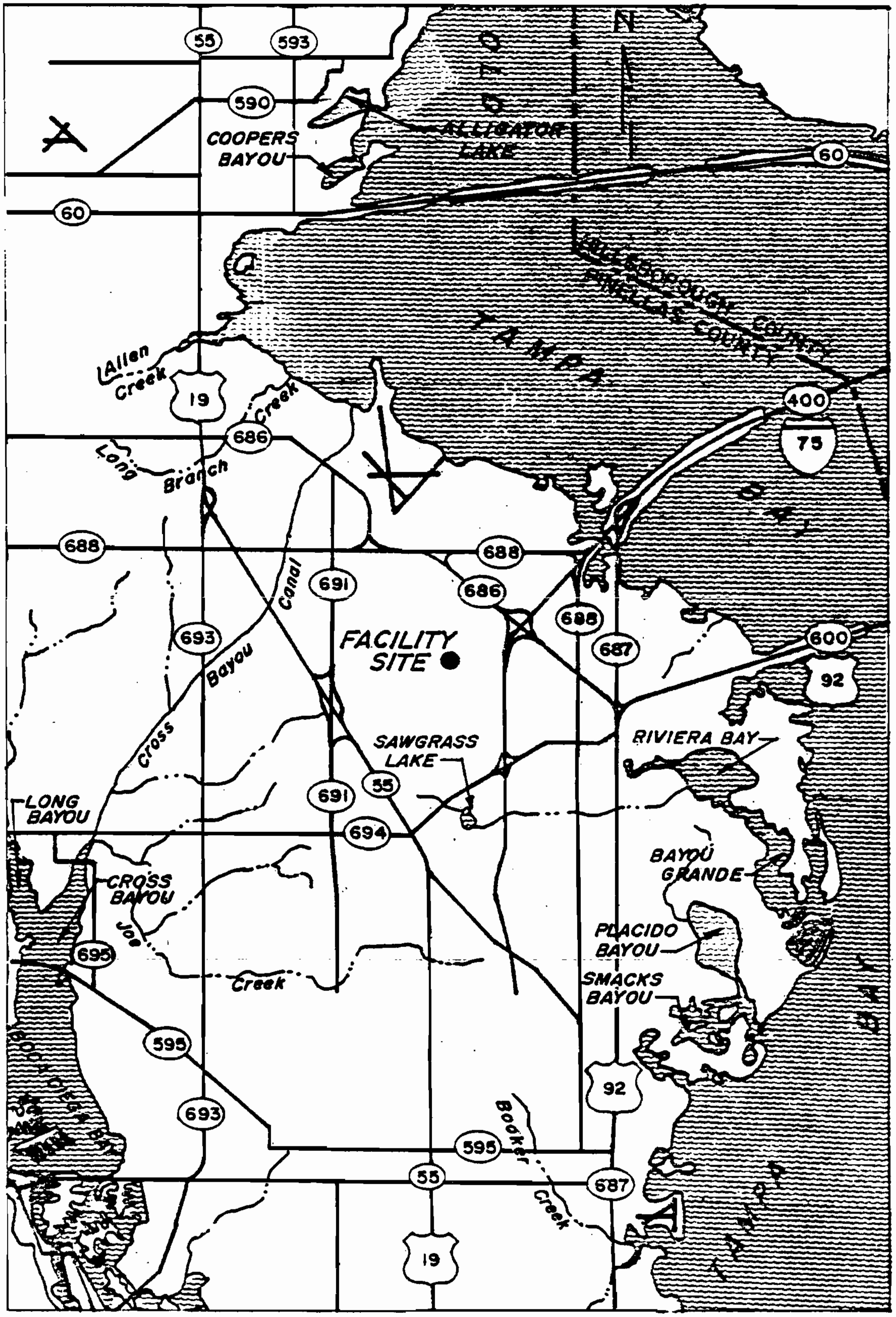
TABLE 2.4.b

CHARACTERISTICS OF FACILITY SITE SOIL SERIES

	Soil Series	
	Eldred	Felda
On-site Description	65 pct.	35 pct.
SCS Description	nearly poorly drained soils on broad low ridges in the flatwoods	nearly level poorly drained soil that occupies slightly elevated areas bordering sloughs and ponds
Soil Texture	0-30" fine sand 30-35" fine sandy loam 35-62" sand, shell	0-30" fine sand 30-41" fine sandy loam, loamy fine sand 41-60" shell, sand
Water Table Depth (in.)	10-30 inches for 2 to 6 months; and within a depth of 10 inches for 1 to 2 months during wet season	10-40 inches; above 10" for 2 to 6 months
Flood Hazard	once in 5 to 20 years for 7 to 30 days	once in 5 to 20 years for 7 to 10 days
Available Moisture Capacity (in./in.)	less than 0.05 in/in for depths 0-30 inches; less than 0.10-0.15 in/in for depths 30-62 inches	less than 0.05 in/in for depths 0-30 inches; less than 0.10-0.15 in/in for depths 30-62 inches
Permeability Experienced at Depth		
6.3-20 in/hr	0-30 in.	0-30 in.
.63-2.0 in/hr	30-35 in.	30-41 in.
6.3-20 in/hr	35-67 in.	41-60 in.
Shrink Swell Capacity	low	low
Bearing Strength (AASHO Class.)	A3	A3

SOURCE: SCS 1978

FIGURE 2.5.a.



SURFACE WATER FEATURES OF THE STUDY AREA

Groundwater - The aquifer system underlying the study area is composed of three distinct units, as shown in Figure 2.5.b.

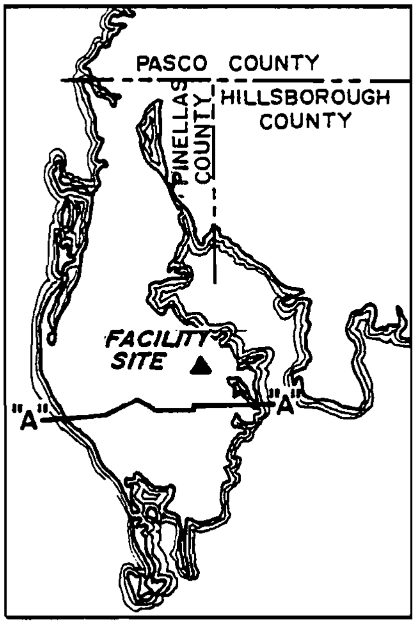
The surface or water table aquifer lies closest to the surface, with expected depths ranging from 13 to 23 feet (average 19 feet). Water from this aquifer is generally of good quality, except where leachate from landfills or wastewater sprayfields are encountered. As the water table aquifer is recharged exclusively by rainwater and runoff, water levels fluctuate with season. Water yield from this layer is quite small, less than 5 gallons per minute near the proposed facility site.

Segregating the surficial and upper limestone (Floridan) aquifers is a confining layer, or aquiclude, composed of marl and clay. This impermeable layer averages a thickness of 37 feet in the study area and is quite effective in minimizing aquifer intermixing. Artesian characteristics are imparted to the Floridan aquifer by this confinement of groundwater.

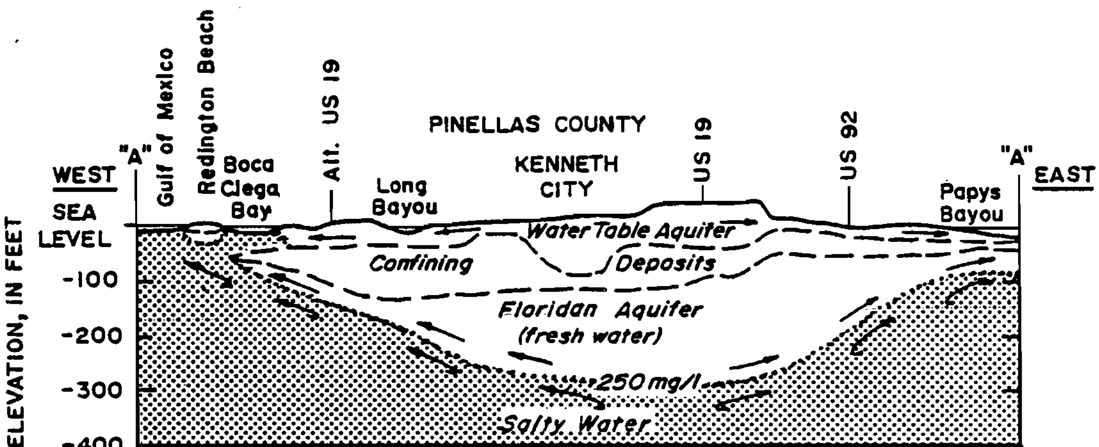
The upper Floridan aquifer is composed of hard chert and limestone of the Tampa formation and is quite saturated with freshwater in its upper region, grading to more saline concentrations with increased depth (see Figure 2.5.b). Recharge of this system is accomplished primarily via leakage from the shallow aquifer. Due to the forementioned properties of the confining layer, water in this aquifer is under artesian pressure; thus, wells tapping this region yield large volumes of water, ranging from several hundred to 5,000 gallons per minute. Indeed, it is from this aquifer that all regional

FIGURE 2.5.b.

HYDROGEOLOGIC CROSS SECTION IN VICINITY OF STUDY AREA



LOCATION OF HYDROGEOLOGIC SECTION "A"—"A"



HYDROGEOLOGIC SECTION "A"—"A"

LEGEND

- BOUNDARY OF HYDROLOGIC UNIT
- APPROXIMATE POSITION OF 250 mg/l ISOCHLOR IN ZONE OF DIFFUSION (1973-1974)
- CHLORIDE CONTENT OF GROUND WATER GREATER THAN 250 mg/l
- APPROXIMATE DIRECTION OF GROUND WATER FLOW

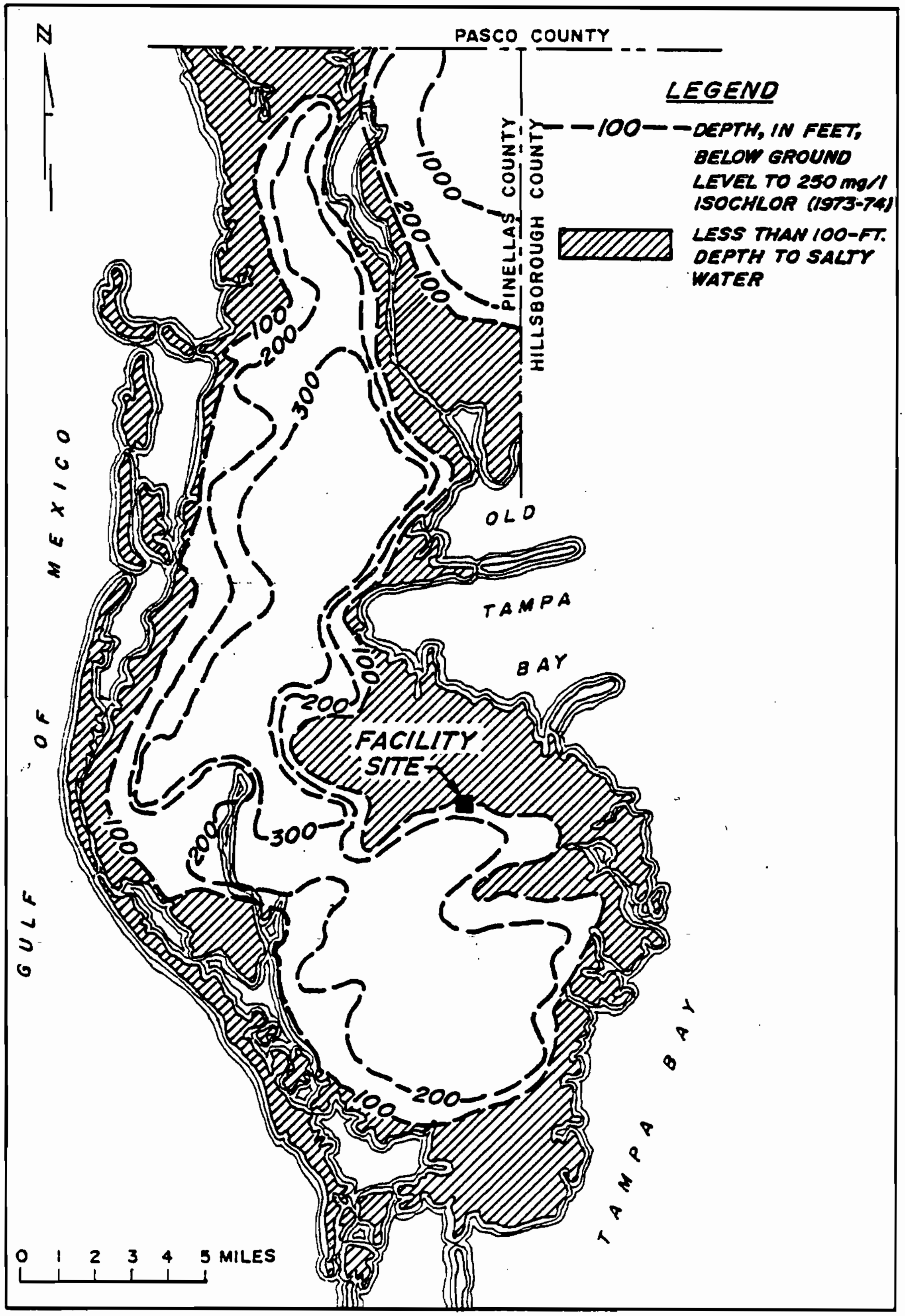
potable water is extracted (although excessive pumping and, consequently, salt water encroachment have precluded most municipal withdrawals on the Pinellas Peninsula; see Section 2.2.3). Although seasonal water table fluctuations facilitate the movement of more saline waters into the freshwater zone, aquifer water quality is good in the vicinity of the resource recovery site. Hydrologists have arbitrarily designed those waters with a chloride concentration in excess of 250 mg/l as salt or brine water, with a lesser concentration indicating freshwater; the estimated depth to the 250 mg/l isochlor is featured in Figure 2.5.c.

Flood Prone Areas - The highly permeable coarse sands of the higher elevations permit rapid internal drainage to the water table. At lower elevations where surface runoff is much slower, the highly organic soils or hardpan hold moisture and act as a reservoir of fresh water. The occasional inundation of significant portions of the study area can be blamed on the slow percolation rates of these soils and the high water table.

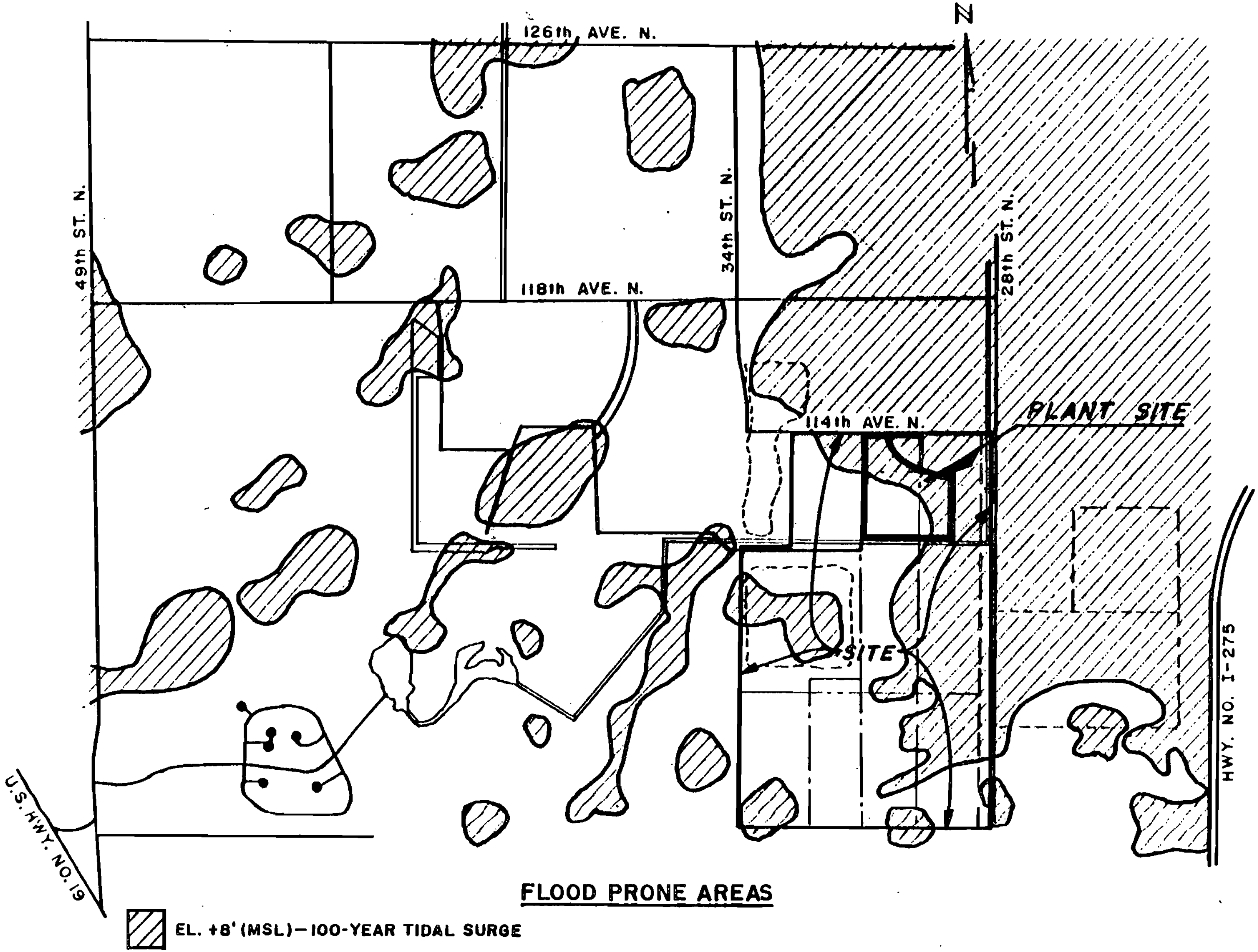
Figure 2.5.d identifies those portions of the study area which are subject to inundation from a 100-year tidal surge; the primary delineating criterion for flood-prone designation is the eight foot (msl) tidal elevation contour.

2.5.1 Affected Waters - Surface drainage of those areas encompassing the proposed site will be maintained on site (see Section 3.10). Discharges will occur only under high rainfall

FIGURE 2.5.c.



DEPTH TO SALINE WATER



FLOOD PRONE AREAS

FIGURE 2.5.d.

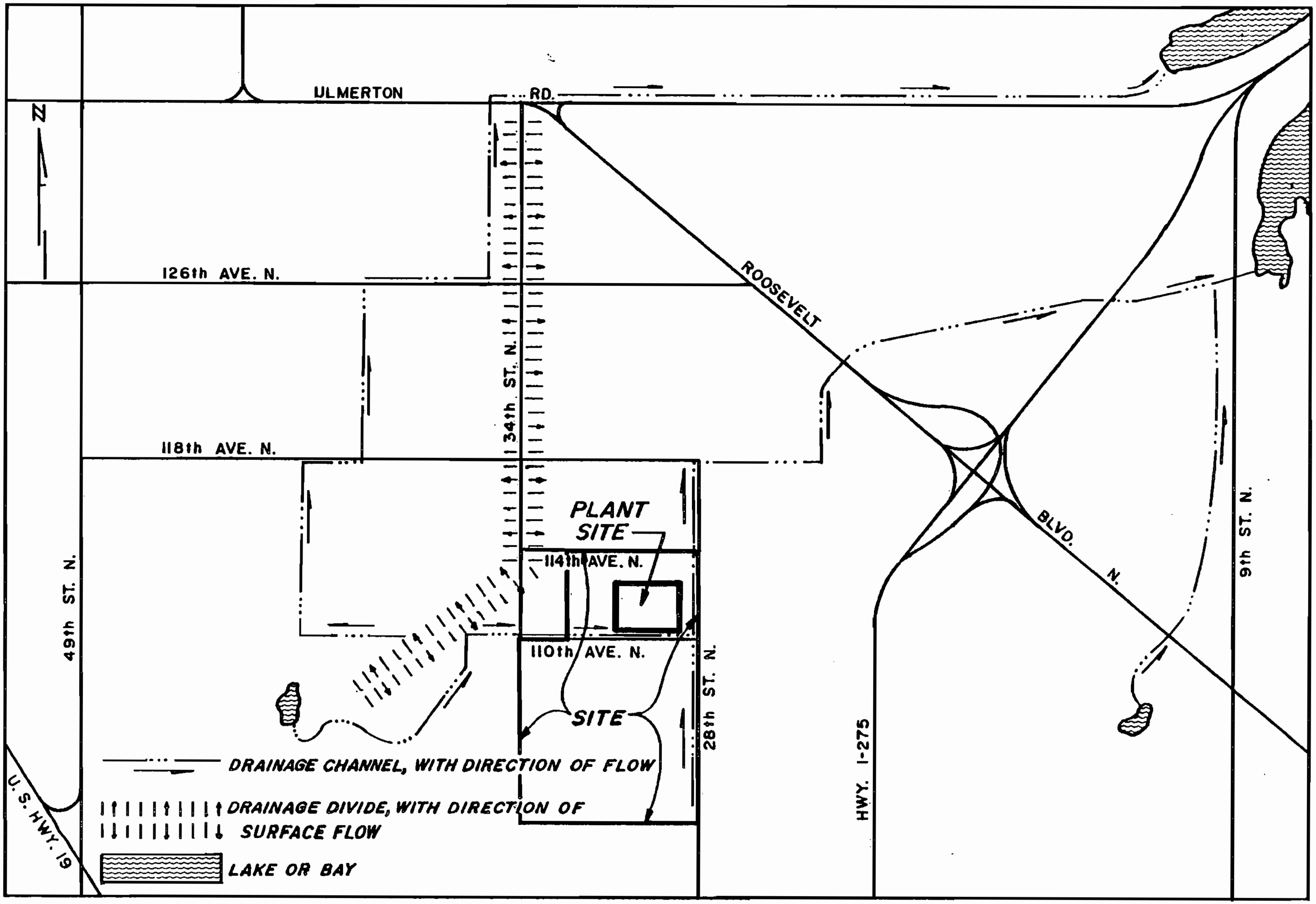
conditions and then only treated stormwater runoff will be discharged. Existing drainage in the area is shown on Figure 2.5.1.a. At present drainage from the site is channeled through the Roosevelt drainage basin as delineated in the Central Pinellas 201 Plan. This designated Class III watershed (Chapter 17-3, FAC) is composed of manmade arteries in its upstream areas which generally parallel county roads and superhighways. These channels gradually diffuse into the myriad of ponds and streams which characterize the shoreline mangrove estuaries. An illustration of the drainage scheme for the resource recovery site is shown in Section 3.10. As discussed in that section, all drainage will be contained on site and any discharge will be in emergency high water conditions. During these conditions, discharged treated stormwater runoff will be directed in accordance with the area-wide drainage plan currently being prepared by the County. In any case, Tampa Bay will receive any discharge from the new facility in the same general vicinity as the present drainage.

With regard to groundwater, activities associated with facility construction and operation will have a minimal impact on aquifer water quantity and quality; it is anticipated that plant incurred effects on these systems will be only locally significant. This is substantiated upon analysis of a 1976 USGS report concerning landfilling activities and groundwater plume dispersal at Toytown (approximately 1 mile east).[1] This report indicates that downgradient horizontal movement of groundwater in the study area is minimal (1 to 10 feet per year). Furthermore, on-site soil borings suggest the

[1] "Geohydrological Evaluation of a Landfill in a Coastal Area, St. Petersburg, Florida"

FIGURE 2.5.1.a

EXISTING STUDY AREA DRAINAGE SCHEME



presence of a continuous, areally significant clay/marl zone underlying the study area at an average depth of 19 feet.

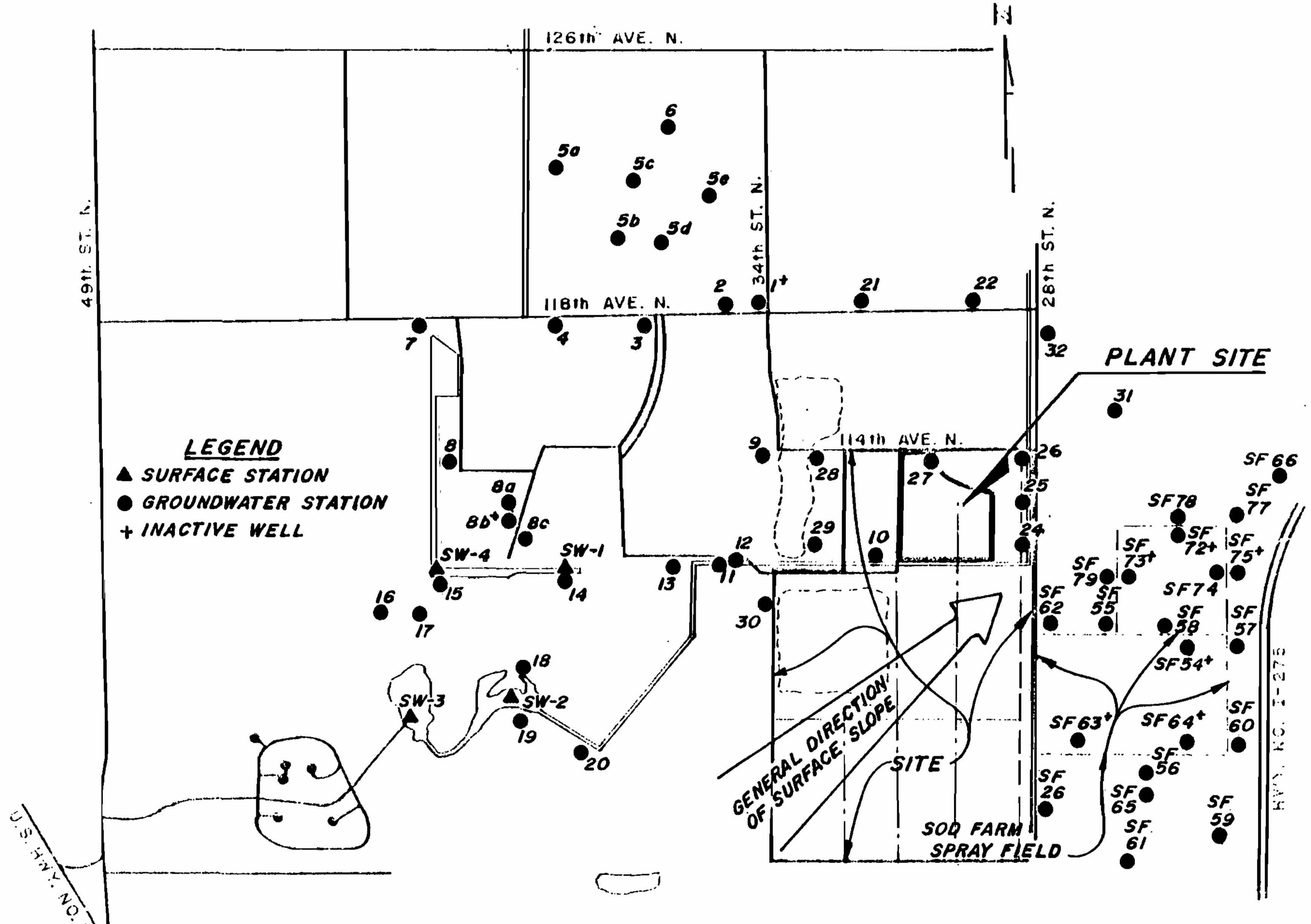
More detailed discussions of plant induced water quality impacts are featured in Chapters 4, 5, and 6; the provisions regarding facility water consumption, landfilling needs and stormwater control are specified in Chapter 3. Section 2.5.4 identifies background chemical characteristics of study area surface and ground waters.

2.5.2 Water Withdrawals - Water needs for the proposed facility will be supplied by existing municipal systems (see Chapter 3). No existing or new wells in the study area will be utilized.

2.5.3 Affected Tributaries - The component streams of the Roosevelt drainage basin are the only affected tributaries pertinent to the proposed facility. As previously cited, the upper reaches of the watershed are drained by manmade canals and ditches, and shallow, natural drainage courses. Just east of Roosevelt Boulevard, these channels empty into black and red mangrove tidal zones and, ultimately, into Old Tampa Bay. Quality and quantity (flow) data on streams and estuaries in the Roosevelt basin are virtually non-existent; watershed sampling regimens have been limited to the vicinity of the Toytown and Pinellas County landfills. By extrapolating data from similar areas in Pinellas County for which a representative data base is available, one can speculate that chemical quality of those affected tributaries is generally good except where landfill and sprayfield effluents are encountered (see Section 2.5.4).

Estuarine water quality has been estimated from National Marine Fisheries Service monitors near Weedon Island, Albert Whitted Airport and Point Pinellas. Basically, nutrient data indicate no untoward conditions while dissolved oxygen concentrations ranged from 3.5 to 4.4 milliliters per liter during the six year regimen (1966-1972). All data results were consistent with expected pollutant concentrations for estuaries receiving moderate urban inflows.

2.5.4 Background Characteristics - Data reviewed to discern water quality characterics were WATSTORE retrievals of USGS sampling efforts in the study area. Figure 2.5.4.a illustrates the array of surface water, shallow aquifer and Floridan aquifer monitoring wells from which data were examined. In most cases those monitors located upgradient of landfill and sprayfield areas were selected as being most representative of study site background conditions; however, for the Floridan aquifer evaluation, no monitor upgradient of these effluent areas contain a data base adequate enough to estimate water quality, even in a cursory sense. For this reason, and due to the forementioned relative isolation of this lower aquifer from more surficial layers, it is speculated that utilization of data from a Floridan aquifer monitor underlying the sod farm wastewater sprayfield will not be overly biased by sprayfield leachate and, consequently, will approximate background conditions.



WATER QUALITY MONITORING SITES

FIGURE 2.5.4.a.

Surface Water - Table 2.5.4.a identifies maximum, minimum and mean concentrations (mg/l) of chemical constituents from two monitors (SW-4 and SW-1, Figure 2.5.4.a) located in the perimeter ditch of the phased out Pinellas landfill. Data from Stations SW-3 and SW-2 were also examined, but it was determined that surface waters at those sites were significantly impacted by urban runoff (high concentrations of coliform and oxygen demanding substances). At SW-4 and SW-1, concentrations of the vast majority of constituents are quite low, especially in comparison with other nearby surface waters in urban locations which receive domestic wastewater effluents (see Table 2.5.4). The bacterial levels, however, indicate that fecal pollution is quite apparent with state standards (Chapter 17-3, FAC) being routinely violated. This is largely due to the prominence of high seagull populations which feed off the raw garbage of the current landfill.

Shallow Aquifer - Data from well number SF-26 (Figure 2.5.4.a) was selected for discussion; maximum, minimum and mean concentrations for representative parameters at that location are shown in Table 2.5.4.b. The data reviewed indicate significantly higher nutrient concentrations for the water table aquifer than those recorded in surface waters. As this well is located upgradient from the sod farm wastewater sprayfield, a possible explanation for this phenomenon is contaminated plume spreading; a cursory review of the limited data from other upgradient wells (numbers SF-56, SF-65 and SF-61) supports these findings. As you would expect of waste encased in a soluble substrate, common mineral content

Table 2.5.4.a

CHEMICAL CHARACTERISTICS OF SURFACE WATERS[1]

Parameter	WATSTORE	Mean	N[2]	Max	Min
Total Organic Nitrogen, MG/L	00605	0.99	10	1.3	0.80
Total Ammonia Nitrogen, MG/L	00610	0.08	8	0.13	0.05
Total Nitrite Nitrogen, MG/L	00615	0.0	8	0.0	0.0
Total Nitrate Nitrogen, MG/L	00620	0.0	7	0.0	0.0
Total Phosphorus, MG/L	00665	0.06	10	0.10	0.02
BOD, MG/L	00310	1.59	10	2.1	0.8
COD, MG/L	00340	52	10	73	24
Turbidity, JTU	00070	9.5	2	15	4
Color, PtCU	00080	53	3	65	40
Specific Conductance, Micromhos	00095	504	10	740	360
Dissolved Chloride, MG/L	00940	43	10	80	16
pH	00400	7.7	12	8.6	6.3
Dissolved Calcium, MG/L	00915	72	8	89	51
Dissolved Magnesium, MG/L	00925	7.1	8	11	4.2
Dissolved Potassium, MG/L	00935	3.5	8	6.0	2.1
Dissolved Sodium, MG/L	00930	29	8	54	16
Hardness, Ca MG/L	00900	210	8	270	150
Total Arsenic, MG/L	01002	1.8	10	4	0
Total Cadmium, MG/L	01027	0.2	10	1	0
Total Chromium, MG/L	01034	15	10	30	<10[3]
Total Copper, MG/L	01042	5.7	10	27	0
Total Iron, MG/L	01045	251	10	470	100
Total Lead, MG/L	01051	4.2	10	12	0
Total Mercury, MG/L	71900	0.28	10	0.8	0
Total Zinc, MG/L	01092	20	10	30	0
Confirmed Coliform MPN	31505	16,114	9	110,000	210
Fecal Coliform MPN	31615	1,074	7	4,600	21

[1]Values extracted from WATSTORE;USGS stations #275218082410700 and #275217082412500, both in the Pinellas County Landfill Perimeter Ditch.

[2]Number of samples examined.

[3]4 of 10 readings were <10, or below detection limits.

Table 2.5.4.b

CHEMICAL CHARACTERISTICS OF SURFICIAL AQUIFER WATER[1]

Parameter	WATSTORE	Mean	N[2]	Max	Min
Total Organic Nitrogen, MG/L	00605	0.77	12	0.90	0.67
Total Ammonia Nitrogen, MG/L	00610	0.34	8	0.43	0.29
Total Nitrite Nitrogen, MG/L	00615	0.004	8	0.01	0.0
Total Nitrate Nitrogen, MG/L	00620	0.04	8	0.32	0.0
Total Phosphorus, MG/L	00665	0.15	14	0.32	0.04
BOD, MG/L	00335	1.12	13	3.9	0.3
COD, MG/L	00340	74	12	110	29
Specific Conductance, Micromhos	00095	1402	15	1700	1190
Dissolved Chloride, MG/L	00940	214	13	280	170
pH	00400	7.37	13	7.7	6.6
Dissolved Calcium, MG/L	00915	134	11	160	110
Dissolved Magnesium, MG/L	00925	21	11	26	16
Dissolved Sodium, MG/L	00930	146	11	160	130
Dissolved Potassium, MG/L	00935	1.7	11	1.9	1.5
Hardness, Ca MG/L	00900	420	11	510	340
Total Arsenic, MG/L	01002	8	12	11	5
Total Cadmium, MG/L	01027	0.45	11	2	0
Total Copper, MG/L	01042	12	12	41	0
Total Chromium, MG/L	01034	11.7[3]	12	20	<10
Total Iron, MG/L	01045	6055	11	7800	4900
Total Lead, MG/L	01051	20	12	43	3
Total Mercury, MG/L	71900	0.19	12	0.9	0.0
Total Zinc, MG/L	01092	51	12	150	10
Coliform MPN	31505	184[4]	14	2300	<3
Fecal Coliform MPN	31615	24[5]	14	300	<3

[1]From USGS Well #275157082401901; data from WATSTORE, 1974-1977.

[2]Number of samples examined.

[3]6 of 12 readings were < 10, or below detection limits.

[4]7 of 14 readings were <3, or below detection limits.

[5]11 of 14 readings were < 3, or below detection limits.

Table 2.5.4

COMPARISON OF CHEMICAL CHARACTERISTICS
OF LANDFILL PERIMETER DITCH SURFACE WATERS
WITH THOSE OF OTHER NEARBY WATERWAYS

Parameter	Landfill		Allen Creek[1]		Cross Bayou Canal[1]	
	Max	Min	Max	Min	Max	Min
BOD	2.1	0.8	5.5	1.2	15.0	2.0
NH_3, MG/L N	0.13	0.05	0.26	0.02	1.5	0.35
TOT-PO_4, MG/L PO_4	0.10	0.02	0.90	0.19	15.5	1.0
Total Coliform	110,000	210	42,500	40	542,000	94

[1]Extracted from Central Pinellas 201.

is substantially higher than that indicated for surface waters, as shown by the specific conductance readings. Indeed, as a rule, there is a direct relationship between specific conductance readings and dissolved chloride, sodium, magnesium and calcium concentrations. With regard to metals, only chromium and mercury levels in the shallow aquifer were lower than those recorded from surface waters; all other aquifer metal concentrations were substantially higher than surface readings. Finally, bacterial concentrations in the aquifer system are well below those identified from surface waters. This is to be expected upon consideration of bacterial life cycles (fecal coliform bacteria are relatively short-lived), the filtration of organisms through the overburden, and the higher chloride content of underlying waters.

Limestones or Floridan Aquifer - Maximum, minimum and mean concentration of significant parameters from USGS well number SF-54 (see Figure 2.5.4.a) are shown in Table 2.5.4.c. In general, chemical characteristics of contained waters are quite similar to those noted from the surficial aquifer. Shown on Figure 2.5.4.d is a comparison of water quality characteristics for surface waters, surface aquifer and limestone aquifer. The primary source of recharge for the Florida aquifer is leakage from this surficial layer, although remote from the site (vicinity of the Pasco High). The higher BOD, phosphorus and nitrate nitrogen levels in the limestone aquifer (as opposed to the readings in surface and shallow aquifer waters) suggest that the current sprayfield activities (St. Petersburg sod farm) do impact groundwater in the underlying areas; this is notably pronounced for the readily soluble nitrate nitrogen species.

2.5.5 Natural Variation of Waters - As previously discussed surface water levels are a direct response to precipitation and, as a result, surficial water table levels. Other considerable influences on water level fluctuations are discharge in a general northeasterly direction to Tampa Bay, pumping of aquifer waters, tidal cycles and evapotranspiration.

Once again, no withdrawals from study area waters will be induced by installation and operation of the proposed facility. Further discussion of groundwater characteristics is presented in the following section.

2.5.6 Groundwater - The water table level in the vicinity of the proposed facility fluctuates as a result of precipitation and,

Table 2.5.4.c

CHEMICAL CHARACTERISTICS OF LIMESTONE AQUIFER WATER[1]

Parameter	WATSTORE	Mean	N[2]	Max	Min
Total Organic Nitrogen, MG/L	00605	0.25	12	0.49	0.0
Total Ammonia Nitrogen, MG/L	00610	0.32	6	0.66	0.05
Total Nitrite Nitrogen, MG/L	00615	0.01	6	0.02	0.0
Total Nitrate Nitrogen, MG/L	00620	0.75	6	2.9	0.0
Total Phosphorus, MG/L	00665	0.31	14	0.83	0.04
BOD, MG/L	00310	2.85	13	7.3	0.7
COD, MG/L	00340	25	4	30	17
Color, PtCU	00080	11	4	20	5
Specific Conductance, Micromhos	00095	1342	12	1600	1250
Dissolved Chloride, MG/L	00940	198	11	230	160
pH	00400	7.5	13	8.0	6.7
Dissolved Calcium, MG/L	00915	126	12	150	110
Dissolved Magnesium, MG/L	00925	30	12	34	25
Dissolved Sodium, MG/L	00930	107	12	120	97
Dissolved Potassium, MG/L	00935	15	11	16	14
Hardness, Ca MG/L	00900	436	12	390	490
Total Arsenic, MG/L	01002	2	12	6	0
Total Cadmium, MG/L	01027	0.67	12	3	0
Total Chromium, MG/L	01034	11[3]	11	20	0
Total Copper, MG/L	01042	25	12	45	0
Total Iron, MG/L	01045	2562	11	4400	130
Total Lead, MG/L	01051	50	12	160	2
Total Mercury, MG/L	71900	0.19	10	0.6	0.0
Total Zinc, MG/L	01092	55	12	150	0
Coliform MPN	31505	287	9	2400	4
Fecal Coliform MPN	31615	112[4]	11	1100	<3

[1]From USGS Well #275210082395901; WATSTORE Data, 1973-1974.

[2]Number of samples examined.

[3]3 of 11 readings were <10, or below detection limits.

[4]5 of 11 readings were <3, or below detection limits.

TABLE 2.5.4.d

COMPARISON OF QUALITY PARAMETERS

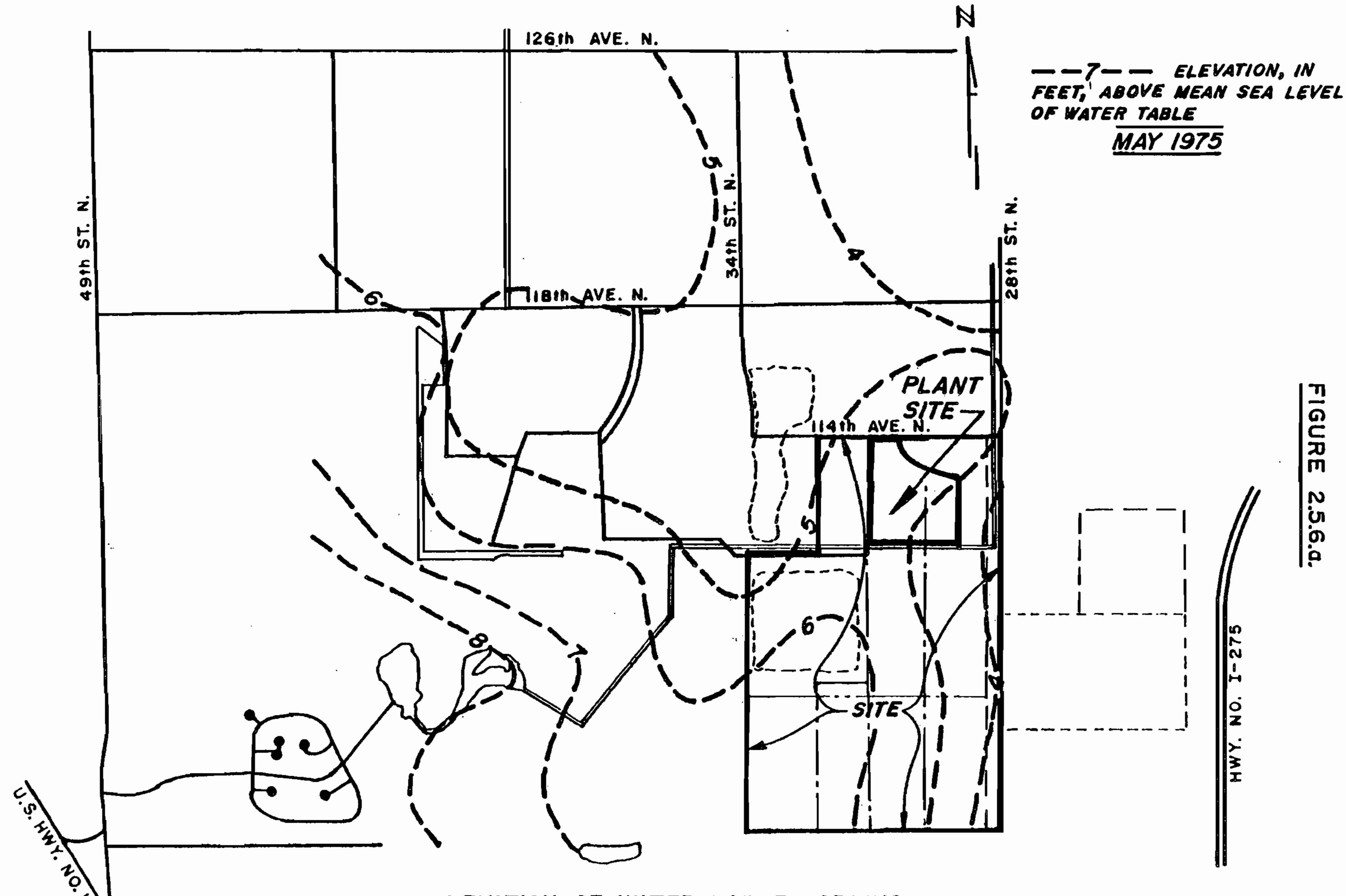
FROM SURFICIAL AND SURFACE/DEEP AQUIFER WATER[1]

	Surface	Surface Aquifer	Limestone Aquifer
Total Organic Nitrogen	0.99	0.77	0.25
Ammonia	0.08	0.34	0.32
Nitrate	0.00	0.04	0.75
Phosphorus	0.06	0.15	0.31
BOD	1.59	1.12	2.85
COD	52	74	25
Color	53	-	11
Conductance	504	1,402	1,342
Dissolved Chloride	43	214	198
pH	7.7	7.4	7.5
Dissolved Sodium	29	146	107
Dissolved Magnesium	7.1	21	30
Dissolved Calcium	72	134	126
Hardness	210	420	436
Arsenic	1.8	8	2
Cadmium	0.2	0.45	0.67
Chromium	15	11.7	11
Copper	5.7	12	25
Iron	251	6,055	2,562
Lead	4.2	20	50
Mercury	0.28	0.19	0.19
Zinc	20	51	55
Coliform	16,114	184	287
Fecal Coliform	1,074	24	112

1 Mean Values, MG/L

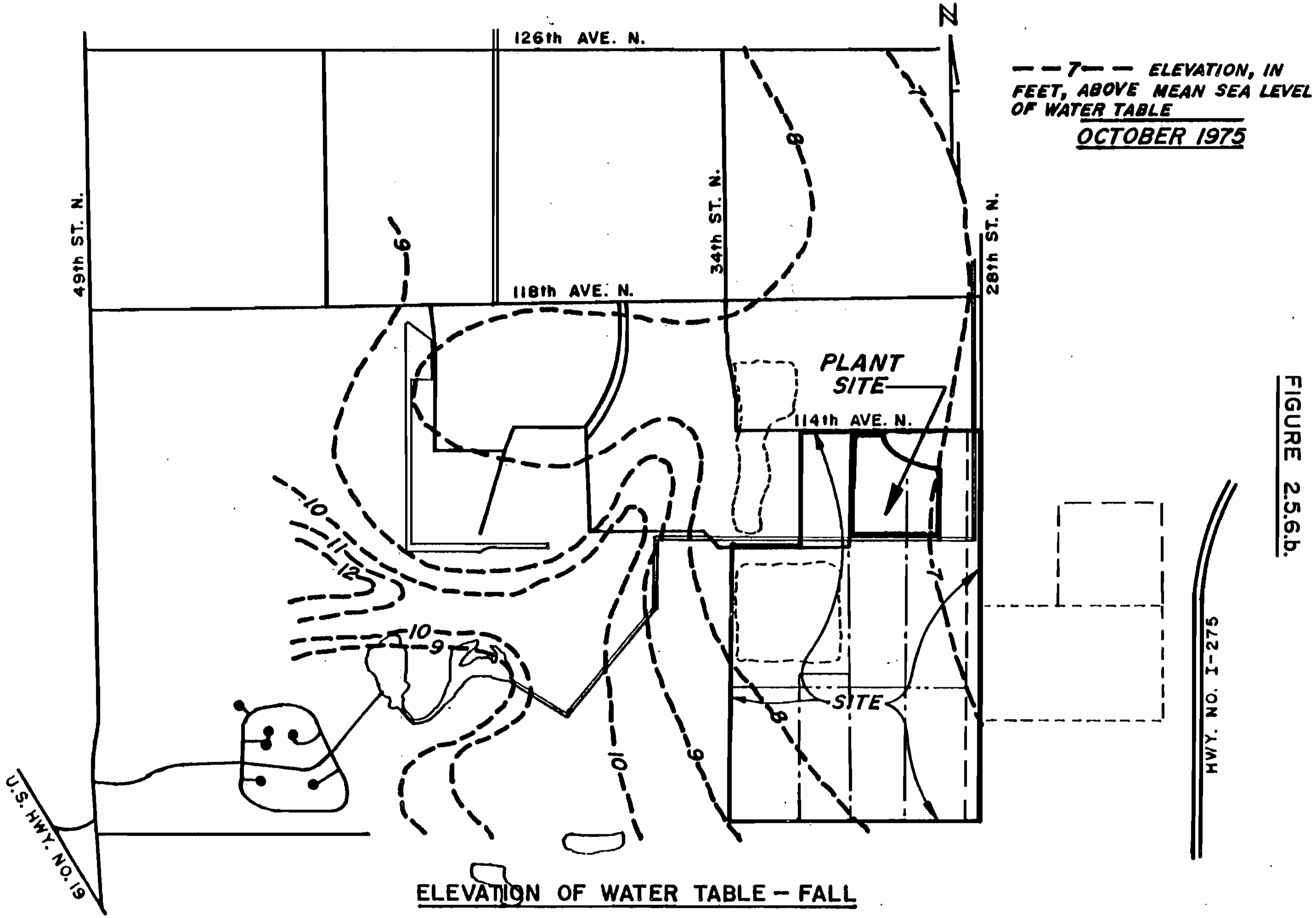
to a lesser degree, evapotranspiration, seepage to the Floridan aquifer, pump-out by local wells and discharge to Tampa Bay. Figures 2.5.6.a and 2.5.6 b illustrate water table contours in the study area for May and October, respectively. From these figures it is evident that the water table, relatively low as a result of drier winter and early spring months, is substantially elevated by October due to the prevalence of rain during the summer months. This phenomenon is also a characteristic of the Floridan aquifer. Figure 2.5.6.c features a comparison of potentiometric surfaces in that aquifer for the months of May and September. Again, abundant summer precipitation and subsequent seepage of the rainwater through the confining deposits increases local artesian pressures, thus expanding the areal coverage of the five foot contour in Pinellas County.

Data concerning aquifer transmissivity and flow velocity are available for the Toytown landfill, located approximately one mile east of the proposed facility. From this information, based on direct monitoring of on-site wells, a languid, northeastward flow of groundwater from the study area has been noted. Due to the extreme gentleness of the water table gradient and the low horizontal hydraulic conductivity of the water bearing strata, the velocity of groundwater from Toytown to the bay has been estimated at one (1) foot per year, assuming a four foot water table head at the northeast boundary of the landfill property and an effective porosity of 0.31. Assuming these conditions it is estimated



ELEVATION OF WATER TABLE — SPRING

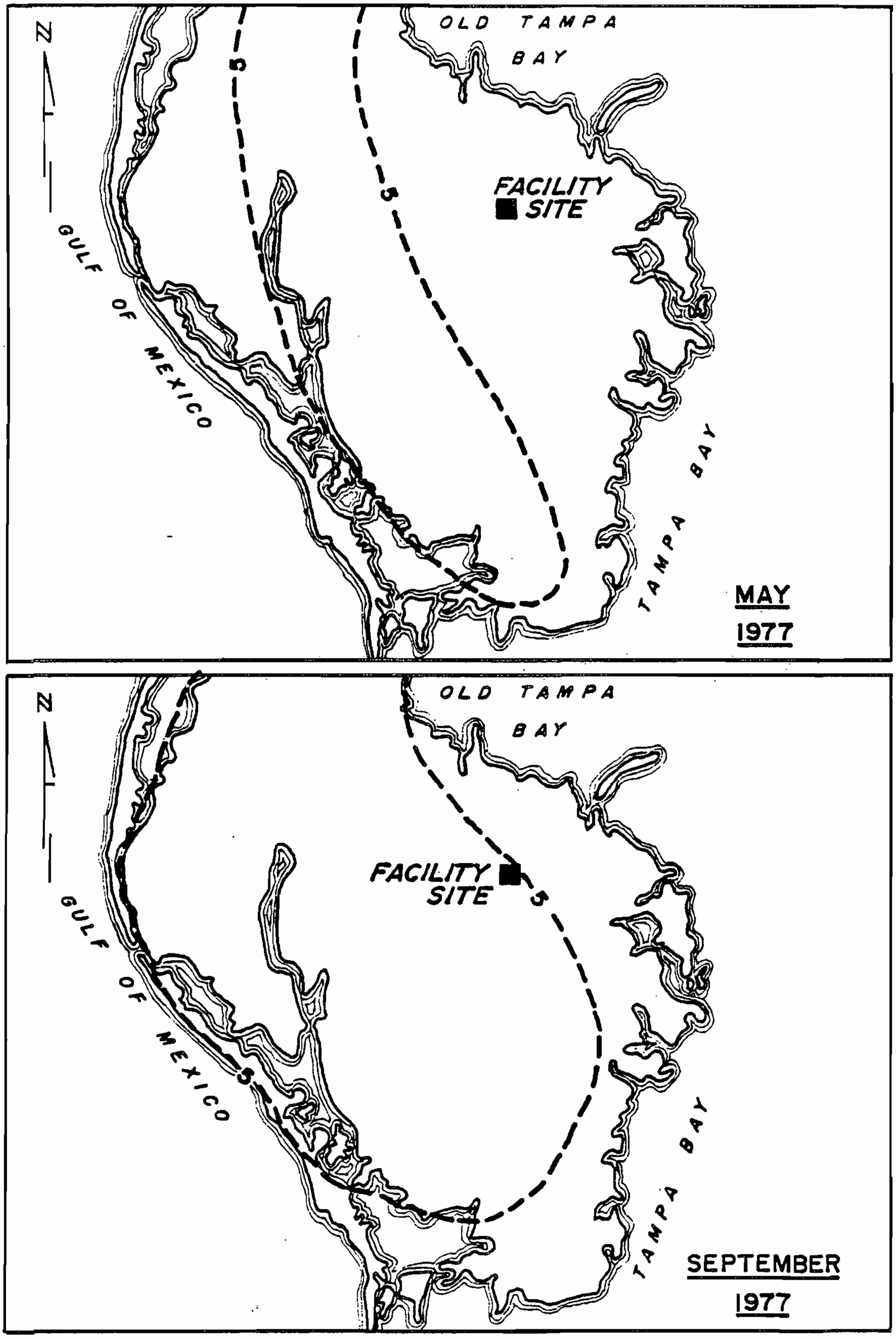
FIGURE 2.5.6.a.



ELEVATION OF WATER TABLE – FALL

FIGURE 2.5.6.b.

FIGURE 2.5.6.c.



POTENTIOMETRIC SURFACE OF FLORIDIAN AQUIFER that a minimum of 10,000 years will elapse before water seeping from the proposed facility site into the groundwater will reach Tampa Bay. Leakage from the surface aquifer through the confining bed into the Floridan aquifer has also been estimated for the Toytown landfill. By utilizing Darcy's Law the seepage rate at Toytown was calculated at 15,100 gallons per day or 5.5 million gallons per year; average leakage through a one foot square of confining bed soil column is estimated at 0.0014 gallons per day. Furthermore, vertical groundwater velocity through the confining bed has been estimated at 0.00074 feet per day, under steady state conditions. With these factors in mind, leachate from landfilling activities would take approximately 100 years to flow through the confining bed into the Floridan Aquifer.

2.6 Meterology

Temperature - The St. Petersburg/Clearwater region is classified as sub-tropical with temperatures being heavily modified by the Gulf and coastal waters surrounding the peninsula. Mean daily maximum temperatures during the four summer months of July, July, August and September are near 90°F. These maxima drop to just over 70°F for the winter months. Minimum temperatures during summer are in the mid 70's ranging to the mid-50's for the winter (see Table 2.6.a). Extreme highs and lows are rare due to the modifying influence of the surrounding water. The record highest temperature for a period of 25 years

TABLE 2.6.a

Temperature Means and Extremes (^{o}F)

1st Entry - Tampa, Florida (Period of Record is: 1941 - 1970)
2nd Entry - St. Petersburg, Fla. (Period of Record is: 1951 - 1974)

Month	Monthly Mean	Average Daily Maximum	Average Daily Minimum	Record Maximum	Record Minimum
January	60.4 62.2	70.6 70.3	50.1 54.1	84 85	23 29
February	61.8 63.2	71.9 71.4	51.7 55.1	88 86+	24 32
March	66 67.6	76.1 75.6	55.9 59.5	91 88	34 39+
April	72 73.2	82.4 81.3	61.6 65	93 91+	40 49+
May	77.2 78.4	87.5 86.6	66.9 70.2	98 96	49 56+
June	81 81.7	89.9 89.1	72 74.3	98 98	61 61
July	81.9 82.9	90.1 89.9	73.7 75.8	97 97+	63 66
August	82.2 82.9	90.4 89.9	74.0 75.8	98 97	67 66
Sept.	80.8 81.6	89 88.6	72.6 74.6	96 95+	59 62
Oct.	74.7 75.9	83.9 83.3	65.5 68.5	94 96	40 47
November	66.8 68.7	77.1 76.7	56.4 60.7	90 89	23 35+
December	61.6 63.4	72.0 71.5	51.2 55.3	86. 84+	18 22
Annual	72.2 73.5	81.7 81.2	62.6 65.7	98 98	18 22

between 1951 to 1974 was 98°F in June of 1964 while the record low was 22°F in December 1962. The maximum frost probability during any winter season is 30%.

Precipitation (Table 2.6.b) - The dominant climatological feature of the region is its summertime thunderstorm season. During the months of June, July, August and September, the Tampa Bay area experiences an average of 90 days with thundershower activity. This produces mean monthly rainfall amounts between 6 and 9 inches. A secondary maximum of just over 4 inches occurs in March while the winter months of November through January contribute between 2 and 3 inches. The late Spring months of April and May are also relatively dry with averages below 3 inches. Snowfall contributions are negligible. Only trace amounts have been recorded for the months of January and February during the 25 year period of record. The occurrence of fog is generally limited to the cooler season of the year. The mean number of days with heavy fog are 6 and 5 respectively for January and December while during the summer months, a mean of less than one day has been recorded.

Severe Storms - The risk of a hurricane moving in from the Gulf of Mexico has been greatest in June and October. A tropical storm of July 28-29, 1960, brought the Tampa Bay region its heaviest rain: 12.11 inches in 24 hours. The most destructive and highest tide occurred during the Gulf hurricane of October 21, 1921 when a tide level of 10.5 feet above mean low water was

TABLE 2.6.b
Precipitation (inches)

1st Entry - Tampa, Fla. (Period of record is 1941 - 1970)
2nd Entry - St. Petersburg, Fla. (Period of record is 1951 - 1974)

Month	Mean	Record Monthly Rainfall	Record Daily Rainfall
January	2.33	8.02	3.29
	2.41	5.91	3.6
February	2.86	7.95	3.25
	3.35	8.26	4.1
March	3.89	12.64	5.20
	4.15	11.33	3.4
April	2.10	6.59	3.70
	2.58	8.45	5.05
May	2.41	8.13	4.10
	2.92	10.64	3.75
June	6.49	13.75	5.53
	6.65	23.00	9.14
July	8.43	20.59	12.11
	8.43	16.46	6.72
August	8.0	18.59	5.37
	8.94	17.93	5.3
September	6.35	13.04	4.67
	7.70	18.60	5.4
October	2.54	7.36	2.54
	3.35	14.12	3.39
November	1.79	6.12	4.22
	2.26	6.85	4.4
December	2.19	6.66	3.28
	2.51	6.77	3.3
Annual	49.38	20.59	12.11
	55.25	23.00	9.14

recorded. A maximum wind speed of over 75 mph sustained for a period of 5 minutes resulted during passage of the Labor Day hurricane in September, 1935.

Atmospheric Stability (Table 2.6.c) - Stability in the atmosphere is an important consideration when studying the dispersion of pollutants. It provides for a measure of vertical mixing similar to the manner in which wind is used to calculate horizontal transport. Highly stable atmospheres inhibit the vertical distribution of a pollutant laden bubble or stream of hot air exiting a boiler stack whereas an unstable atmosphere allows warm plumes to reach considerable heights. Generally speaking, stability is weakened (more unstable) when a colder air mass moves over warmer surfaces or when strong solar insolation warms the surface. Stability increases when surface cooling occurs such as during clear nights or when a warm air mass moves over a colder surface. Over land surfaces, maximum stabilities usually occur near sunrise, especially when wind speeds are light. Frequently a temperature inversion will develop as a result of night time radiative surface cooling. This serves as an effective barrier against vertical mixing which results in the trapping of pollutants in a relatively shallow layer above the earth's surface.

Land-Sea Breeze Effects - Land surfaces near relatively large bodies of water are subject to a circulation pattern known as Land-Sea Breezes. Since land surfaces warm up quickly

TABLE 2.6.c

MONTHLY RELATIVE FREQUENCY OF OCCURRENCE - PASQUILL'S STABILITIES

TAMPA, FLORIDA (1971 - 1975)

MONTH	Pasquill's Stability Class (% Relative Frequency)							
	A	B	C	D	E	F	G	H
January	0.	2.66	12.66	22.18	23.95	14.52	17.98	6.05
February	0.	3.13	9.55	24.82	24.91	17.59	14.55	5.45
March	0.	2.58	13.47	21.46	23.22	16.77	16.37	6.13
April	0.17	5.0	14.17	22.33	18.67	18.92	14.58	6.16
May	0.08	6.94	20.32	22.66	14.84	16.45	13.95	4.76
June	0.17	10.75	21.50	17.58	17.16	15.50	13.42	3.92
July	0.56	10.65	20.32	18.47	12.26	17.74	15.24	4.76
August	0.56	13.31	15.89	14.60	11.13	20.40	19.84	4.27
September	0.58	8.33	13.67	14.92	13.67	21.33	23.42	4.08
October	0.08	5.32	13.07	19.03	14.27	18.23	23.63	6.37
November	0.	2.83	14.83	19.83	17.92	18.17	21.75	4.67
December	0.	2.02	13.15	22.33	21.69	15.16	18.31	7.34

due to solar insolation and cool quickly under nocturnal radiation, the resultant temperature differences between land and water surfaces produce off-shore breezes at night and on-shore breezes during the day when prevailing synoptic wind conditions do not override this effect. Pinellas County is effectively surrounded on three sides by water which serves to enhance the land-sea breeze effect. Thus, when synoptic winds are light, there is a general outflow of surface air from the peninsula at night and an inflow during day time. Inflow during the day results in wind covergence and rising air which promotes good vertical transport and an increase in convective shower activity. Conversely, at night, surface outflow causes subsidence over the peninsula which increases the stability, thus inhibiting convective shower development. Prevailing wind patterns affecting the Pinellas peninsula are featured in Figure 2.6.a (monthly wind roses are featured in Figures 2.6.b through 2.6.d); Table 2.6.d identifies joint wind speed-stability-direction frequencies calculated from the 1970-1975 Tampa Airport data base.

2.7 Ecology

The discussion of ambient ecology will focus on that area shown in Figure 2.7.a, with special emphasis on those areas which will be impacted by construction and operation of the proposed resource recovery plant and associated facilities (Figure 2.7.b).

The proposed site is within a tract of land owned by Pinellas County and leased to private concerns as a sanitary landfill. This area of Pinellas County is typified by undeveloped

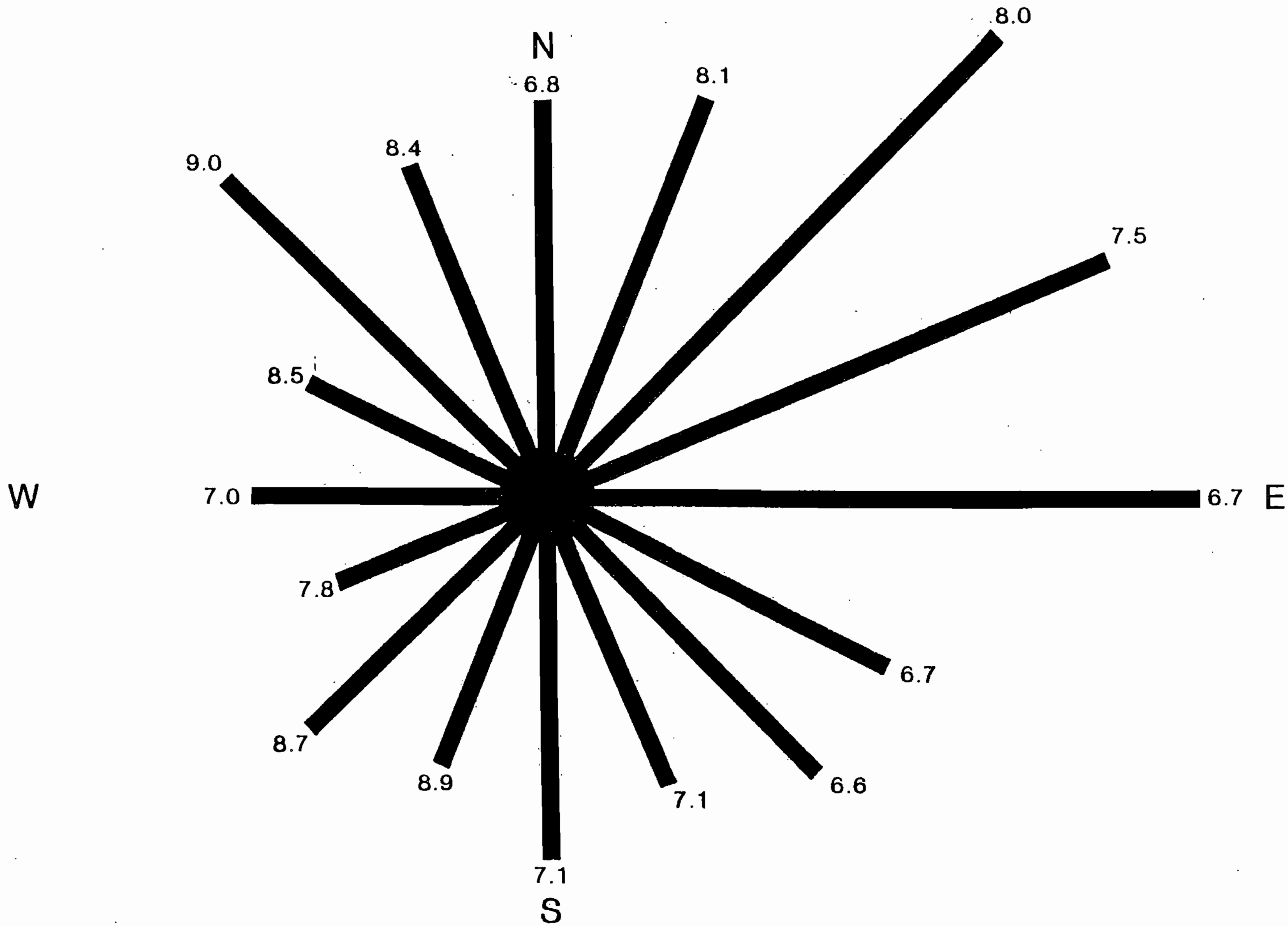


FIGURE 2.6.a

CLIMATOLOGICAL WIND ROSE FOR MACDILL AFB (1941-1972)

NOTE: Barb length indicates relative frequency; numbers indicate average wind speed in knots.

FIGURE 2.6.b.
MONTHLY WIND ROSES
McDILL AFB, 1942-1972

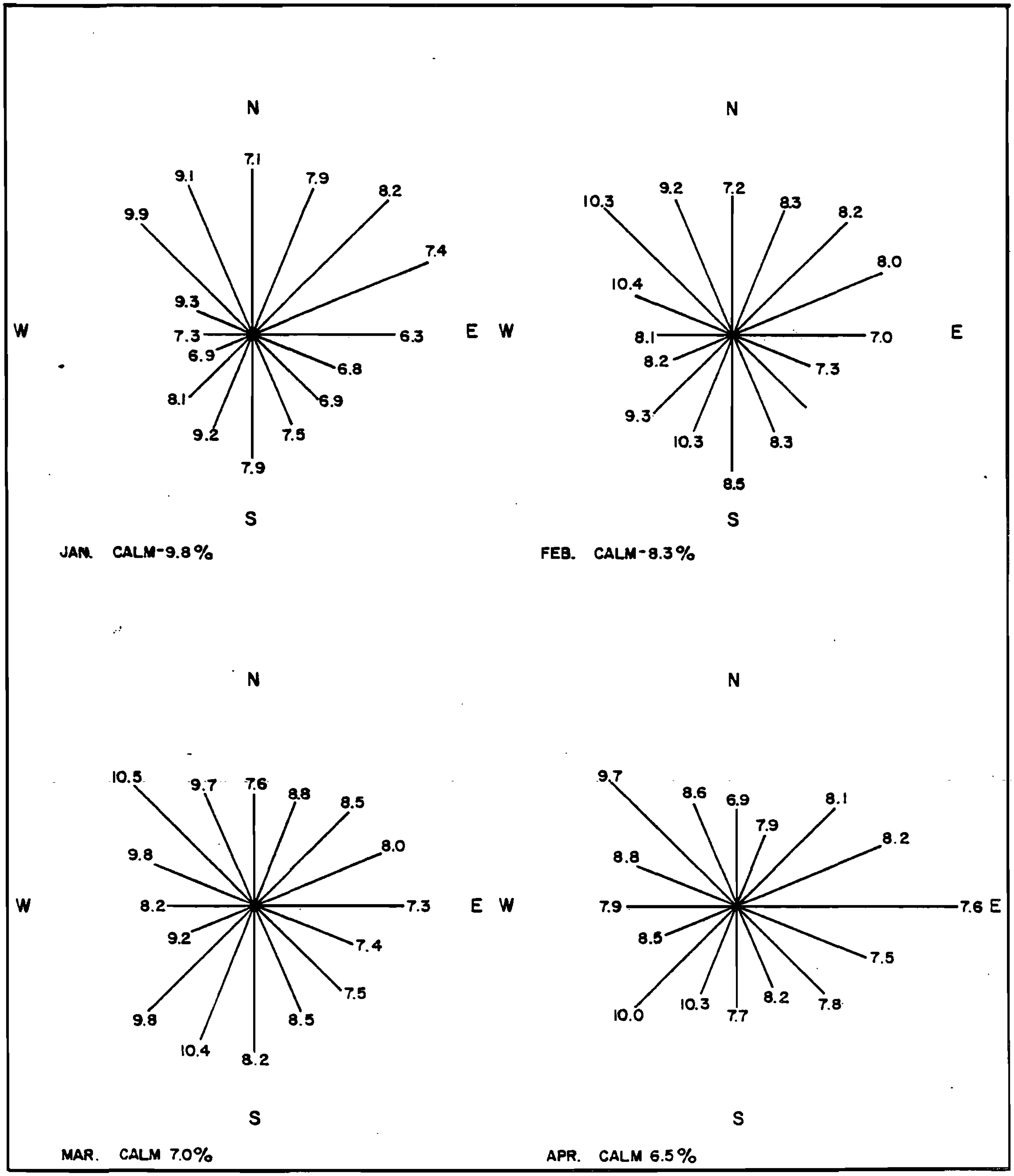


FIGURE 2.6.b.
MONTHLY WIND ROSES
McDILL AFB, 1942-1972

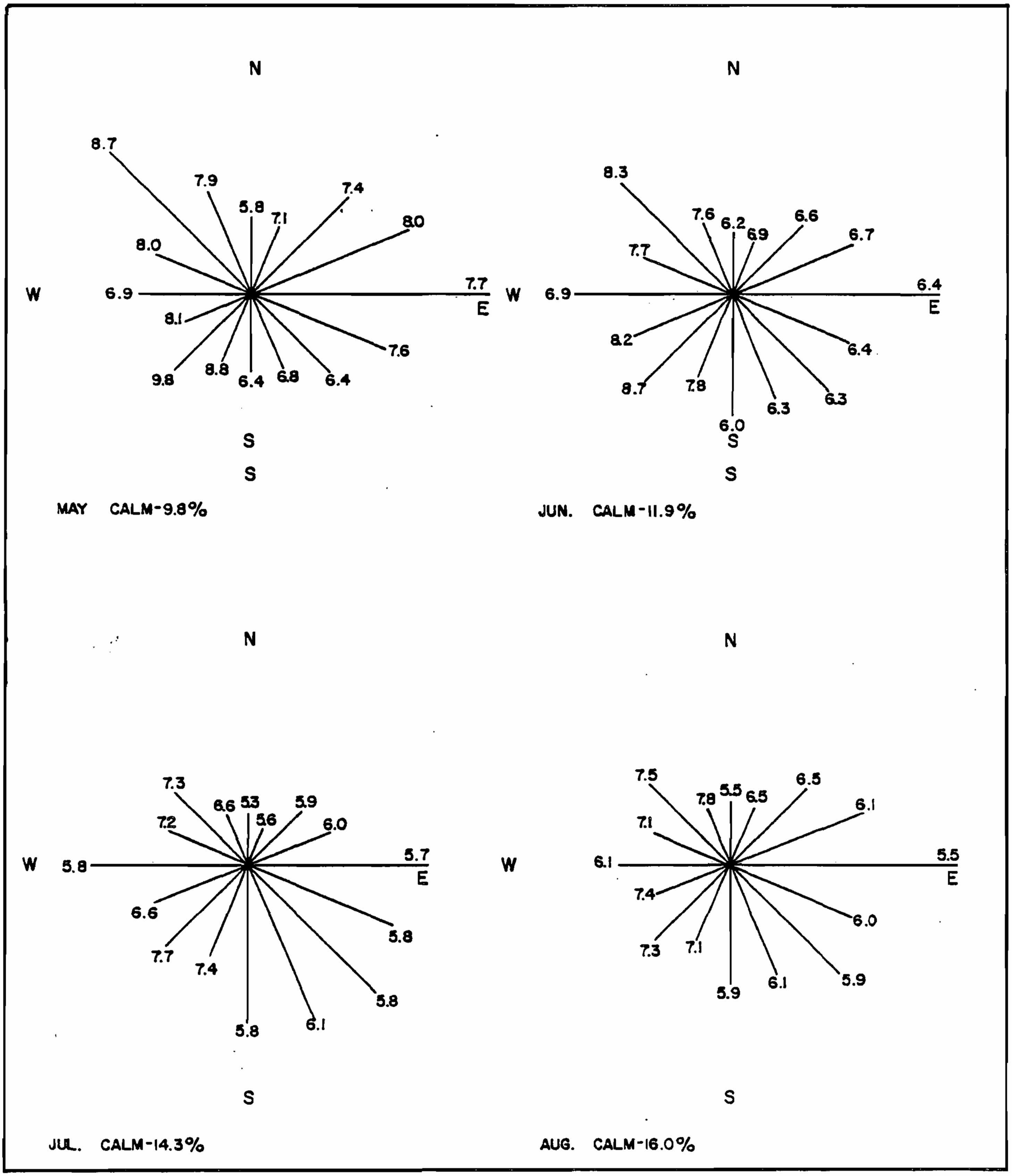


FIGURE 2.6.b.
MONTHLY WIND ROSES
McDILL AFB, 1942-1972

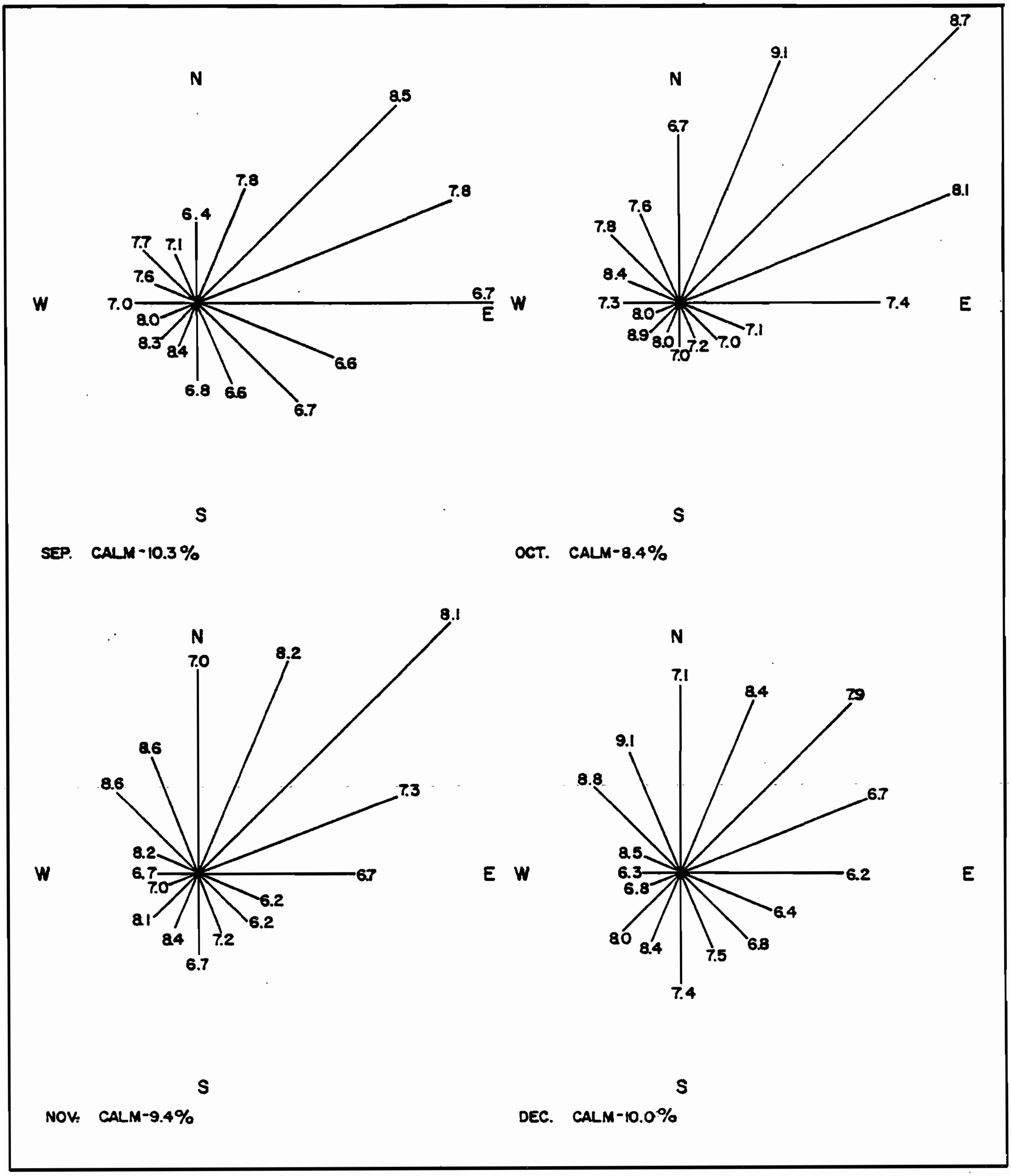


TABLE 2.6.d

CLIMATOLOGICAL DISPERSION MODEL

PINELLAS COUNTY MODEL (USES 1971-1974 STAR DATA - JOINT FREQUENCY FUNCTION)

RUN 6

METEOROLOGICAL JOINT FREQUENCY FUNCTION

STABILITY CLASS 1

WIND DIRECTION	SECTOR	WIND SPEED CLASS 1	2	3	4	5	6
N	1	.000020	.000140	0.000000	0.000000	0.000000	0.000000
NNE	2	.000020	.000140	0.000000	0.000000	0.000000	0.000000
NE	3	.000020	.000140	0.000000	0.000000	0.000000	0.000000
ENE	4	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
E	5	.000020	.000140	0.000000	0.000000	0.000000	0.000000
ESE	6	.000010	.000070	0.000000	0.000000	0.000000	0.000000
SE	7	.000010	.000070	0.000000	0.000000	0.000000	0.000000
SSE	8	.000010	.000070	0.000000	0.000000	0.000000	0.000000
S	9	.000100	.000140	0.000000	0.000000	0.000000	0.000000
SSW	10	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SW	11	.000040	.000210	0.000000	0.000000	0.000000	0.000000
WSW	12	.000020	.000140	0.000000	0.000000	0.000000	0.000000
W	13	.000100	.000140	0.000000	0.000000	0.000000	0.000000
WNW	14	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
NW	15	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
NNW	16	.000010	.000070	0.000000	0.000000	0.000000	0.000000

STABILITY CLASS 2

WIND DIRECTION	SECTOR	WIND SPEED CLASS 1	2	3	4	5	6
N	1	.000220	.001440	.000890	0.000000	0.000000	0.000000
NNE	2	.000290	.001510	.001230	0.000000	0.000000	0.000000
NE	3	.000370	.001510	.000620	0.000000	0.000000	0.000000
ENE	4	.000420	.001160	.000960	0.000000	0.000000	0.000000
E	5	.000670	.003220	.002670	0.000000	0.000000	0.000000
ESE	6	.000970	.002120	.001300	0.000000	0.000000	0.000000
SE	7	.000430	.001440	.001370	0.000000	0.000000	0.000000
SSE	8	.000300	.001710	.001300	0.000000	0.000000	0.000000
S	9	.000600	.001780	.001370	0.000000	0.000000	0.000000
SSW	10	.000360	.001440	.001440	0.000000	0.000000	0.000000
SW	11	.000440	.001580	.002740	0.000000	0.000000	0.000000
WSW	12	.000180	.002120	.004250	0.000000	0.000000	0.000000
W	13	.000680	.003360	.005960	0.000000	0.000000	0.000000
WNW	14	.000270	.001030	.000620	0.000000	0.000000	0.000000
NW	15	.000250	.000680	.000340	0.000000	0.000000	0.000000
NNW	16	.000470	.000750	.000620	0.000000	0.000000	0.000000

TABLE 2.6.d
(cont.)

C L I M A T O L O G I C A L   D I S P E R S I O N   M O D E L

PINELLAS COUNTY MODEL (USES 1971-1974 STAR DATA - JOINT FREQUENCY FUNCTION)
RUN 6

METEOROLOGICAL JOINT FREQUENCY FUNCTION

STABILITY CLASS 3

WIND DIRECTION	SECTOR	WIND SPEED CLASS 1	2	3	4	5	6
N	1	.000260	.000750	.003770	.000270	0.000000	0.000000
NNE	2	.000220	.001370	.003700	.000620	0.000000	0.000000
NE	3	.000280	.001230	.004520	.000550	0.000000	0.000000
ENE	4	.000430	.002530	.007670	.001100	0.000000	0.000000
E	5	.000690	.004660	.010550	.002050	0.000000	0.000000
ESE	6	.000250	.001990	.006230	.000890	0.000000	0.000000
SE	7	.000360	.001370	.006920	.000270	0.000000	0.000000
SSE	8	.000320	.001850	.006920	.000750	0.000000	0.000000
S	9	.000220	.001440	.005960	.001230	0.000000	.000070
SSW	10	.000270	.001030	.005620	.002120	0.000000	0.000000
SW	11	.000090	.001580	.005340	.001230	0.000000	0.000000
WSW	12	.000260	.002190	.008490	.001030	0.000000	0.000000
W	13	.000180	.001990	.017260	.006640	.000210	0.000000
WNW	14	.000200	.001100	.002810	.001230	.000070	.000070
NW	15	.000090	.000270	.002190	.000620	.000140	0.000000
NNW	16	.000120	.000820	.002050	.000750	.000210	0.000000

STABILITY CLASS 4

WIND DIRECTION	SECTOR	WIND SPEED CLASS 1	2	3	4	5	6
N	1	.000010	.000960	.002670	.004660	.000410	0.000000
NNE	2	.000010	.001300	.002740	.003290	.000140	0.000000
NE	3	.000010	.001370	.004180	.005750	.000210	.000070
ENE	4	.000090	.002330	.006370	.006850	.000410	0.000000
E	5	.000040	.005750	.009930	.008700	.000410	0.000000
ESE	6	.000090	.002400	.004040	.006230	0.000000	0.000000
SE	7	.000150	.001990	.004380	.004660	.000070	0.000000
SSE	8	.000020	.002260	.004450	.005270	.000210	0.000000
S	9	.000160	.002330	.004860	.007670	.000410	.000070
SSW	10	.000150	.001030	.003490	.006300	.000550	0.000000
SW	11	.000010	.000960	.002400	.002810	.000140	0.000000
WSW	12	.000010	.000890	.003080	.004320	.000070	0.000000
W	13	.000010	.001230	.007190	.017190	.000210	0.000000
WNW	14	0.000000	.000480	.001990	.005340	.000680	.000210
NW	15	0.000000	.000410	.001920	.005680	.001100	.000340
NNW	16	.000070	.000620	.001510	.006070	.001160	0.000000

C L I M A T O L O G I C A L   D I S P E R S I O N   M O D E L

TABLE 2.6.d
(cont.)

PINELLAS COUNTY MODEL (USES 1971-1974 STAR DATA - JOINT FREQUENCY FUNCTION)

RUN 6

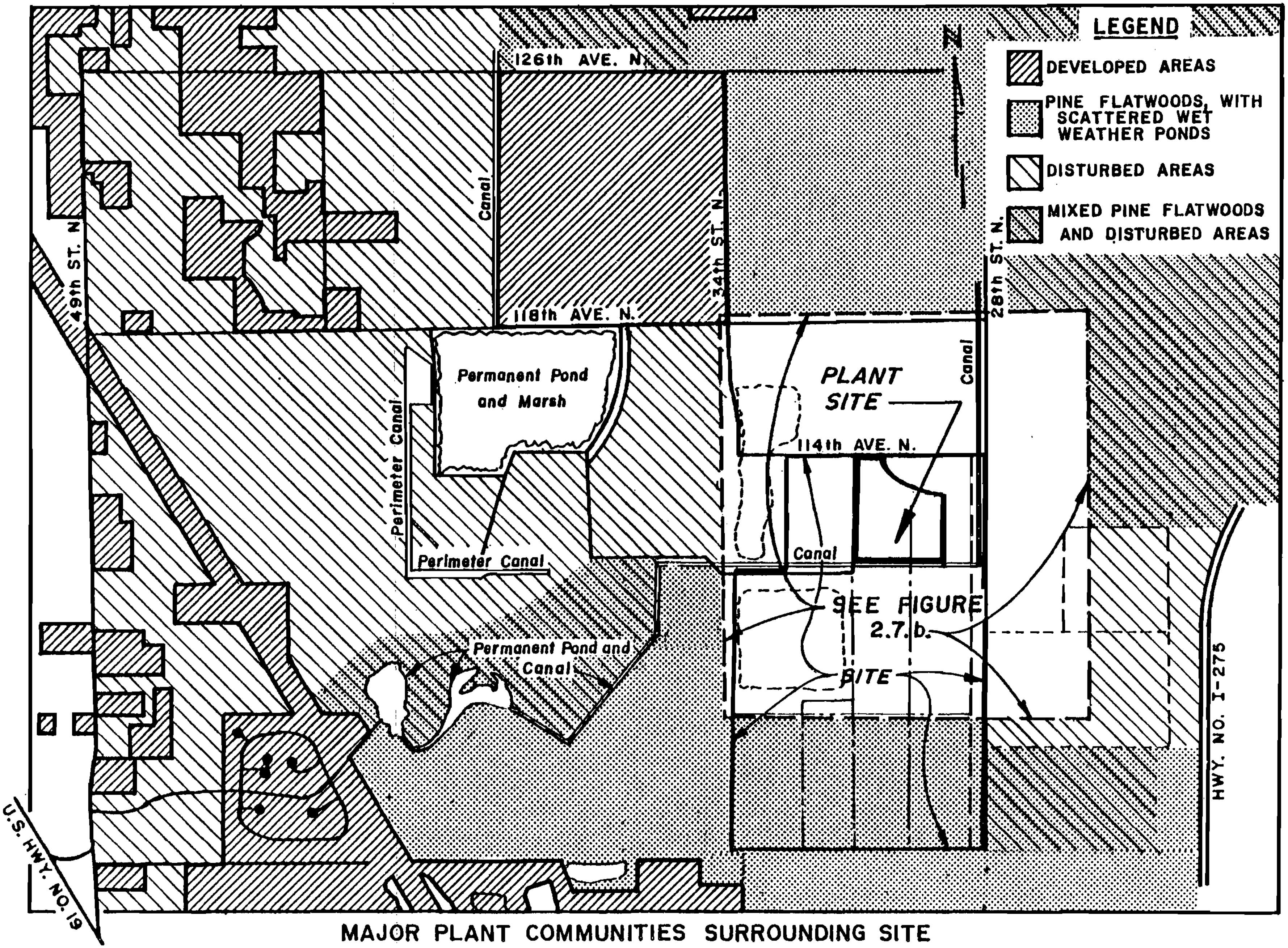
METEOROLOGICAL JOINT FREQUENCY FUNCTION

STABILITY CLASS 5

WIND DIRECTION	SECTOR	WIND SPEED CLASS 1	2	3	4	5	6
N	1	.000550	.001230	.007260	.003560	0.000000	0.000000
NNE	2	.000230	.001850	.004590	.003560	.000140	0.000000
NE	3	.000540	.001920	.006100	.004860	.000070	0.000000
ENE	4	.000780	.002120	.009180	.003220	.000070	0.000000
E	5	.001010	.003080	.014790	.005890	.000070	0.000000
ESE	6	.000350	.001510	.008840	.001990	.000140	0.000000
SE	7	.000290	.001710	.007400	.002330	.000140	0.000000
SSE	8	.000300	.000960	.006440	.002740	.000070	.000070
S	9	.000560	.002260	.007600	.002810	.000340	0.000000
SSW	10	.000110	.000410	.003360	.001710	0.000000	0.000000
SW	11	.000230	.000960	.001230	.001030	.000070	0.000000
WSW	12	.000100	.000340	.003150	.001510	0.000000	0.000000
W	13	.000170	.001100	.007880	.003010	.000070	0.000000
WNW	14	.000420	.000550	.003560	.003290	.000550	.000070
NW	15	.000170	.001160	.003840	.003290	0.000000	.000140
NNW	16	.000210	.000680	.004730	.002950	.000070	0.000000

STABILITY CLASS 6

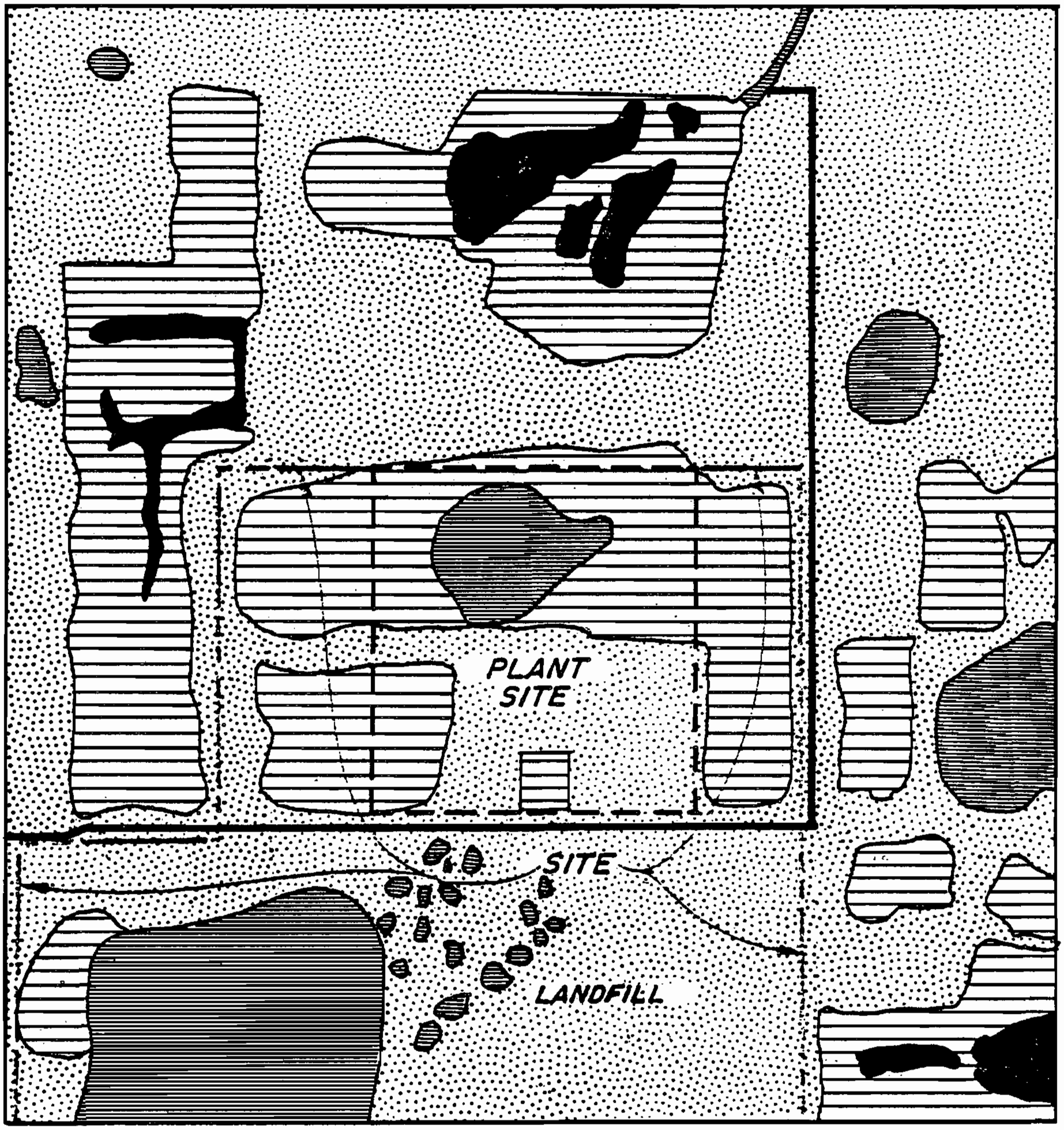
WIND DIRECTION	SECTOR	WIND SPEED CLASS 1	2	3	4	5	6
N	1	.001430	.004040	.001990	0.000000	0.000000	0.000000
NNE	2	.001590	.004250	.001960	0.000000	0.000000	0.000000
NE	3	.002300	.006670	.002260	0.000000	0.000000	0.000000
ENE	4	.003870	.011210	.003150	0.000000	0.000000	0.000000
E	5	.004900	.017100	.004250	0.000000	0.000000	0.000000
ESE	6	.003010	.007420	.001920	0.000000	0.000000	0.000000
SE	7	.002160	.004310	.001870	0.000000	0.000000	0.000000
SSE	8	.001010	.004250	.001140	0.000000	0.000000	0.000000
S	9	.001200	.003450	.000870	0.000000	0.000000	0.000000
SSW	10	.000390	.001440	.000620	0.000000	0.000000	0.000000
SW	11	.000540	.002350	.000460	0.000000	0.000000	0.000000
WSW	12	.000490	.001440	.000550	0.000000	0.000000	0.000000
W	13	.001200	.002370	.001600	0.000000	0.000000	0.000000
WNW	14	.000730	.002490	.001210	0.000000	0.000000	0.000000
NW	15	.001130	.004020	.002260	0.000000	0.000000	0.000000
NNW	16	.001300	.003190	.001420	0.000000	0.000000	0.000000



MAJOR PLANT COMMUNITIES SURROUNDING SITE

FIGURE 2.7.a.

FIGURE 2.7.b.



MAJOR PLANT COMMUNITIES AT THE FACILITY SITE

PINE-FLATWOODS

STANDING WATER (CANALS, LAKES)

WET-WEATHER PONDS AND DITCHES

AREAS CURRENTLY OR PREVIOUSLY DISTURBED BY MAN land, pasturage and light industrial sites. Portions of the facility site, as well as contiguous tracts, have been mechanically disturbed due to landfill operation.

Four distinct plant communities can be found within the study area: the pine flatwoods, wet weather ponds, permanent ponds and disturbed areas.

The pine flatwoods community is the dominant ecosystem and occupies those sites which are slightly more elevated and less disturbed by man than surrounding areas. Generally, the flatwoods are situated on poorly drained, acidic sands of marine origin. An organic hardpan usually underlies the surface at a depth of from 2 to 3 feet rendering these sites poor aquifer rechargers; runoff is directed to adjacent lowlands and wet weather ponds where groundwater interactions are intimate. The South Florida slash pine forms the primary canopy of this woodland community, with scattered specimens of oaks, American holly and persimmon found in better drained locations. The understory is composed primarily of wax myrtle, saw palmetto and gallberry; species of wiregrass and panicgrass flourish on the forest floor. With respect to wildlife, the pine flatwoods offer habitat and forage to a wide variety of animals, among them such important sport species as the bobwhite quail, mourning dove and cottontail rabbit. The disturbed nature of site environs precludes the occurrence of larger mammals in the study area, notably the black bear and white-tailed deer. The terminal trophic level in the study area pine flatwoods is probably occupied by the grey fox and stray dogs. A listing of animals and plants common to the study area is featured in Table 2.7.a.

Surficial outcroppings of the water table aquifer are quite common to lower elevations in the study area, especially during the rainier summer and fall months. At these sites a unique biological community, the wet weather pond, is found. This habitat is a relatively harsh environment for organisms to colonize due to the physiological stresses incurred by the intermittent occurrence of standing water. The vegetation in these areas is composed of several sedges and rushes, with willows and (in semi-disturbed areas) Brazilian pepper trees fringing the littoral. In ponds with maximal duration periods of standing water, cattails and maidencane may be found. The occurrence of animal species, with the exception of a few hardy insects and amphibians is greatly regulated by the presence of water in the pond. For example, during wet periods, large numbers of wading birds (egrets, bittern, etc.) and mammals (raccoon, etc.) frequent these areas to feed and drink; the ubiquitous mosquito fish is also prevalent during such times. In contrast the dry season yields little in the way of species diversity with transient occurrences of pine flatwoods' organisms most common. During dry periods those endemic insects must enter a dormant state until standing water returns; adaptations by vegetation, primarily with respect to root structure and stoma functions, permit continued absorption of soil moisture while suppressing transpirational water losses.

TABLE 2.7.a

PLANTS AND ANIMALS COMMON TO THE STUDY AREA

	Pine Flatwood	Wet Weather Pond	Permanent Ponds	Disturbed Areas	Observed On Site
PLANTS					
South Fla. Slash Pine *Pinus elliottii var. densa*	C	N	N	N	yes
Runner Oak *Quercus pumila*	S	N	N	N	yes
Laurel Oak *Quercus laurifolia*	S	N	N	N	yes
American Holly *Ilex opaca*	S	N	N	N	yes
Persimmon *Diospyros virginiana*	S	N	N	N	yes
Wax Myrtle *Myrica cerifera*	C	N	N	N	yes
Dahoon Holly *Ilex cassine*	S	S	N	N	yes
Gallberry *Ilex glabra*	C	N	N	N	yes
Winged Sumac *Rhus copallina*	S	N	N	N	yes
Coastal Plains Willow *Salix caroliniana*	N	S	C	N	yes
Saw Palmetto *Serenoa repens*	C	S	N	N	yes
Duck Weed *Lemna* spp.	N	N	C	N	yes

C = very common
S = scattered occurrences
N = infrequent or no occurrences

TABLE 2.7.a (cont.)

	Pine Flatwood	Wet Weather Pond	Permanent Ponds	Disturbed Areas	Observed On Site
Poke Berry *Phytolacca americana*	S	N	N	S	yes
Brazilian Pepper *Schinus terebinthifolius*	N	S	S	C	yes
Wiregrass *Aristida stricta*	C	S	N	N	yes
Virginia Creeper *Parthenocissus quinquefolia*	C	N	N	N	yes
Lantana *Lantana involucrata*	N	N	N	C	yes
Panicgrass *Panicum* spp.	S	C	N	S	yes
Johnson Grass *Sorghum halpense*	N	N	N	C	yes
Baccharis *Baccharis* spp.	S	N	N	N	yes
Dog Fennel *Eupatorium* spp.	N	N	N	C	yes
Aster *Aster* spp.	S	N	N	C	yes
Sedges *Carex* spp.	S	C	C	S	yes
Paw Paw *Asimina* spp.	S	N	N	S	yes
Arrowleaf *Sagittaria* spp.	N	S	C	N	yes

C = very common
S = scattered occurrences
N = infrequent or no occurrences

TABLE 2.7.a (cont.)

	Pine Flatwood	Wet Weather Pond	Permanent Ponds	Disturbed Areas	Observed On Site
Cattails Family Typhoceae	N	C	C	N	yes
Rushes *Juncus* spp.	N	C	C	N	yes
Sawgrass *Caladium jamicensus*	N	C	C	N	yes
Maidencane *Panicum* spp.	N	S	C	N	yes
FISHES					
Eastern Mosquito Fish *Gambusia affinis*	N	S	C	N	yes
Sunfish *Lepomis* spp.	N	N	C	N	yes
Gar *Lepisosteus* spp.	N	N	C	N	yes
Black Bass *Micropterus salmoides floridanus*	N	N	C	N	no
Top Minnows *Fundulus* spp.	N	N	C	N	no
AMPHIBIANS					
American Toad *Bufo americanus*	S	S	N	S	no

C = very common
S = scattered occurrences
N = infrequent or no occurrences

TABLE 2.7.a (cont.)

	Pine Flatwood	Wet Weather Pond	Permanent Ponds	Disturbed Areas	Observed On Site
Spring Peeper Hyla crucifer	C	C	S	N	no
Green Tree Frog Hyla cinerea	C	C	S	N	no
REPTILES					
Eastern Diamondback Rattlesnake Crotalus adamanteus	C	S	N	N	yes
Ground Rattlesnake Sistrurus milarius barbouri	C	S	N	N	no
Corn snake Elaphe guttata guttata	C	S	N	S	no
Yellow Rat Snake Elaphe obsoleta quadriuittata	C	S	N	S	no
Gopher Tortoise Gopherus polyphemus	C	N	N	N	yes
Ground Skink Lygoroma laterale	C	S	N	N	yes
American Alligator Alligator mississipiensis	N	N	S	N	no
Green Anole Anolis carolinensis carolinensis	C	S	N	S	no

C = very common
S = scattered occurrences
N = infrequent or no occurrences

TABLE 2.7.a (cont.)

	Pine Flatwood	Wet Weather Pond	Permanent Ponds	Disturbed Areas	Observed On Site
BIRDS					
Mourning Dove *Zenaida macroura*	C	S	N	N	yes
Fish Crow *Corvus ossifragus*	C	S	S	C	yes
Pine Warbler *Dendroica pinus*	C	S	N	N	no
Black Vulture *Coragyps atratus*	S	S	S	S	no
White Eyed Vired *Vireo griseus*	S	S	N	N	no
Bob-White Quail *Colinus virginianus*	C	N	N	N	no
White Ibis *Eudocimus albus*	N	S	S	N	yes
Rufous Sided Towhee *Pipilo erythrophthalmus*	S	S	N	N	yes
Red Winged Blackbird *Agelaius phoeniceus*	N	S	C	N	yes
Mockingbird *Mimus polyglottus*	C	S	N	N	no
Gulls *Larus* spp.	N	S	S	C	yes
Killdeer *Charadrius vociferus*	N	S	S	S	yes

C = very common
S = scattered occurrences
N = infrequent or no occurrences

TABLE 2.7.a (cont.)

	Pine Flatwood	Wet Weather Pond	Permanent Ponds	Disturbed Areas	Observed On Site
Cardinal *Richmondena cardinalis floridana*	C	S	N	N	yes
Blue Jay *Cyanocitta cristata cristata*	C	S	N	N	yes
American Coot *Fulica americana*	N	S	C	N	yes
Florida Gallinule *Gallinula chloropus cachinnans*	N	S	C	N	yes
Purple Gallinule *Porphyrula martinica*	N	S	S	N	no
American Egret *Casmerodius albus egretta*	N	S	S	N	yes
American Bittern *Botaurus lentiginosos*	N	S	S	N	no
MAMMALS					
Field Mouse *Peromyscus floridanus*	C	S	N	S	no
Cotton Rat *Sigmoden hispidus*	C	S	S	S	yes
Cottontail Rabbit *Sylvilagus floridanus*	C	S	N	N	yes
Marsh Rabbit *Sylvilagus palustris*	C	C	S	N	yes

C = very common
S = scattered occurrences
N = infrequent or no occurrences

TABLE 2.7.a (cont.)

	Pine Flatwood	Wet Weather Pond	Permanent Ponds	Disturbed Areas	Observed On Site
Racoon *Procyon lotor*	C	S	S	S	no
Opossum *Didelphs marsupialis*	C	S	N	S	no
Armadillo *Dasypus novemcinctus*	C	S	N	S	yes
Grey Fox *Urocyon cinereoargenteus*	S	S	N	N	no
Southeastern Pocket Gopher *Geomys floridanus*	C	S	N	S	no
Striped Skunk *Mephitis mephitis*	C	S	N	S	no
Short-Tailed Shrew *Blarina brevicauda*	C	S	N	N	no
Bats *Myotis* spp.	S	N	N	N	no

C = very common
S = scattered occurrences
N = infrequent or no occurrences

In many areas within the study area surface excavations for landfilling, quarry operations and drainage have produced permanent ponds, canals, and marshes with sufficient depths so that a perennial water level is maintained. In most cases, due to the highly enriched nature of landfill runoff and leachate, these water bodies are quite eutrophic, thus heavily vegetated. In some areas, notably in perimeter canals, lush growths of duck weed permeate the water column from shore to shore. The littoral zone of larger ponds is almost exclusively composed of emergent plants such as sawgrass, cattails and maidencane. Rushes and sedges often occur in the superlittoral area between high and low water zones. Animals residing in the pond/marsh habitat are those typically associated with such systems in the Florida peninsula. Specifically, wading birds, such as the American egret and bittern, are frequently noted in the littoral zone among cattails and sawgrass; these carnivores also frequent the shallow rush areas in search of snails and frogs. Non-migratory waterfowl, in essence the American coot, are quite abundant in deeper ponds where heavy growths of aquatic weeds prevade. Gallinules, while not as common, could be seen walking on the thick mats of duck weed in search of small fish and insects. While first hand observation of the American alligator was not reported, it is speculated that, given the habitat and food supply found in the large pond one-half mile west of the facility site, the probability of occurrence of this species is quite high; this factor also pertains to other aquatic herpetiforme animals such as the bullfrog, the cottonmouth mocassin and the painted turtle. Based on observations of juvenile sunfish and an adult alligator gar in perimeter canals, it is further conjectured that those fishes typical of eutrophic coastal plain ponds will be found in most permanent study area waters. Indeed, discussions with a local fisherman reveal that hefty black bass have been caught in the large pond located west of the facility site. Mammals which frequent the pond shorelines are the marsh rabbit, the opossum and, most commonly, the raccoon.

Disturbed tracts of land abound in the study area and consist of active landfill sites, quarry pits and abandoned but revegetated dumps. As is typical of such areas in South Florida, the Brazilian pepper and melaleuca trees dominate this altered terrain. Understory, when present (as Brazilian pepper often forms dense thickets, thus inhibiting sunlight penetration), is usually comprised of Johnson grass, poke berry and lantana. While the berries of the Brazilian pepper do attract large numbers of birds, most notably migratory robins, this monospecific habitat is generally considered to be of marginal value with respect to the propogation and sustenance of wildlife. The dominant animals occurring in disturbed areas are typified by raccoons, stray dogs, rats and a large variety of avian scavengers, primarily sea gulls.

2.7.1 Important Species - Several game species of animals are common to the study area; specifically, these are the bob-white quail, the mourning dove, the cottontail rabbit, the large mouth bass and the bluegill sunfish. Incidences of migratory waterfowl in the study area are not reported although there is a distinct possibility of such occurrences.

Except for the fishes and waterfowl, all important game species can be found in the pine flatwoods community. The bob-white quail constructs nests in drier ground locations, such as the base of a tree or fence post; these birds will forage on such flatwood delicacies as palmetto berries and gallberries. The mourning dove nests in pine boughs within the tree canopy; dove also frequent wet weather ponds and roadways, in search of water. The primary food supply for these birds is composed of seeds, small grains and berries. The cottontail rabbit, like the quail, nests on the ground in drier locations. It feeds primarily on grass shoots and other succulent vegetation; however, predation on insects is not uncommon. The large mouth bass, as well as other Centrarchid fishes, are found primarily in the large permanent pond located west of the proposed facility. Migration or colonization by larger specimens into perimeter canals is probably inhibited by water level fluctuations and weed blockages. As is reported from many South Florida systems, the highly productive, eutrophic nature of the ponds and canals yield large populations of bream and bluegill due to abundant food supplies (insects, minnows) and readily available refuges from predation (weeds). This overpopulation, though, severely limits the growth of individual specimens, thus the desirability of these organisms from a sportfishing standpoint is lessened.

Specimens of black bass, on the other hand, reach substantial (greater than 5 pounds) weights; their population, though, is restricted by an abundant yet elusive prey, intraspecific cannabalism and the limited availability of optimum breeding sites.

Within the study area two rare, endangered or threatened species are thought to occur. As previously cited, the threatened American alligator probably inhabits the large study area permanent pond. The wood ibis has also been noted in the general vicinity of the study area and, during the rainy season, could frequent the wet weather ponds. Nevertheless, local nesting or prolonged residency by this endangered bird is not reported.

2.7.2 Abundance of Organisms - The organisms which habitate the pine flatwoods community appear to be present in balanced proportions except for the absence of larger consumers, such as deer and bobcats. The extirpation of such organisms is usually attributed to those man-induced stresses discussed in the next section.

Aquatic communities contain a conventional trophic structure with a relatively stable species fluctuation. The excessive vegetation in certain areas can contribute to untoward conditions, notably algal die-offs and oxygen depletion. This, in many areas, could seriously alter the localized fauna, although recovery from such stresses is generally quite rapid.

Animals and plants invading disturbed areas are very habitat specific and usually number only a few species. The monospecific nature of these disturbed zones makes them very unstable, thus poor habitat for other organisms.

2.7.3 Pre-Existing Stresses - As cited throughout this section, much of the study area has been substantially modified by landfilling and mining activities. Even the large pond, referenced in preceding sections, occurs on an abandoned landfill tract. By this, the highly nutrified nature of surface waters is quite understandable. However, as the health and productivity of that community lie in apparent equilibrium, the capabilities of natural systems to assimilate excessive organic waste loads is amply demonstrated.

Perhaps the most influential factor imparted to study area plant communities is the general lowering of the water table by surface excavations. If the degree of level reduction is small (as is the case for the study area) then the pine flatwoods community would not be as adversely affected as would the wet weather pond system.

Finally, a unique fauna of animals, primarily birds, have developed a trenchant dependence on landfills for a source of food. Indeed, the Toytown landfill (a mile to the east) is a popular study site for ornithologists during Christmas bird surveys.

2.8 Ambient Air

2.8.1 Baseline Data

° General

Analyzing the 1977 and 1978 data, ambient levels are below the Florida Ambient Air Quality Standards. While data obtained during the first four months of 1978 (Table 2.8.1.a) indicate that particulate levels are increasing, this factor is mitigated upon realization that higher levels of air pollution are typically measured during the winter months when air stagnations are common and worse case situations occur. Although 1977 data are not available for comparison, an arithmetic average from June 1977 to April 1978 reveals that all stations are below the annual particulate standard of 60 micrograms per cubic meter.

° Carbon Monoxide

Carbon monoxide is a colorless, odorless gas ultimately produced by incomplete combustion, primarily of carbonaceous compounds. Large amounts of this gas can be fatal, while lesser amounts can produce fatigue, headache, dizziness and general disorientation.

Available data imply that Pinellas County does not have a carbon monoxide problem. The one and eight hour standards were not exceeded in 1976 or 1977 at either of the two monitoring locations. Carbon monoxide levels have remained fairly static,

Table 2.8.1.a

SYNOPSIS OF PINELLAS COUNTY AIR QUALITY DATA

FROM JANUARY 1978 TO APRIL 1978

	Concentration: ug/m^3						
	Nitrogen Dioxide		Sulfur Dioxide		TSP		
Site	24 Hr. Max	2nd Max	24 Hr. Max	2nd Max	24 Hr. Max	2nd Max	AM (Avg.)
Airport	66	42	40	7	66	62	46
Largo	51	31	3	2	86	75	49
Oakhurst	55	48	35	31	80	69	45
Koger	60	58	49	47	94	85	56
Woodlawn	72	55	51	21	112	80	61

although a slight decrease, probably due to better emission control on automobiles, has been noted. A major factor attributing to the low ambient carbon monoxide levels is the County's level topography and strong land-sea breezes which aid in the dispersion of air pollutants.

A synopsis of carbon monoxide levels in Pinellas County is given below:

Florida Ambient Air Quality Standard:

1. Nine (9) parts per million (ppm) - maximum 8 hour concentration not to be exceeded more than once per year.
2. Thirty-five (35) parts per million (ppm) - maximum one hour concentration not to be exceeded more than once per year.

	1 Hour Maximum (ppm)		8 Hour Maximum (ppm)	
	*1976	1977	*1976	1977
Clearwater	13.2	14.0	7.2	5.8
Oakhurst	-	15.5	-	5.7

* Data collection began in July 1976.

° Hydrocarbons

Studies conducted on the health effects of hydrocarbons have not demonstrated direct adverse effects. However, it has been shown that ambient levels of ozone are a direct function of hydrocarbon concentrations. Data correlation experiments have divulged that hydrocarbon concentrations in excess of 240 parts per billion for the 3-hour period from 6:00

to 9:00 a.m. correlate to ozone concentrations of about 100 parts per billion, occurring two to four hours later. Based on these findings, a standard for hydrocarbons (excluding methane) was set at a maximum 3-hour (6 - 9 a.m.) concentration of 240 parts per billion.

A Bendix Model 8201 flame ionization detection instrument measures reactive hydrocarbons (total hydrocarbons minus methane) at the Clearwater site. During 1977, the hydrocarbon standard was exceeded approximately 95% of the time.

° Nitrogen Dioxide

Nitrogen dioxide, a reddish-brown gas, can be produced by high temperature combustion such as the burning of gasoline in an automobile. The State of Florida has an established annual standard for this pollutant of 100 micrograms per cubic meter annual arithmetic mean; however, at the present time, there is not a short term standard for nitrogen dioxide, although 250 micrograms per cubic meter for a 24-hour maximum has been proposed.

A summary of nitrogen dioxide data obtained in Pinellas County is provided below:

Florida Ambient Air Quality Standard

1. 100 micrograms per cubic meter (ug/m^3) annual arithmetic mean.

*Bubbler Data - concentration ug/m^3

	24 Hour Maximum	2nd Maximum	Average
Airport	49	44	32
East Lake	29	25	20
Koger	66	60	37
Largo	53	50	27
Oakhurst	62	56	27
Safety Harbor	53	44	18
Tarpon Springs	32	30	15

* Annual arithmetic mean cannot be computed. Sampling did not begin until June 1977.

Continuous Data - concentration ug/m^3

	1 Hour Maximum	24 Hour Maximum	2nd 24 Hour Maximum
Fencon	132	63	59
East Lake	47	27	16

- Ozone

Ozone, a colorless, pungent gas, can cause coughing, choking, headaches, and severe fatigue. In animal studies, it has been shown to lower the body's resistance to infection. It can damage the leaves of plants, crack rubber, and deteriorate fabrics.

Ozone formation is a photochemical reaction between solar radiation and nitrogen dioxide in the presence of some hydrocarbons. The primary anthropogenic source of hydrocarbons and nitrogen dioxide is the automobile.

Reviewing the available ozone data, Pinellas County has a countywide oxidant problem. During the ozone season (April - October) the Florida Ambient Air Quality Standard has been exceeded many times at each monitoring station. Although the resource recovery facility does emit hydrocarbon (35 tons/year), the overall impact of this facility on ozone production will be insignificant. A recent hydrocarbon emissions inventory has been completed and the total emissions for the County excluding highway mobile sources is 7200 metric tons. Assuming that point sources are responsible for 50 percent of the hydrocarbon emission, the facility will emit approximately 0.2 of a percent of all hydrocarbons in Pinellas County.

In Pinellas County, ozone concentration can be summarized as follows:

Florida Ambient Air Quality Standard

1. 80 parts per billion (ppb) - maximum 1 hour concentration, not to be exceeded more than once per year.

Concentration - PPB

	1 Hour Maximum		2nd Maximum		Number of Hours Exceeded Standard	
	*1976	1977	*1976	1977	*1976	1977
East Lake	-	175	-	125	-	37
Fencon	-	105	-	100	-	25
Koger	69	160	69	150	0	31
Oakhurst	64	135	64	130	0	65
Tarpon Springs	77	120	69	115	0	94

* Sampling began July 1976 and continued through December 1976.

° Sulfur Dioxide

Sulfur dioxide comes primarily from the combustion of sulfur-containing fossil fuels. It is a heavy, pungent, colorless gas that combines easily with water vapor to become sulfurous acid (H_2SO_3). In the presence of atmospheric oxygen, this compound becomes the more corrosive, irritating sulfuric acid (H_2SO_4). Sulfuric acid, a strong oxidizing agent, is destructive to bodily tissues. It destroys lung tissue and also weakens this organ's cleansing and protection mechanisms.

On a county-wide basis, sulfur dioxide concentrations are well below state standards; however, a chronic problem area is noted in northern Pinellas County in the vicinity of Tarpon Springs. Three localized sources, a chemical plant, an asphalt batching unit and a power plant are responsible for this situation.

A synopsis of sulfur dioxide data is featured below:

Florida Ambient Air Quality Standard

1. 60 micrograms per cubic meter (ug/m^3) annual arithmetic mean.
2. 260 micrograms per cubic meter (ug/m^3) - maximum 24-hour concentration, not to be exceeded more than once per year.
3. 1300 micrograms per cubic meter (ug/m^3) - maximum 3-hour concentration, not to be exceeded more than once per year.

Bubbler Data

Concentration - ug/m^3

	24 Hr. Maximum		2nd Maximum		Average		Number of Times Exceeded Standard 24 Hour Standard	
	1976	1977*	1976	1977*	1976	1977*	1976	1977
Airport	-	13	-	5	-	2	-	0
East Lake	-	2	-	0	-		-	0
Koger	41	50	25	45	14	9	0	0
Largo	165	29	13	23	15	4	0	0
Oakhurst	26	62	13	30	6	5	0	0
Safety Harbor	7	21	4	15	3	2	0	0
Tarpon Springs	367	303	286	281	53	42	2	2

Continuous Data

Concentration ug/m^3

	24 Hour Maximum	2nd Maximum	Number of Times Exceeded 24 Hour Standard
Tarpon Springs	720	550	3
	3 Hour Maximum Average	2nd Maximum	Number of Times Exceeded 3 Hour Standard
	1898	1545	4

NOTE: Thermo Electron Model 43 with hydrocarbon cutter was installed at Tarpon Springs July 1, 1977.

* Sampling was resumed June 1977.

- Total Suspended Particulates

Suspended particulate matter is a name for airborne dirt, including airborne solid or liquid bodies smaller than 100 microns.

Particulate matter by itself or in association with other pollutants may irritate the human respiratory tract by mechanical abrasion, similar to the irritation caused by a speck of dirt in the eye. Small particulate matter (less than 10 microns) can penetrate deep into the lungs and destroy lung tissue.

An analysis of data indicates that county-wide TSP levels are moderate. The Safety Harbor site has recorded several high values; however, they are considered biased, as the site is located adjacent to a school being remodeled. Values from the Tarpon Springs site, located in an industrial area, have exceeded the standard once.

A review of the TSP data for Pinellas County is summarized below:

<u>Florida Ambient Air Quality Standard</u>

1. 60 micrograms per cubic meter - annual geometric mean.
2. 150 micrograms per cubic meter - maximum 24-hour concentration, not to be exceeded more than once per year.

TSP

Concentration ug/m^3

	24 Hr. Maximum		2nd Maximum		Average		Number of Times Exceeded Standard	
	1976	1977	1976	1977	1976	1977	1976	1977
Airport	-	73	-	60	-	41	-	0
Koger	72	76	67	69	43	47	0	0
Largo	71	72	69	70	38	41	0	0
Oakhurst	77	74	67	74	40	42	0	0
Safety Harbor	95	201	74	161	41	67	0	3
Tarpon Springs	230	178	155	139	74	69	2	1

2.8.2 Data Source

The air quality data collected by the Pinellas County Department of Environmental Management, Air and Water Quality Division, were utilized to assess baseline ambient air quality conditions.

County monitoring sites which assess the air quality in the vicinity of the proposed facility are: Airport, Koger, Largo, Oakhurst, and Woodlawn (Figure 2.8.2.a). Nitrogen dioxide, sulfur dioxide and particulates are measured once every six days for twenty-four hours at each of the above locations. Federal reference procedures are used for sample collection and analysis. Bubblers have been temperature controlled since June 1977.

With regard to specific methodologies for the previously discussed pollutants (Section 2.8.1), the following statements are offered:

FIGURE 2.8.2.a.

LOCATION OF PROPOSED FACILITY
AND PINELLAS COUNTY AIR QUALITY MONITORS

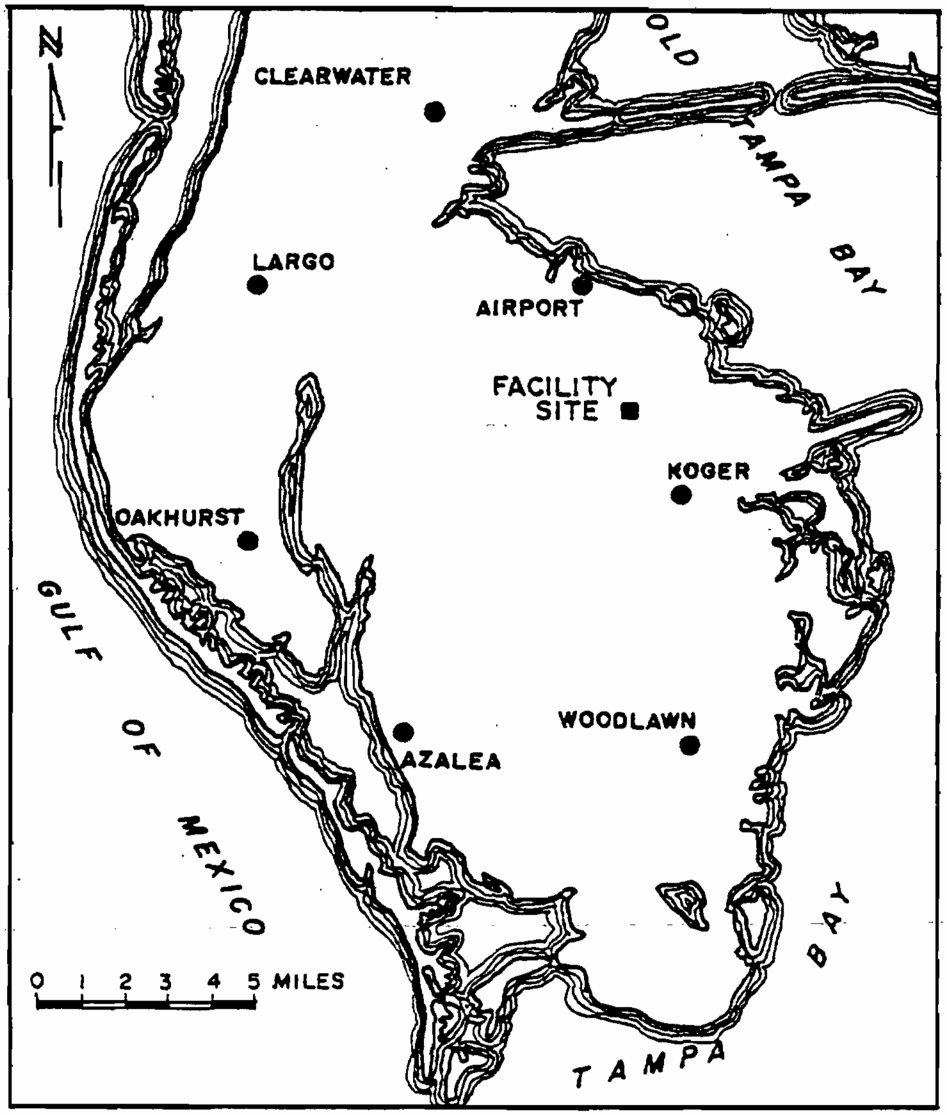


Table 2.8.2.a

SYNOPSIS OF THE PINELLAS COUNTY

AIR QUALITY MONITORING NETWORK

	TSP	SO_2	NO_2	CO	O_3	HC	Wind Speed Direction
1. Tarpon Springs	I	C,I	I	N	C	N	C
2. Safety Harbor	I	I	I	N	N	N	N
3. Clearwater	N	N	N	C	N	C	N
4. Largo	I	I	I	N	N	N	N
5. Koger	I	I	I	N	C	N	C
6. Oakhurst	I	I	I	C	C	N	N
7. East Lake	N	I	C,I	N	C	N	C
8. Fencon	N	N	C	N	C	N	N
9. Airport	I	I	I	N	N	N	N

C = Continuous Instrument

I = Intermittent Samplers

N = Not Monitored

- Carbon monoxide is monitored by an electronic instrument using a technique known as non-dispersive infrared spectrophotometry. In 1977 carbon monoxide was monitored at two sites in Pinellas County. The Clearwater site, which is located near the intersection of Gulf to Bay and U. S. 19, monitors pollution levels at one of the busiest intersections in the county.

- The concentration of nitrogen dioxide in the ambient air is measured by two techniques. One, an electronic analyzer, operates continuously, 24 hours a day, and uses a chemiluminescent principle. The sodium arsenite method is used by intermittent samplers. Intermittent samplers operate once every six days for twenty-four hours. Nitrogen dioxide sampling was initiated in 1977. The downtown Clearwater site (Fencon) measures ambient levels of nitrogen dioxide by the chemiluminescent method. Although this site did not begin operation until April, the trend indicates that downtown Clearwater does not have a nitrogen dioxide problem. The other seven sites which measure nitrogen dioxide also indicate low levels of nitrogen dioxide pollution.

- Ozone concentrations are continuously monitored by the chemiluminescent method. Comparing 1977 data to 1976 data, certain discrepancies are apparent. The only explanations given as to the absence of violations in 1976 are incorrect calibration procedures and general inexperience in ozone monitoring. Calibration methods were changed in April 1977 from the potassium iodide method to gas phase titration.

° Sulfur dioxide is measured by two techniques; intermittent sampling (bubbler) and continuous sampling (electronic instrumentation). Intermittent samplers operate once every six days for twenty-four hours, measuring the sulfur dioxide concentration as dissolved in the bubbler solution. In contrast, the continuous instrument utilizes a method called pulsed fluorescence. Operating twenty-four hours a day and seven days a week, the continuous instrument can provide data for a variety of time periods any day. Sulfur dioxide sampling began July 1976. In January 1977, however, sulfur dioxide sampling was discontinued until temperature control devices could be ordered and installed. During the interim, a quality control program was implemented to give validity to the data collected.

° Total suspended particulate is monitored with a high volume sampler. Particulate sampling did not begin until July 1976. In January 1977 the TSP network was temporarily shut down (it was restarted in April) to implement a quality assurance program. Therefore, both 1976 and 1977 regimens have insufficient particulate data to compute a true annual geometric mean. The column labeled average is an arithmetic mean for existing data in each year.

CHAPTER 3

THE PLANT

3.0 The primary purpose of the facility described in this chapter will be to dispose of municipal solid waste material (as an alternative to conventional landfilling) while recovering certain marketable materials and generating electrical energy. In light of this primary objective, the facility will display many characteristics dissimilar to those of a conventional fossil fuel fired generating facility. To illustrate important aspects of the facility the following process description is presented ahead of the standard sequence of items in this Chapter 3.

The plant is designed to receive and process garbage, rubbish, refuse and other discarded solid or semi-solid materials resulting from domestic, commercial, industrial, agricultural and governmental operations. It will not process solids or dissolved materials in domestic sewage or other significant pollutants in water resources such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows, or other common water pollutants. Pathological, biological and other hazardous wastes will not be processed in the facility. All waste material received at the facility will be burned in the boilers in "as-received" form with the exception of oversized materials which will be sheared into processible size and materials classified as non-processible which will be returned to the county landfill. Non-processible items include the aforementioned waste not to be processed plus non-combustible construction and demolition debris.

Commercial collection and transfer vehicles will enter the facility site along the northern boundary of the property. Private citizens wishing to use the facility will enter the site along a parallel road which will be separated from the roadway used by the larger collection and transfer vehicles. There will be a private citizen dumping area provided (see Figure 3.1.a) where any private citizen can dump refuse into transfer trailers which in turn will be hauled over the scales and into the tipping area by plant personnel. This will eliminate potential hazards resulting from having private automobiles maneuvering with the large vehicles using the facility.

Two 60-ton capacity, 10 feet by 60 feet platform, electronic truck scales will be provided to weigh the incoming waste trucks. A pre-punched card for each truck will be stored in the scale house. The card will have a truck number, district or other source, tare weight, and other pertinent information.

Upon arrival at the scale, one of two scalesmen will remove the truck's card from a rack, insert it into the scale mechanism, and press the weigh button. In just a few seconds the truck will be weighed and a ticket will be printed showing truck number, source, time, gross tare and net weight, date and time. This ticket will be given to the driver. Simultaneously, the same information will be printed on a ledger in the office. The equipment will be suitable for producing punched tape, punched cards, or other hard copy data processing material.

The scale operators will direct the incoming load of material to the resource recovery facility (or to the county landfill operation in the case where non-processibles are delivered).

The trucks directed to the resource recovery facility will proceed directly to an enclosed tipping floor and will discharge the refuse material at one of twelve (12) tipping bays into the refuse storage pit.

The volumetric capacity of the pit, using mounded storage configuration, is approximately 22,000 cubic yards or 7,700 tons of solid waste. This provides sufficient storage for three to four days of all incoming material.

Two overhead cranes will lift the material from the pit to the charging hopper of the boiler. The operator will mix and sort the pit material as required to provide the best possible fuel mixture in the boiler. Non-processible material that inadvertently is delivered to the pit will be removed by the crane for alternate disposal.

The combustion, steam generation and electrical generation processes are described in detail in Sections 3.1 through 3.10 below.

Since a major objective of the facility is to recover certain marketable materials from the waste stream, the residue leaving the boiler is processed in a manner uncommon to normal fossil fuel electrical generating practices. A schematic diagram of the materials recovery system is shown in Figure 3.0.a.

Combustion residue initially falls into a vibrating conveyor from the ash discharger. A grizzly screen is located so as to keep most massive (over 10" x 10") pieces from damaging the conveyor. These massive pieces are hand-picked for metals; non-metallics are landfilled (residues).

Upon entering the materials recovery building, the residue is sized at the end of the primary residue conveyor. First, the -2" material drops out, then the -10" + 2" fraction, leaving any remaining +10" objects which the grizzly screen may have missed. The massive pieces are handled as above.

Prior to the initial sizing operation, a diverter chute has been provided so that repairs can be effected downstream while the combustion units continue to operate normally.

The -10" + 2" residue falls from the primary residue conveyor to another vibrating conveyor. This fraction, primarily tin cans, is conveyed to a magnetic separator which removes the ferrous metal and deposits it on a belt conveyor. This ferrous metal is then transported to a storage/shipping/further processing as required. The -2" residue from the primary residue conveyor falls to another vibrating conveyor which moves the residue to a second sizing operation. At this point, the fine residue/ash is removed, combined with moistened electrostatic precipitator flyash and belt conveyed further downstream.

The remainder of the -2" residue moves via another vibrating conveyor to a magnetic separator, which removes the miscellaneous small ferrous metal to a belt conveyor for transporting to storage/shipping.

The non-magnetic material next travels by belt conveyor to a size reduction unit which breaks up the friable materials. From size reduction, the stream moves to a sizing operation which removes the larger metallics from the shattered friables and undersize metallics.

The larger metallics are elevated by bucket elevator to a heavy media unit. This heavy media system uses a ferrofluid to achieve an effective specific gravity of 3.0 or more. Under these conditions, the aluminum present floats, while the heavy nonferrous metals sink. Both fractions are recovered as clean products and move by belt conveyor to storage/shipping.

The undersize from the sizing operation proceeds by belt conveyor to a mineral jig which serves to segregate the heavy non-ferrous metals from the aluminum-aggregate fraction. This jig also produces a fine aggregate product which is dewatered and mixed with the fine residue/flyash stream. After dewatering, the heavy nonferrous jig product moves by belt conveyor so as to combine with the heavy nonferrous from the heavy media system.

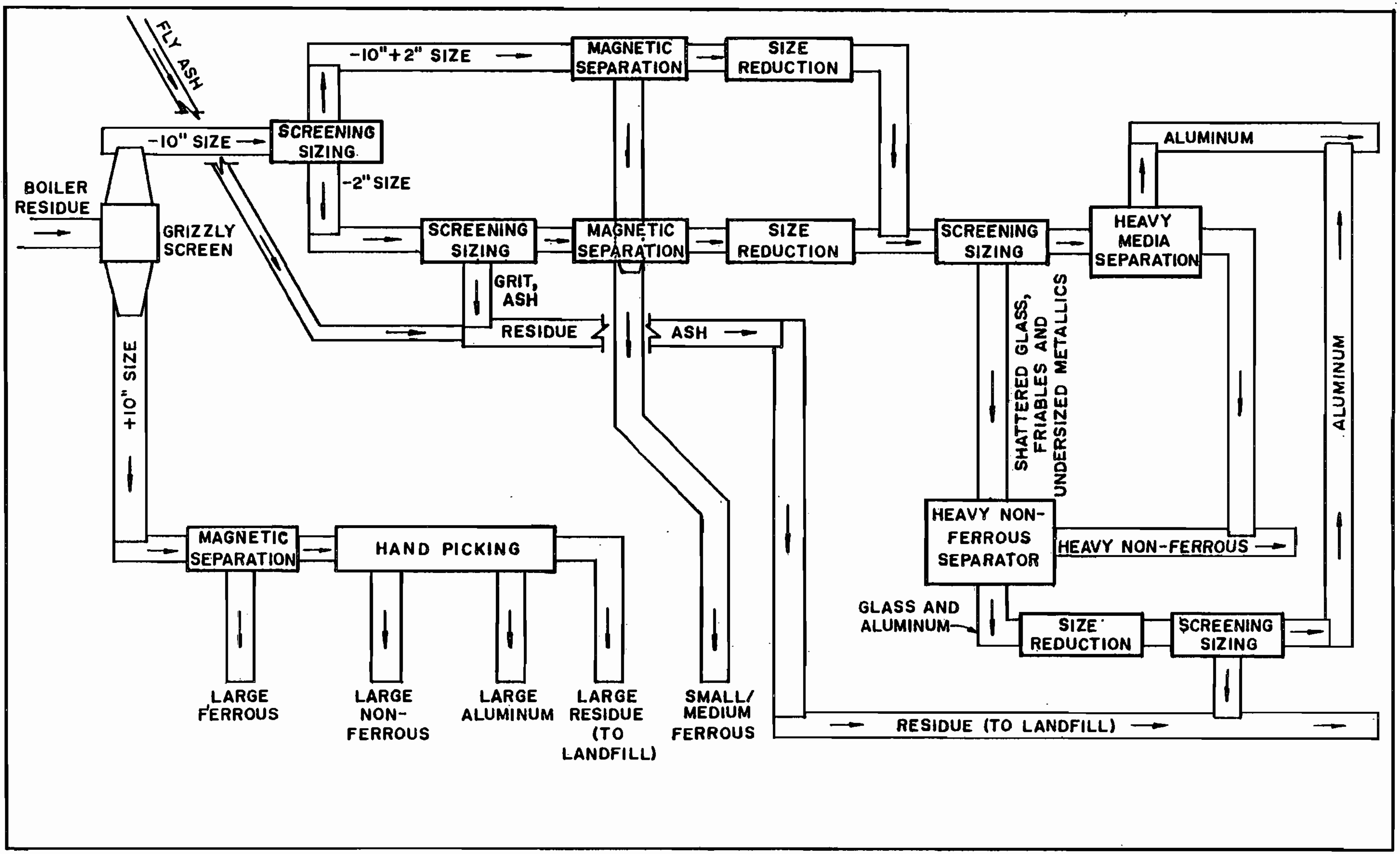


FIGURE 3.0.a.

MATERIALS RECOVERY SCHEMATIC

The glass and remaining recoverable aluminum are also dewatered and then belt conveyed to a size reduction unit which crushes the friable glass, ceramic, etc. The aluminum tends to flatten into flakes during this operation.

A belt conveyor takes the crushed and flattened material to a final sizing step, where the aluminum is recovered and moves by belt conveyor to storage/shipping/further processing. The undersize falls to the aggregate belt conveyor where it combines with the fine aggregate, fine residue and flyash previously produced. This material is suitable for use as the aggregate portion of asphalt.

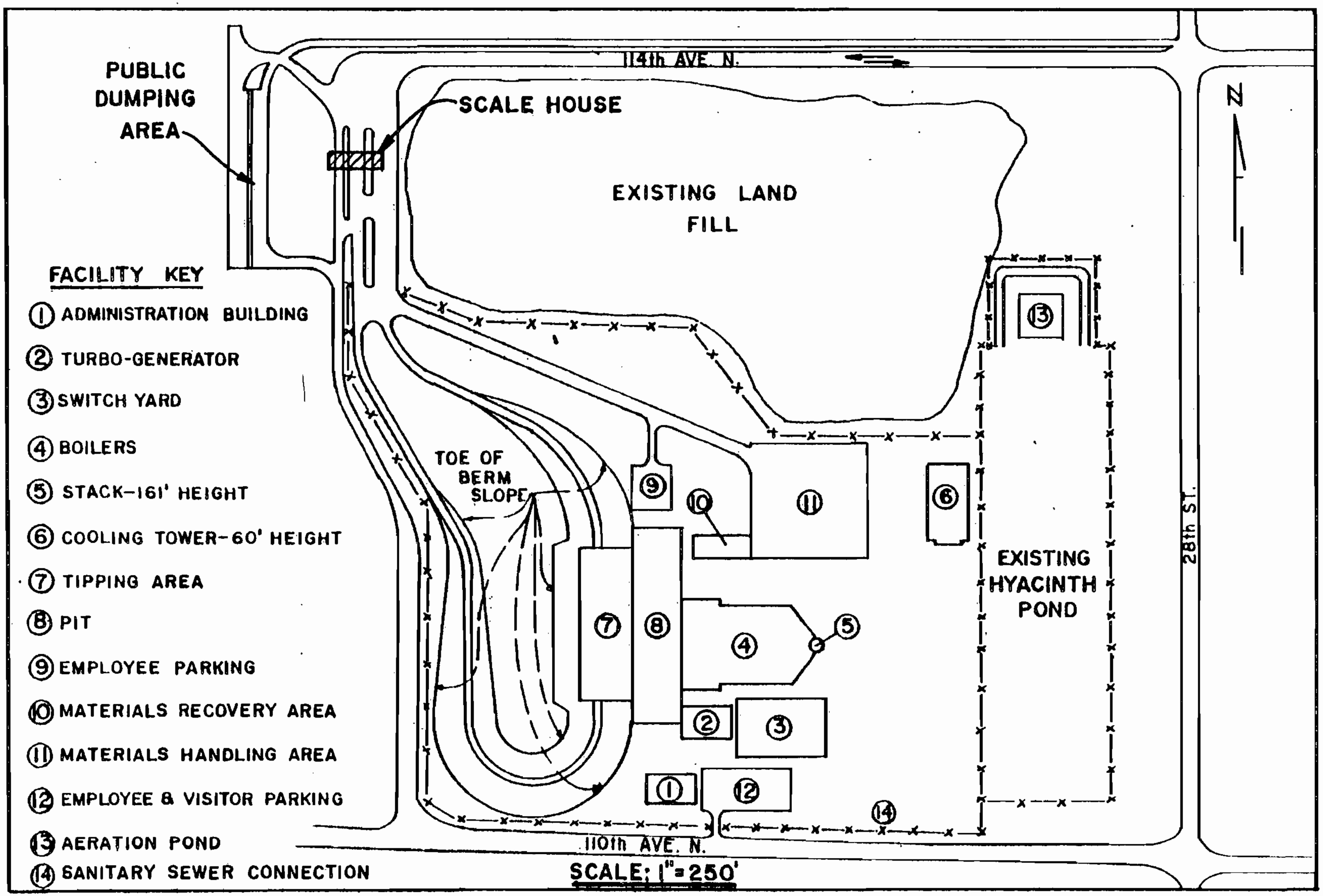
The materials handling system is adaptable to the addition of recovery equipment for other materials, such as glass, as market demands make such measures economically viable.

3.1 External Appearance

Figure 3.1.a shows the general layout of the facility at the site and indicates the locations where liquid and gaseous waste leave the plant site perimeter.

An artist's rendition of the exterior appearance of the resource recovery plant is presented in Figure 3.1.b. The buildings will consist of steel framed structures providing required clear spans for efficient function of the processes. The facade of the structures will have prefabricated modular siding capable of providing a pleasing aesthetic effect.

Roofing systems will be constructed of components that will insulate the roof deck, span the structural elements, and



PLANT SITE LAYOUT

FIGURE 3.1.a

PINELLAS COUNTY RESOURCE RECOVERY PLANT

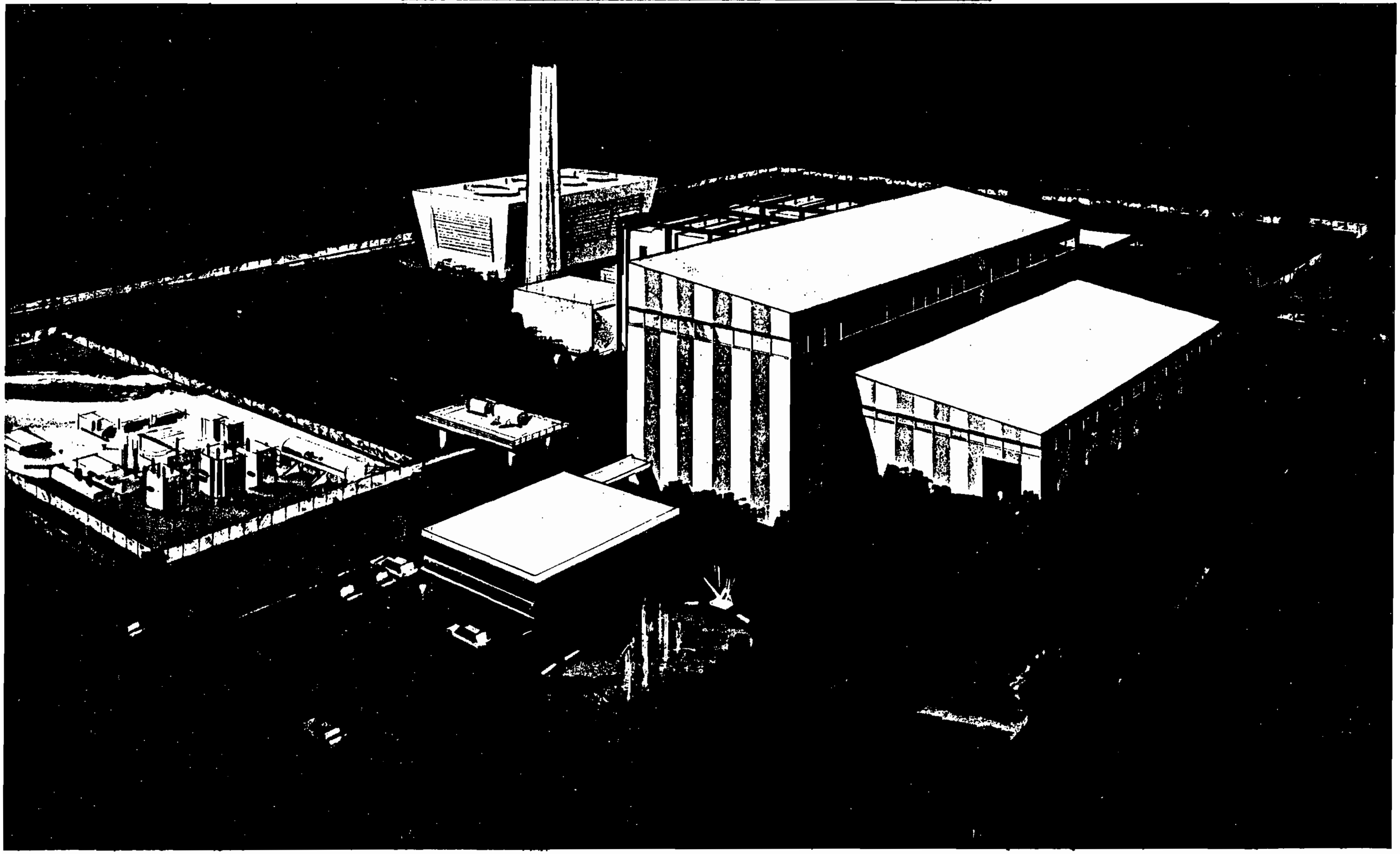


FIGURE 3.I.b.

provide a weathertight surface. Concrete floor surfaces will be sealed and hardened to permit proper maintenance and operation in each process area.

Plant offices and employee areas will be the standard materials used for such construction.

3.2 Fuel

The generating plant will use municipal solid waste for fuel as discussed in the introduction remarks (Section 3.0). No provision is made for auxiliary fuel. However, the plant could be modified to burn alternate refuse material (sawdust, bark, paper, etc.) or coal, if found necessary in the future.

Table 3.2.a shows the characteristics of solid waste as used in the design criteria. Table 3.2.b shows the design analysis of the residue as discharged from the boiler.

UOP (the contractor) has designed the resource recovery facility to guarantee a capacity of 14,000 tons of solid waste per week. The boiler design is the limiting factor although a balanced design concept has been used throughout the facility to match all portions at this design size. Listed below are the projected quantities of solid waste for Pinellas County for three of the project years:

Year	Quantity (Tons
1980	592,690
1990	676,455
2000	776,400

TABLE 3.2.a

DESIGN SPECIFICATION OF
PINELLAS COUNTY RESOURCE RECOVERY

ANALYSIS (WET BASIS) %	
Carbon	27.03
Hydrogen	3.67
Nitrogen	.21
Sulphur	.14
Chlorine	.16
Oxygen	20.29
Ash	18.5
Water	30.0
BTU per pound (dry)	7143
BTU per pound (as fired)	5000

TABLE 3.2.b

ANTICIPATED ANALYSIS OF
BOILER DISCHARGE MATERIAL

	% BY WEIGHT (WET)
Metals	34.5
Glass, Ceramics	37.65
Stone and Dirt	
Ash	9.69
Unburned Carbon	3.15
Moisture	15

These estimated quantities are based on the 1977 population projections for the three project years and a 4 lbs/capita/day waste generation rate. The facility was sized to accommodate the current and future solid waste needs for the county, with accommodations for peak periods.

The projection of solid waste is highly speculative and any deviations in the projections stated above will be tracked closely. If and when solid wastes are available in such quantities to justify expansion, the plant boiler capabilities will be expanded in a prudent fashion.

The solid waste material will be delivered to the facility by packer trucks or transfer vehicle as are presently employed in waste handling practice.

The fuel will be stored in the refuse storage pit as mentioned in Section 3.0 above. The design size for pit storage is based upon historic availability of refuse burning equipment and the relative difficulty of storing wastes for extended periods of time.

The quality of the fuel was presented in Table 3.2.a.

The County has by law the right to dispose of or have disposed of all of the solid waste within the boundaries of the county. The design tonnage capacity of the facility closely approximates the guaranteed tonnages (with peaking factors) which the County can be assured of being delivered in the immediate future (reference Chapter 1 for further discussion of this matter).

3.3 Plant Water Use

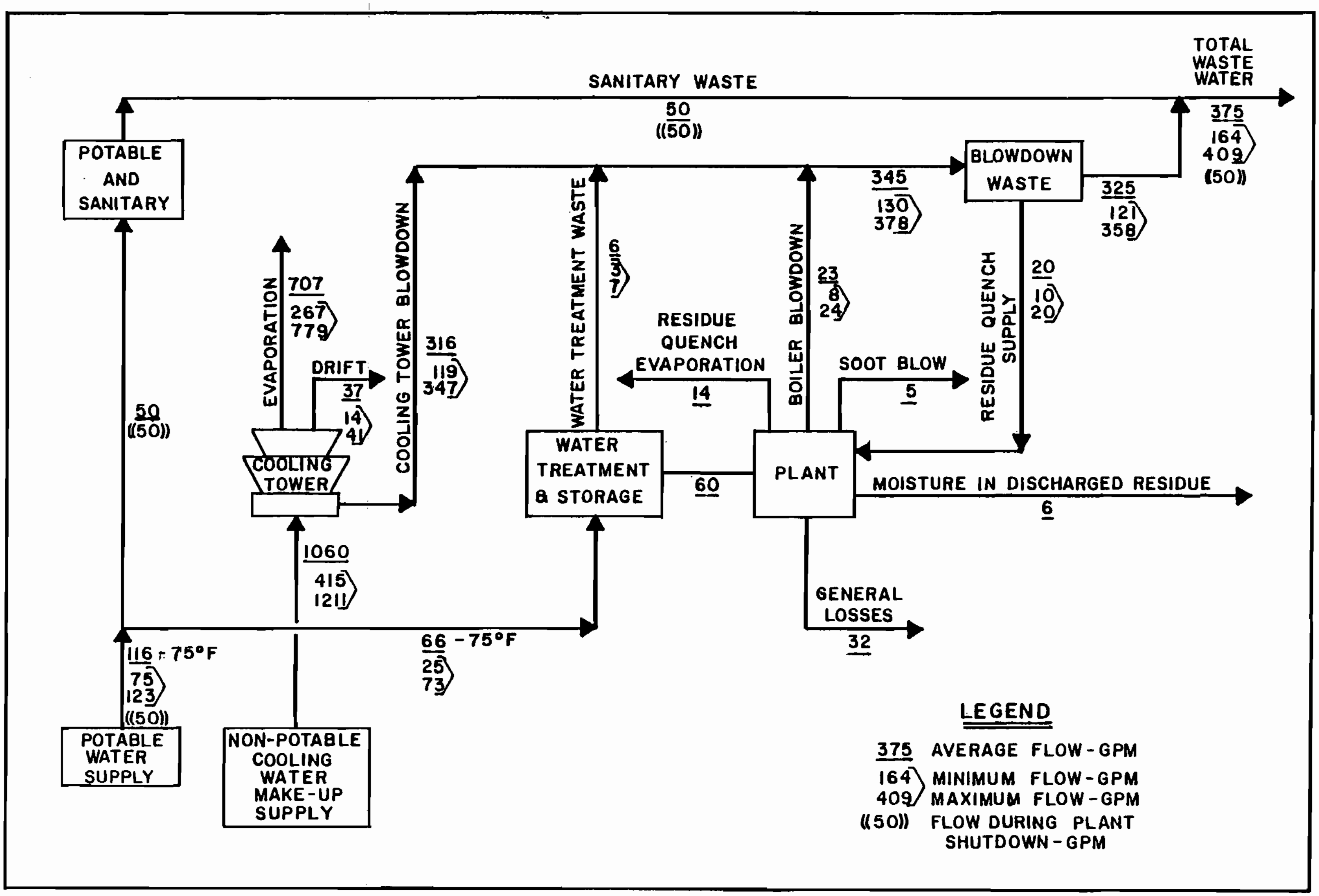
Figure 3.3.a presents the design water use rates for normal and peak load operation of the facility. Heat dissipation, sanitary, chemical waste and process water systems are shown. Also shown are the sources of water for various supply sources. Flows which will occur during a plant shutdown are shown in double parentheses on Figure 3.3.a.

3.4 Heat Dissipation System

The electric generating portion of the resource recovery facility will use water cooled condensers to condense the low pressure steam discharged from the turbine. The cooling water will circulate at a rate of approximately 37,500 gpm and will leave the condenser at approximately 110°F. The cooling water will pass through a wet mechanical draft cross-flow cooling tower for the dissipation of the waste heat. Presented in Figure 3.4.a is a flow diagram of the circulating water using the cooling tower system. The design outlet temperature of the tower is 86°F with an ambient wet bulb temperature of 79°F. The cooling tower system will dissipate 450 million BTU/hr at the normal operating rate. A typical analysis of the cooling tower supply water is presented in Table 3.4.2.a.

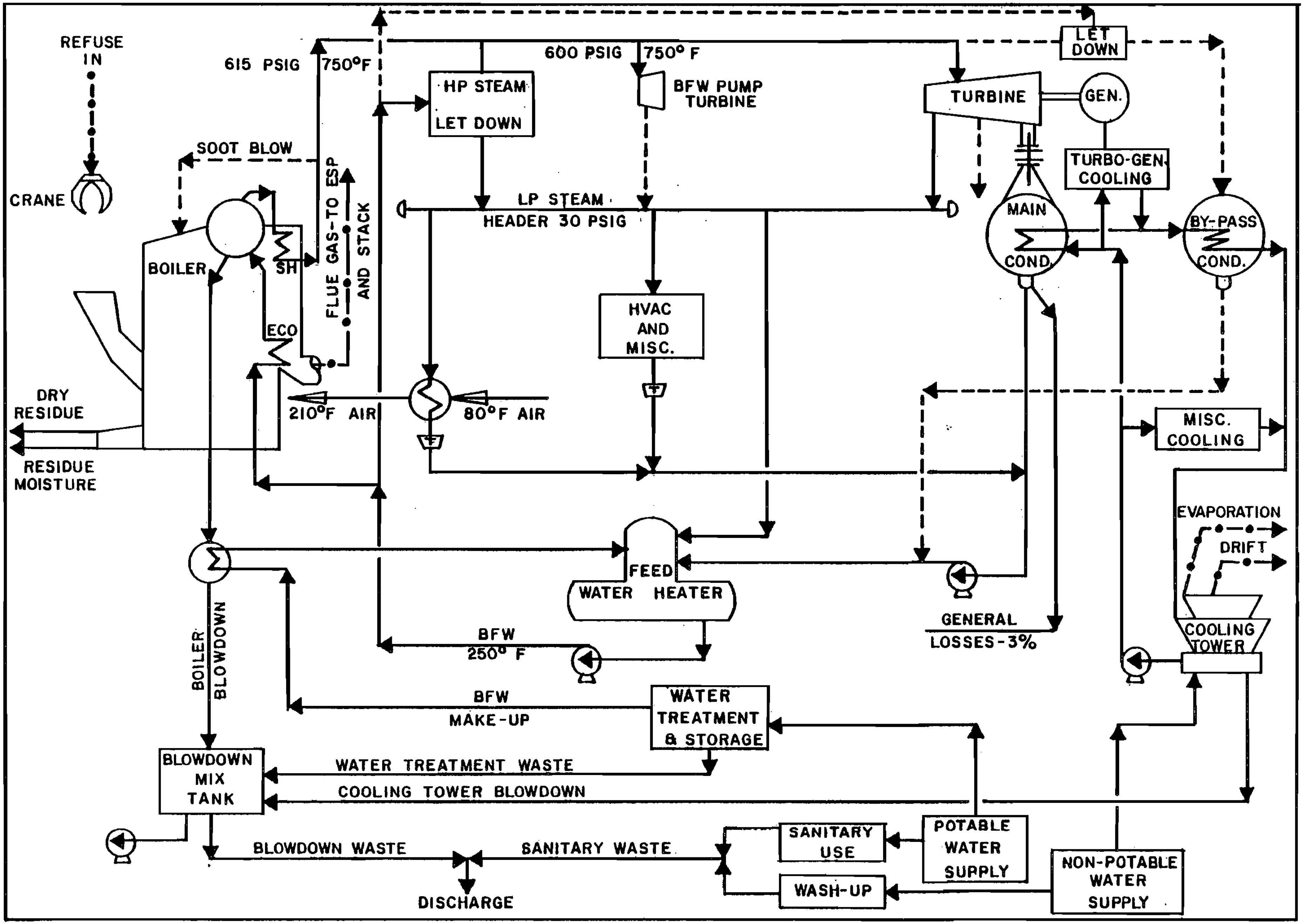
3.4.1 Intake and Outfall

Since the supply and discharge points for the facility are "hard-connected" to existing facilities as shown in Figures 3.1.a and 3.9.a, no intake or outfall exists in the normal sense.



SUMMARY WATER FLOW DIAGRAM

FIGURE 3.3.a.



WATER USAGE FLOW DIAGRAM

FIGURE 3.4.a.

TABLE 3.4.2.a

CHEMICAL CHARACTERISTICS OF FACILITY COOLING WATER INFLUENT[1]

Chemical Constituent	Potable Supply Pinellas County	Non-Potable Supply 1 (St. Petersburg NE STP)	Non-Potable Supply 2 (Largo STP)
pH	7.7	7.0	7.1
Total hardness as ppm $CaCO_3$	124	412	248
Calcium hardness as ppm $CaCO_3$	108	282	232
Total Alkalinity as ppm $CaCO_3$	90	240	252
P-Alkalinity as ppm $CaCO_3$	0	0	0
OH-Alkalinity as ppm $CACO_3$	0	0	0
Total dissolved solids, ppm	20	1350	685
Suspended solids, ppm	10	30	7
Conductivity, micromhos/cm	268	2390	938
Calcium, ppm Ca	43	113	93
Magnesium, ppm Mg	4	32	4
Ferric iron, ppm Fe	$<.05$	.29	.11
Bicarbonate, ppm HCO_3	110	293	307
Carbonate, ppm CO_3	0	0	0
Sulfate, ppm SO_4	0	65	50
Chloride, ppm Cl	26	528	106
Silica, ppm SiO_2	16	20	21
Aluminum, ppm Al	$<.1$	$<.1$	$<.1$
Zinc, ppm Zn	.05	.06	.12
Ortho phosphate, ppm PO_4	0	4	9

[1] Based on most recent water analysis reports from each treatment plant

A future alternative source of cooling water, stormwater runoff from the resource recovery site, is being considered. In this case, however, stormwater runoff will be used as evaporative make-up to the cooling towers and no discharge will take place.

3.4.2 Source of Cooling Water

Cooling tower make-up water will be obtained from (1) the City of St. Petersburg tertiary treatment plant effluent system, (2) the City of Largo sewage effluent (treated to land disposal quality) and (3) an optional source contemplated in stormwater runoff from the resource recovery site. Quantities available from (1) and (2) are sufficient to supply the requirements individually. The St. Petersburg supply will be the primary source with the Largo system as a back-up supply. Stormwater runoff will only be utilized for a portion of the make-up (due to insufficient volumes) if this source is utilized. Characteristics of the St. Petersburg and Largo supplies are shown on Table 3.4.2.a. Figure 3.3.a presents the quantities and temperatures (potable only) of sources of supply water.

3.4.3 System Design

The cooling system has been designed with capacity to condense the exhausted steam from the turbine when operating at the full steam rate of both boilers. In the event that the turbo-generator equipment is not in operation, a separate, high pressure, bypass condenser is provided to condense the steam from one boiler. The cooling tower system will also have capacity to provide for this contingency. This bypass condenser will provide refuse disposal and materials recovery capability at 50% design rate of the facility when electrical generation is not possible. The design rate of heat dissipation for the facility is 450,000,000 BTU/hour or 37,500 tons of cooling.

The quantities of water withdrawn from sources of supply are shown in Figure 3.3.a. The average potable withdrawal is 116 gpm (maximum = 123 gpm and minimum = 75 gpm). The average non-potable withdrawal is 1060 gpm (maximum = 1211 gpm and minimum = 415 gpm).

The consumptive useage rate for the system is shown in Figure 3.3.a. The consumptive use of water by the facility is in the form of cooling tower losses. Cooling tower losses are in the form of evaporation and drift. The average evaporative loss will be 707 gpm (minimum = 267 gpm and maximum = 779 gpm) and the average drift loss will be 37 gpm (minimum = 14 gpm and maximun = 41 gpm).

The location of the cooling towers is shown on the facility layout (Figure 3.1.a). The cooling tower system will consist of a four (4) cell group of Class 600 Marley cross flow towers or approved substitutes. The average blow down rate for the towers is 316 gpm (minimum = 119 gpm and maximum = 347 gpm). The cooling tower blow down will accumulate along with the boiler dimineralization back flush water (average flow 6 gpm, minimum = 3 gpm, maximum = 7 gpm) and the boiler blow down water (average flow 23 gpm, minimum = 8 gpm, maximum = 24 gpm) for a total process blow down average flow of 345 gpm (minimum = 130 gpm, maximum = 378 gpm). The water that is used to quench the residue discharged from the boiler grates will be drawn from the process blow down cumulative flow. The remaining average process discharge rate will be 325 gpm as shown on Figure 3.3.a. Minimum and maximum process flows are 121 gpm and 358 gpm, respectively. Sanitary flow discharge at a rate of 50 gpm will be added to the process flow discharge for an average total discharge of 375 gpm (minimum = 164 gpm, maximum = 409 gpm).

The physical and chemical characteristics of the water in the cooling system as well as potable water supplies are presented in Table 3.4.2.a.

The cooling water increases in temperature by 24°F from 86°F to 110°F in the process of condensing the exhaust steam from the turbine. The water is then cooled by evaporation in the cooling tower. The flow rate through the cooling tower is 37,500 gpm and the evaporation rate from the tower will average 707 gpm or approximately 1.9% of the circulation rate. No intake structure is anticipated at this time since the cooling water will be drawn from a pressurized main which carries non-potable water and the potable water supply will also be drawn from a pressurized main. The maximum temperature of water at the facility boundary POD is 92°F. This plant effluent will be pumped to the Pinellas Park lift station shown on Figure 3.9.a; from there it will enter the Pinellas

County sewage treatment system. After transporting and mixing with existing flows, very little elevation in temperature will remain.

3.4.4 Dilution System

No dilution of the effluent will be required prior to the discharge to the municipal sewage treatment facility. Provision will be made within the facility to adjust the pH of the effluent as required prior to discharge. A stabilizing tank will hold water prior to discharge to assure that no instantaneous "spikes" in the pH level occur of the discharge effluent.

3.4.5 Blowdown and Trash Disposal

Blowdown will occur at the boilers, the cooling towers and the demineralizers as described in Section 3.4.3 above. This cumulative flow,less than 20 gpm,to the residue quench is discharged after neutralization and stabilization to the municipal sewage treatment plant. The characteristics of this cumulative blowdown flow which will be transported to the sanitary sewer system are shown in Tables 3.4.5.a and 3.4.5.b.

3.4.6 Injection Wells

No injection wells are proposed for this project.

3.5 Chemical and Biocide Waste

Both anti-corrosion and anti-fouling agents will be used in the facility in the boilers and in the cooling towers. These are listed below:

TABLE 3.4.5.a

HYPOTHETICAL ION CONCENTRATION IN BLOWDOWN WASTE STREAMS, PPM

I. Demineralizer Blowdown
II. Boiler Blowdown
III. Cooling Tower Blowdown

Chemical Constituents	I	II	III
Calcium as $CaCO_3$	2294	0	210
Magnesium as $CaCO_3$	274	0	90
Iron as $CaCO_3$		0	2
Sodium as $CaCO_3$	1609	6	2004
TOTAL CATIONS	4177	6	2306
Bicarbonate as $CaCO_3$	2465	0	150
Carbonate as $CaCO_3$	0	0	0
Hydroxide as $CaCO_3$	993	6	0
Sulfate as $CaCO_3$	34	0	447
Chloride as $CaCO_3$	377	0	1542
Fluoride as $CaCO_3$	-	0	6
Nitrate as $CaCO_3$	-	0	102
Phosphate as $CaCO_3$	-	0	54
TOTAL ANIONS	3870	6	2310
pH	7	10	8.0
Silica as $CaCO_3$			
TDS as $CaCO_3$	~4000	~1000[A]	~2400[B]

Chemical additions to treated water included in blowdown.

1. Demineralizer Blowdown-approx. 68 lb. NaOH to neutralize.
2. Boiler Blowdown-Sodium di- and tri-phosphates to establish a hexametophosphate residual of -18 ppm and hydrazine.
3. Cooling Tower Blowdown-approx. 185 lb/day 66° BeH_2SO_4 to reduce alkalinity; approx. residuals of 100 ppm of scale inhibitor and a dispersant.

[A] Assume 18 ppm sodium hexametaphosphate in BFW
18 ppm x 50 cycles of concentration = 900 ppm added to TDS

[B] Add approx. 100 ppm for scale inhibitor and dispersant.

SOURCE: UOP, Inc.

TABLE 3.4.5.b

CHARACTERISTICS OF BLOWDOWN MIXTURE

I. Demineralizer Blowdown
II. Boiler Blowdown
III. Cooling Tower Blowdown
IV. Sum of I, II and III
V. Estimated Concentrations in Mixture

Chemical Constituents	I lbs/day	II lbs/day	III lbs/day	IV lbs/day	V ppm
Calcium, as $CaCO_3$	135	0	218	353	243
Magnesium as $CaCO_3$	16	0	93	109	75
Iron as $CaCO_3$	< .1	0	2	2	1
Sodium as $CaCO_3$	95	1	2082	2178	1500
TOTAL CATIONS	246	1	2395	2642	1818
Bicarbonate as $CaCO_3$	146	0	156	302	208
Hydroxide as $CaCO_3$	58	1	0	59	41
Sulfate as $CaCO_3$	2	0	464	466	321
Chloride as $CaCO_3$	22	0	1602	1624	1118
Fluoride as $CaCO_3$	< 1	0	6	7	5
Nitrate as $CaCO_3$	-	0	106	106	73
Phosphate as $CaCO_3$	-	0	56	56	38
TOTAL ANIONS	229	1	2390	2620	1803
pH	7.0	10.0	8.0	7.9	7.9
TDS	~240	~216	~2480	~2937	~2021

SOURCE: UOP, Inc.

a. Corrosion Inhibitors

(1) Boiler

- Hydrazine-oxygen scavenger.
  Concentration in the boiler will be maintained at 1.5 ppm.

(2) Cooling Tower

- Non-polluting polysilicate/organic polymer-based corrosion inhibitors plus scale and foulant control (Zimmite ZD-300 series or equivalent) (or chemicals under b).

b. Chemical and Biological Anti-fouling Agent

(1) Boiler

- Deposition and caustic corrosion control - sodium Di- and Tri-Phosphates 10 ppm.

(2) Cooling Tower

- Scale and corrosion inhibitor and dispersant-polyester (Nalco 7350,7351 or equivalent)
- Biocide - Chlorine may be added on an intermittent basis.

Treatment of blowdowns of these two water systems will be limited to neutralization and stabilization as described in Section 3.4.4 above.

3.6 Sanitary and Other Waste Systems

3.6.1 Volumes and Qualities

With 52 employees plus visitors, the anticipated level of sanitary waste will be 3000 gpd. The concentration of material in this sanitary waste will closely approximate that of domestic sanitary waste.

3.6.2 Treatment and Disposal

Sanitary wastes generated by the lavatory and shower facilities used by plant employees and visitors will be transported by pipe along with the blowdown wastes to the Pinellas Park lift station (which is connected to the Pinellas County treatment system). No on-site treatment of the sanitary waste will be performed.

3.6.3 Solid Wastes

The facility will generate 11,130 tons per year of unusable residue (at guaranteed level of 530,000 tons per year at 2.1 percent residue) from the materials handling facility. This material along with a small amount of unusable and incombustable waste from the plant will be trucked to the sanitary landfill for disposal by burial. The composition of the residue is anticipated to be the following (wet basis):

Constituent	% by Weight
Metals	7
Glass, ceramics	54
Stone and sand	
Ash	14
Unburned Carbon	4
Moisture	21

Additional information on the disposal of this residue is presented in Section 3.10 and Appendix D.

3.7 Air Emissions

3.7.1 Sources

The air emissions sources from the resource recovery facility are the two (2) refuse fuel fired boilers. Combustion of the refuse fuel will result in emissions of particulate matter and sulfur dioxide. The two applicable emission-limiting regulations are as follows:

1. Florida Administrative Code Chapter 17-2.04(6)(a)1
   a. Particulate matter - 0.08 grains per standard cubic foot dry gas corrected to 50 percent excess air.
   b. Odor - There shall be no objectionable odor.
2. 40 CFR Part 60

   60.52 - Standard for particulate matter. No gas discharged which exceeds 0.18 grains per dry standard cubic meter (= .08 gr/dscf) corrected to 12% CO_2.

To meet or exceed this limit of particulate emission a three field electrostatic precipitator will be utilized. The anticipated emissions characteristic from the facility using the three field electrostatic precipitator are displayed in Table 4 in Appendix A..

3.7.2 Stack and Unit Sizes

There will be one (1) stack located as shown in Figure 3.1.a. The internal diameter of the 9'-0" stack is constant from bottom to top. This dimension is 2.74 m and the height above the ground is 161 feet (49.07 m).

There will be two (2) boilers rated at 1050 tons per day at a nominal 5000 BTU per pound higher heating value of the refuse fuel. A single 50 megawatt generator will be utilized. The maximum sustained heat rate is 18,000,000 BTU/MWH.

3.7.3 Emission Rate

The data on gas volume, velocities, total mass flow, chemical composition and stack gas exit temperature is presented in Appendix A (presentation of operational impacts on air quality).

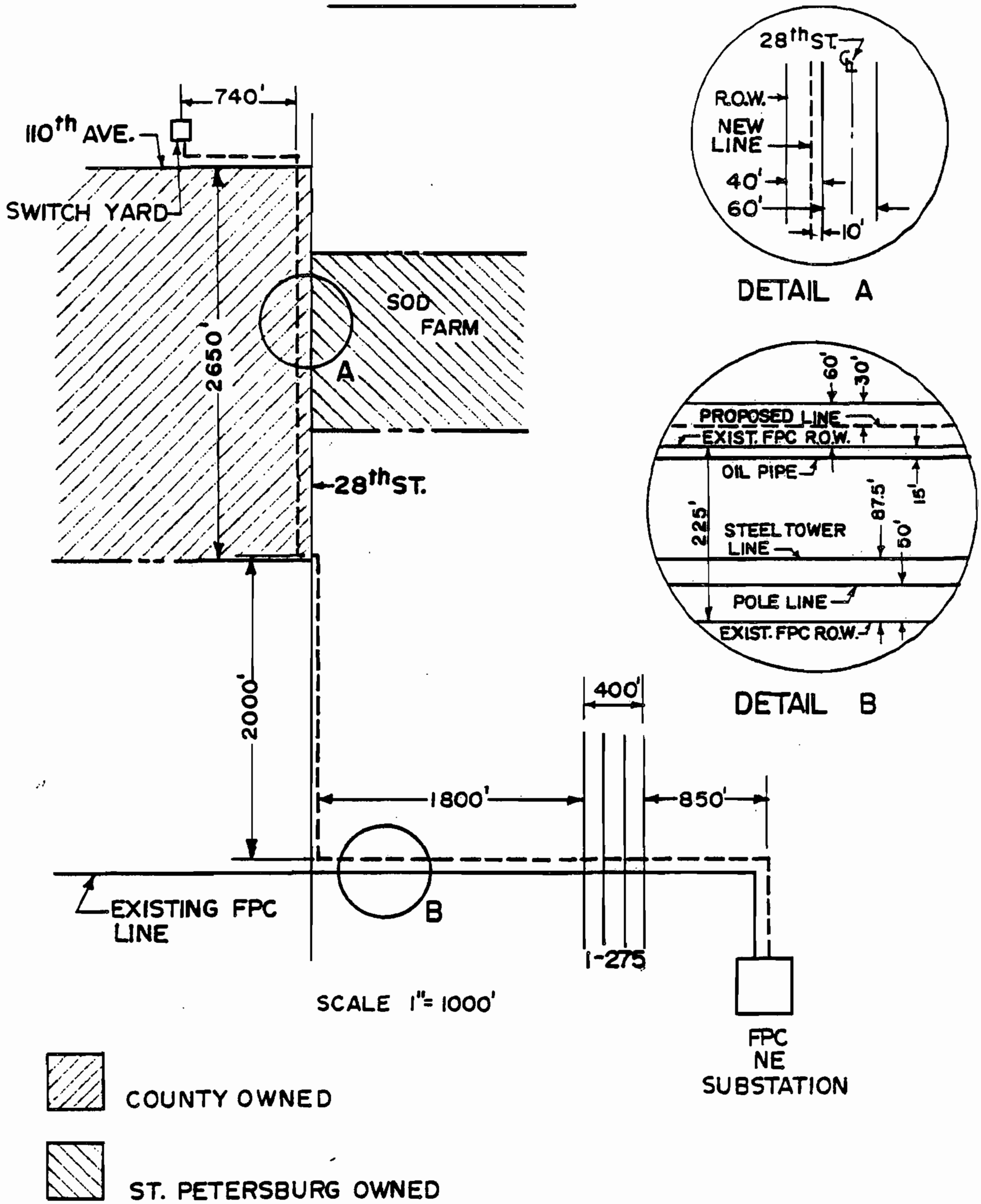
3.8 Directly Associated Transmission Lines

3.8.1 Route and Size

The proposed 230 KV transmission line will link the switchyard at the resource recovery plant with Florida Power Corporation's Northeast Substation; this latter facility lies approximately 1.25 miles southeast of plant site. Figure 3.8.1.a features the anticipated routing of this transmission line and details the alignment of the power line right of way with 28th Street and the existing FPC facilities.

The tubular steel towers will be of vee type "C" design with appropriate distribution attachments. Three transmission (230 KV) and three distribution conductors (12 KV) will be provided; the vertical separation of transmission conductors will be 12', while that of the distribution system will be approximately 3'. An overhead ground and a distribution neutral will be installed with the lowest span (the distribution neutral) situated 28' off the ground on the pole. Where required to maintain the minimum vertical

FIGURE 3.8.1.A



DETAILS OF PROPOSED TRANSMISSION LINE

clearance for the distribution conductors mid span poles, with estimated heights of 40', will be erected. As transmission conductor spans will be specified at 700', it is estimated that 19 such towers will be required for the entire length. Guying of corner poles will consist of tubular steel guy stubs with multi-helix screw-type anchoring.

Access and maintenance of the power lines and right of way will be provided through primitive roadways within the clear zone.

3.8.2 Land Use Impacts

As more thoroughly discussed in Section 4.3.2, the associated transmission lines will span undeveloped, often highly disturbed terrain. All of the affected land is zoned either as manufacturing or semi-public classifications. An exception to this is the tract immediately south of the county property abutting the west side of 28th Street. This parcel, while currently designated as a low density residential area, is expected to be maintained as open space (or buffer) via an alteration of the existing zoning scheme (see Section 2.2.2).

All vegetation will be removed from the power line right of way; routine maintenance practices will limit understory growth to low brush and shrubs. In essence, the proposed power line right of way will assume the same visual characteristics as imparted by that of the larger existing FPC transmission line. It will not be necessary to demolish any man-made structures nor effectuate significant topographic alterations to accommodate the power line.

3.8.3 Beneficial Uses

At present, there are no plans for alternative utilization of the proposed power plant right of way.

3.8.4 Visibility

It is anticipated that the proposed transmission line will be apparent from several well travelled roads for much of its length. It will, however, be overshadowed by the existing, much more ominous FPC power line which it will parallel for much of its route. Specific thoroughfares at which the transmission lines will probably be visible are as follows:

- U. S. Highway 19 near 49th Street North interchange - visible upon close observation only as the larger FPC lines bisect the line of sight.
- Gandy Bridge Boulevard near 28th Street and I-275 - visible upon close observation as the proposed lines are immediately behind the larger existing ones.
- I-275 - very visible as the proposed lines will cross this superhighway, again very close to the existing FPC conductors.

In addition where the proposed lines parallel 28th Street, they will be distinct to viewers residing in the outer perimeter of the mainlands of Tamarac Subdivision (in the vicinity of

101st Terr. and 34th Wy., North). The distance to the right of way from these houses is estimated at 0.64 mile.

3.8.5 Associated Transmission Structures

No related electrical transmission structures (i.e. substations) other than those described above and the switchyard at the plant are proposed in this application. The switchyard located at the plant site will be used to step up the 13.8 KV turbogenerator voltage to the 230 KV transmission voltage.

3.9 Associated Facilities

In addition to the construction of the resource recovery facilities as defined within the fenced boundary (shown in Figure 3.1.a) and the power transmission line (described in Section 3.8), several associated facilities will be constructed. These are listed below:

a. Extension of 114th Avenue and 110th Avenue.

b. Non-potable water line extension.

c. Potable water line extension.

d. Pinellas Park sewer line connection.

e. Landfill

f. Spray ~~irrigation field.~~

g. Stormwater holding and treatment system.

These associated facilities are shown in Figure 3.9.a.

3.9.1 Purpose and Location

a. 114th Avenue will be extended to the west from its present effective end on 28th Avenue. 110th Avenue will be extended to the west from 28th Avenue to the plant exit. These extensions will provide access to and egress from the resource recovery facility.

b. The St. Petersburg treated wastewater line will be extended from a point at 102nd Avenue and 16th Street (approximately 1,500 feet east of Interstate 75). This water will be used in the facility for cooling tower and other non-potable needs. A line to connect to the Largo non-potable water system is also being contemplated.

c. Potable water line extension - A water line will be extended to the facility site from the existing Pinellas Park main now terminating on 118th Avenue approximately 1600 feet west of 34th Street. This water will be used for sanitary purposes and as boiler make-up water.

d. Pinellas Park sewer line connection - A sewer line will be constructed from the facility site to the existing lift station as shown in Figure 3.9.a. This line will carry the composite sanitary and process effluent from the facility.

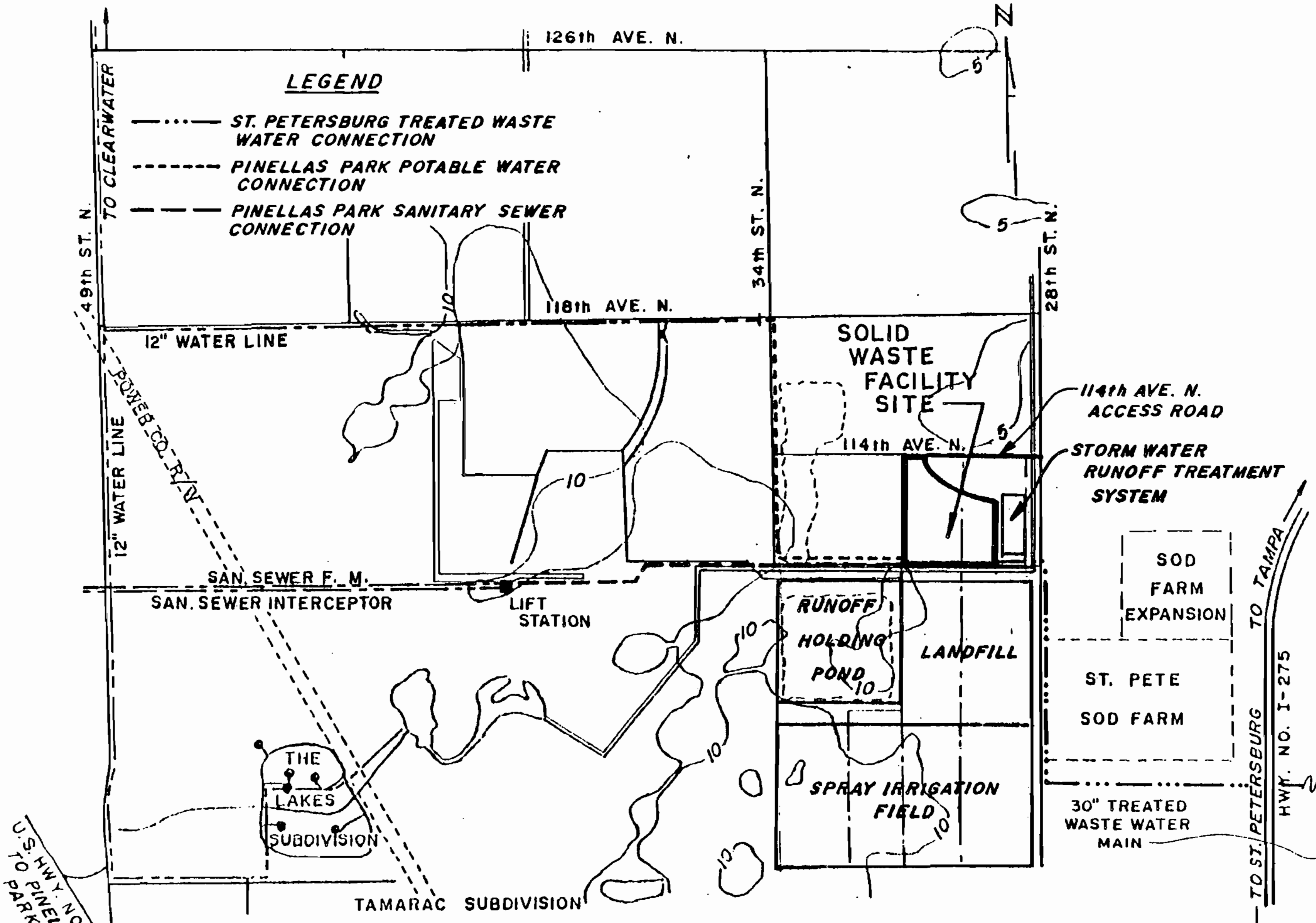
e. The landfill as located on Figure 3.9.a will be used to dispose of residue resulting from the materials handling operations on the boiler ash. In addition, this landfill will be used to dispose of raw refuse when the plant is not operational during emergency conditions. This latter situation is anticipated to be quite rare. During times of raw refuse landfilling, the operation is expected to take place in the same fashion that current landfill practices take place at the County landfill (Phase I Bridgewater Acres). The residues will be landfilled in a similar fashion with the exception that daily cover will not be applied. More detailed information regarding the intended landfill operation is presented in Appendix D.

f. A spray irrigation field, as shown on Figure 3.9.a, will be required to dispose of treated stormwater runoff, as required from the site. More information on this item is presented in Section 3.10 and Appendix D.

g. A stormwater holding pond and treatment facility, as shown on Figure 3.9.a, will be utilized to contain and treat, as required, the stormwater runoff from the plant site as well as the landfill area and completed landfill area on the resource recovery site. More information on this system is provided in Section 3.10 below.

3.9.2 Maps

The location of each of the above mentioned associated facilities is shown on Figure 3.9.a.



ASSOCIATED FACILITIES

FIGURE 3.9.a

3.9.3 Land Type and Uses

The land on which the associated facilities will be constructed is generally undeveloped and zoned for light industrial use. The land on which the access road will be constructed is designated for solid waste management purposes. The other associated facilities which will be constructed are presently County rights-of-way.

3.9.4 Visibility

After construction none of the utility lines will be visible since all of the pipelines will be installed below grade and the disturbed area will be planted with grass and will eventually revegetate with native flora. The road will be visible from 28th Street, as well as some aspects of the landfilling activities at certain times.

3.10 On-Site Drainage System

3.10.1 Overall Drainage Plan

Generally, all stormwater runoff will be collected from all functional areas (i.e. plant site and landfill) on the site as they are being used. Collected runoff will be treated and disposed of by landspreading in the designated areas. Treatment will consist of aeration, contact with water hyacinth and chlorination. Water hyacinth will be harvested, dried and utilized as a fertilizer supplement by the County.

3.10.2 Drainage During Construction

Runoff from the plant construction site will be collected and transported to a collection ditch on the south side of the facility. This ditch flows to the main holding lagoon. From this holding lagoon, the water will be pumped, as necessary, to the treatment area and subsequent land disposal. If dewatering is required during construction, all resulting flows will also be directed to the drainage ditch and holding lagoon.

3.10.3 Drainage During Operation

During operation, two major areas are of concern with regard to drainage, plant site drainage and drainage from landfill operations. The overall drainage plan will apply to both activities, with emphasis on zero discharge, except during extremely high rainfall conditions and then only discharge of treated landspreading runoff.

All drainage from the plant site will be directed to a collection ditch to the south. From there, the water will be treated and landsprayed as required.

During landfilling operations, water which is collected directly in an open cell will be transported directly to the oxidation pond. This water will have had direct contact with raw refuse and residue and will not enter the surface runoff collection system. Water from above grade landfill operations as well as completed landfill areas will migrate to the series of collection ditches which lie around the perimeter of the active landfill areas. From these collection ditches, this water will be directed to the holding pond and will be treated and landsprayed as required.

3.10.4 Stormwater Treatment Facilities

Shown on Figure LP-1 of Appendix D are the stormwater treatment facilities . The major units within the stormwater treatment facility are:

1. Aerated lagoon - 422,081 gallon capacity, 1 day detention time @ 300 gpm flow.
2. Hyacinth pond #1 and #2 - 6.85 days detention time operated in parallel, 13.7 days detention operated in series, at 300 gpm flow.
3. Chlorine contact chamber - 15 min. detention time at 300 gpm flow.
4. High head irrigation pump station - one 170 gpm pump with space of additional pump to match 300 gpm system capacity.
5. Irrigation system - portable aluminum restrainer joint irrigation pipe with irrigation guns. Irrigation field of 56.34 acres (with system 250' buffer zones not included), which has design capabilities of 300 gpm to 600 gpm at application rates of 2 inches per week and 4 inches per week, respectively.

Drainage from the spray irrigation field will migrate to a ditch which surrounds the field on the sides. The only provision for discharge will be an emergency overflow structure in the southeast corner of the ditch in the case of extreme rainfall occurrences.

3.10.5 Optional Systems

Options to the aforementioned drainage plan are:

1. The use of the optional spray irrigation field (see Figure LP-1, Appendix D). This heavily wooded 40 acre area is higher in elevation than the proposed irrigation field and could be used in the event of high water table conditions.
2. The use of stormwater runoff as cooling water make-up. Stormwater could be used directly from the 22 acre holding lagoon or after treatment and chlorination. The quality of the untreated stormwater runoff would dictate whether or not treatment would be required prior to use as cooling water make-up. The approximate cooling water make-up requirements are 415 to 1211 gpm; therefore, the stormwater, if utilized, would be a supplement to the treated wastewater as noted in Section 3.4.2. The implementation of this option could assure a zero discharge operation and alleviate the use of the landspraying operations.

CHAPTER 4

ENVIRONMENTAL EFFECTS OF SITE PREPARATION, PLANT AND ASSOCIATED FACILITIES CONSTRUCTION

4.1 Site Preparation and Plant Construction

4.1.a Impact on Land Use - As discussed in Section 2.2.2 of this report, much of the existing land use at the proposed facility site is characterized by terrain greatly altered by landfilling and excavating activities. The area adjacent to the facility site on its eastern perimeter is utilized as an experimental sludge sprayfield. A 230 kilovolt transmission line will parallel 28th Street North, southward from the facility for approximately 1.0 miles until the existing Florida Power Corporation transmission lines are encountered; proposed facility transmission lines will then parallel the existing FPC lines eastwardly to the Northeast Electrical Generation Substation. Again, the current land uses to be impacted by power line construction are predominately undeveloped and/or highly disturbed areas.

Construction of the resource recovery plant and associated facilities will necessitate an irreversible commitment of approximately 240 acres of land currently zoned for manufacturing purposes. The resource recovery plant will be constructed upon 20 acres of an 80 acre tract just north of 110th Avenue North, and west of 28th Street North. A 160 acre tract just south of the plant site and 110th Avenue North will be reserved for disposal of residues generated by facility operations and stormwater runoff control. Conversion of this tract to landfill purposes will entail the destruction of a basically undisturbed pine flatwoods stand; it is anticipated that adverse impacts on associated biota are minimal as there is an ample amount of similar terrain located adjacent to this particular expanse. Most of the terrain around the 20 acre plant site is highly disturbed land; conversion of this tract to a landscaped and maintained electrical generation plant represents a positive step in eliminating the current landfilling which attracts gulls, flies and other disease vectors.

The most significant impact on land use centers is the cessation of raw refuse landfilling upon initiation of plant operation. At present solid waste generation rates, the twenty acre plant site would be consumed for landfilling in little more than one year. The implementation of resource recovery operations will greatly reduce the large and growing need for an expensive, dwindling resource in Pinellas County, namely land. It should also be noted that land utilized as a landfill is a poor site for future construction due to potential settlement and effluent gas generation. Excluding lands from future landfilling sites promotes the availability of areas for industrial expansion in that neighborhood.

During construction phases, a large traffic volume associated with the building of the plant will be noted along certain roadways serving the site. It is anticipated that work force and heavy equipment traffic will utilize 118th Avenue North and 34th Street North to gain access to the site and its environs. In each case, the land uses abutting these roadways are composed of manufacturing or undeveloped sites and are, therefore, compatible with the expected increases in traffic.

The closest residential boundary to the proposed facility is located approximately a mile to the southwest in Pinellas Park. Construction of the facility should have no great negative impact on this area; contrarily, a positive effect on land value could result with conversion of the land use to a more desirable processing plant. In addition, there is a parcel of land abutting the southern perimeter of the 160 acre landfill expansion area which, according to the Pinellas County Comprehensive Land Use Plan, is designated for medium density residential development. Current plans, however, promulgated by local planning agencies state that this tract can be expected to be at least partially rezoned for industrial purposes which will provide a buffer between the inert residue landfill and possible future residences.

4.1.b Impact on Water Use - Construction water needs mainly include usages for potable supplies, hydraulic equipment, equipment maintenance and sanitary needs.

For the estimated thirty-two (32) month construction period total water needs will approximate 75,000-100,000 gallons per day during peak periods. The majority of this water will be employed for such activities as concrete mixing, building and equipment cleaning and work force potable supplies. All such water will be obtained from the Pinellas Park potable water system.

Sanitary wastewater needs will be handled by a portable toilet contractor, thus precluding any necessary use of municipal facilities directly.

In any case, no on-site surficial or groundwater supplies will be impacted by facility construction water needs. A well point system will extract water from the water table aquifer only at the plant site; this water will be channeled into the perimeter canals without any modifications or withdrawals by construction activities.

4.1.c Impact on Water Quality - Construction of the proposed plant facility will entail the movement of approximately 260,000 cubic yards of fill material at the facility site and along traffic arteries. Additional material will be displaced as perimeter canals are prepared, however the material excavated will be stockpiled alongside these canals for the construction of the sight screening levee. This will facilitate the introduction of sediment and particulate-borne pollutants into perimeter canals. The extent of sedimentation is, no doubt, ameliorated due to the coarse nature (thus low erodibility) of the on-site soils and the nearly flat characteristic of the terrain. It was also noted during on-site visitations following storm events that much of the sedimentation in neighborhood drainage ditches was the result of road bed and road shoulder erosion. As the extent of traffic on these roadways will substantially increase during the construction phase, relative sediment contributions from this source can be expected to increase.

Activities will begin almost immediately, upon promulgation of a "notice to proceed" with construction, which will reduce subsurface water volumes at the site of the resource recovery plant. This will be accomplished through use of a well point system; water extracted from the water table aquifer by this method will be diverted to surficial canals which receive site storm runoff. No dewatering is anticipated for the construction of the perimeter canals and sight screen levee. As noted in Sections 2.4 and 2.5 of this report, the chemical quality of surficial aquifer waters is characteristically more mineralized than surface waters and contains relatively high concentrations of dissolved nitrogen species. The introduction of more nutrified water into perimeter canals could enhance the already untoward clogging of the waterways by noxious weeds. On the other hand, the high bacterial concentrations which typify study area surface waters could be greatly diluted and attenuated by the introduction of large volumes of harder, more saline aquifer waters.

Erosion from construction sites yields an effluent which is generally high in hydrocarbon and synthetic waste concentrations; most notable of these constituents are oils and greases, paving and sealing compounds, pesticides and rodenticides, and cleaning fluids. By applying prudent erosion control measures these factors can be substantially mitigated as on-site terrain is quite level and, consequently, less subject to erosion.

4.1.d <u>Impact on Air Quality</u> - Air pollutants associated with construction of the facilities will originate from vehicular and heavy equipment exhaust emissions, open burning of land clearing debris, and other fugitive sources, notably roadway dust and dirt.

Exhaust emissions from internal combustion engines contribute significant volumes of nitrogen oxides and hydrocarbons to the atmosphere. It has been estimated that 86 percent of the carbon monoxide originating from mobile sources in the nation can be attributed to internal combustion, gasoline vehicles.[1]

[1] Cavender, et al.

Diesel engines contribute less than one percent of that pollutant. Other relative contributions include: nitrogen oxides - gasoline engines 67 percent, diesel engines 11 percent, hydrocarbons - gasoline engines 85 percent, diesel engines 0.5 percent. By tempering these estimates with data projecting the number of gasoline versus diesel powered vehicles included in these estimates (100 million versus 8 million, respectively), one can see that while relative nitrogen oxide emissions from both sources are quite similar, diesel engines contribute far less carbon monoxide and hydrocarbons per unit of operation. This is due to the high compression and temperatures inherent to diesel operations and, thus, more efficient combustion. The impacts imparted by the emissions of heavy equipment characteristic of facility construction will not adversely affect ambient air quality to an appreciable degree. The small quantity of emissions coupled with the short term nature of construction activities will produce very minor and quite localized elevations in certain pollutant concentrations, notably nitrogen oxides. Probably the most substantial mobile source of air pollution associated with facility construction will be those emissions generated by the labor force vehicles as they enter and leave the facility site. Again, though, this impact is short-lived and will probably have little effect on ambient carbon monoxide, hydrocarbon and nitrogen oxide concentrations.

With regard to open burning, it is estimated that some 70 pine trees with diameters (at breast height) averaging 12 inches will be removed, piled into windrows and burned during the construction of the plant. The debris will be further augmented by understory vegetation and scattered brush. All open burning of land clearing debris will be conducted in accordance with those stipulations provided in State (Chapter 17-5.07 FAC) and County (ORD 76-18) rules. Specifically, both State and County requirements mandate that at least one of the following alternatives is satisfied:

(a) The open burning is fifty yards or more from any occupied building or public highway and is performed between 9:00 a.m. (standard time) and one hour before sunset;

(b) At other times when:

1. The open burning is fifty yards or more from any occupied building or public highway and a forced draft system is used; or,

2. The open burning is five hundred yards or more from any occupied building or a public highway and the Department has given permission because of reasonable assurance that atmospheric and meterological conditions in the vicinity of the burning will allow good and proper diffusion and dispersement of air pollutants; or,

(c) The burning is conducted under the supervision of the Department of Transportation, a forced draft is used, and visibility on roadways is not artificially reduced to less than 500 feet.

Other stated requirements are:

(1) If the burning site is situated in a rural area or is adjacent to or near forest, grass, woods, wild lands or marshes, the Division of Forestry shall be notified and consulted prior to any burning.

(2) All open burning under this section shall be conducted in the following manner:

(a) The piles of materials to be burned shall be of such size that the burning will be completed within the designated time given in paragraph 17-5.07(2)(a).

(b) The moisture content and composition of the material to be burned shall be favorable to good burning which will minimize air pollution.

(c) The starter fuel and materials to be ignited shall not emit excessive visible emissions when burned.

In addition, the Pinellas County Code specifies that smoke from open burning will not reduce visibility on traffic arteries or in airport approach corridors to less than 500 feet. As the volume and duration of such burning will be quite small, it is not anticipated that any long term adverse impacts will be rendered. Compliance with the above listed regulations will mitigate any short term untoward emissions of such refuse-related pollutants as carbon monoxide, hydrocarbons and particulate matter.

The most significant source of air pollution associated with plant construction will, no doubt, be fugitive dust. Site preparation activities such as excavating, scraping, filling and compacting generate substantial volumes of dust which ultimately become suspended in the atmosphere. Truck traffic moving in and out of the facility will further aggravate this particulate situation. Estimates by the EPA indicate that suspended dust levels from heavy construction activities proximate 1.2 tons per acre per month of construction activity; with this information, an estimated 451 tons of dust could be generated during the 21 months of actual heavy construction. The ameliorating techniques to be employed by the contractor are discussed in Section 4.1.6.

4.1.e Solid Waste Generation and Disposal - During the process of plant construction a substantial volume of debris will be generated; these wastes will be generally composed of paper, vegetative matter, scrap metals and lumber, concrete and miscellaneous liquids (e.g., oil, hydraulic fluid, etc.)

It is estimated that as many as 70[1] pine trees and associated understory (i.e., wiregrass, saw palmetto) will be removed during plant site preparation; conservatively speaking, this could result in 1800[1] cubic yards of cleared debris which will be either windrowed and burned, or landfilled at the adjacent disposal site. With regard to non-vegetative solid waste it is projected that nearly 63[1] tons of solid waste will be generated by the construction work force during the 32 month work regime. Of these wastes, recyclable materials (e.g., scrap metals, oil, etc.) will be recovered whenever feasible; all other wastes will be disposed of in the adjacent county landfill. Figure 4.1.c.a presents a graphical interpretation of estimated solid waste generation during plant construction.

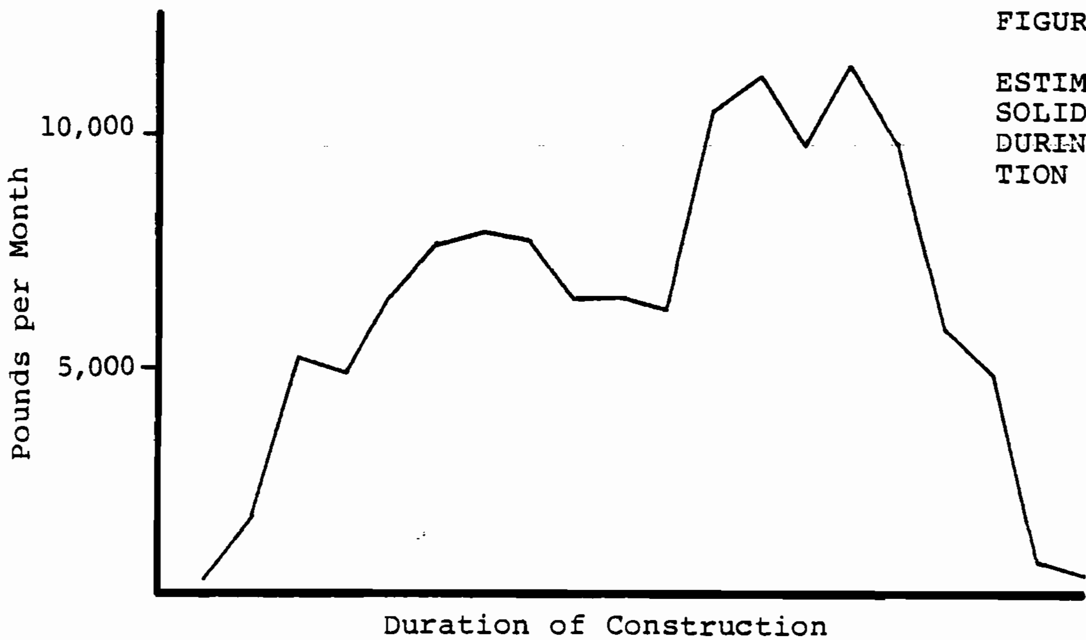


FIGURE 4.1.c.a

ESTIMATED SCHEME OF SOLID WASTE GENERATION DURING PLANT CONSTRUCTION

[1] HDR estimate

4.1.f <u>Ambient Noise Levels</u> - Due to the limited scope of this study, and to the already disturbed nature of the facility site and environs, calculations of ambient noise levels featured in this section and in Chapter Five incorporate certain principles and assumptions presented in various acoustical engineering treatises and publications.[1,2]

Basically, estimates of noise levels are premised on the logarithmic measures of pressure and acceleration; a logarithmic scale is most suitable for these purposes in part because of the extremely large range of pertinent levels and in part because the ear perceives loudness in a logarithmic, not linear, fashion. This logarithmic measure of pressure is termed the pressure level and is expressed in decibels (dB). Studies relative to the geometric propogation of sound reveal that, in a general sense, the attenuation of pressure levels as you move outward from the noise source is highly dependent on the magnitude of the noise and the single or multiple, fixed or mobile nature of the source. Representative noise levels for various types of construction equipmentare featured below.

<u>Noise Levels (dB) of Common Construction Equipment</u>

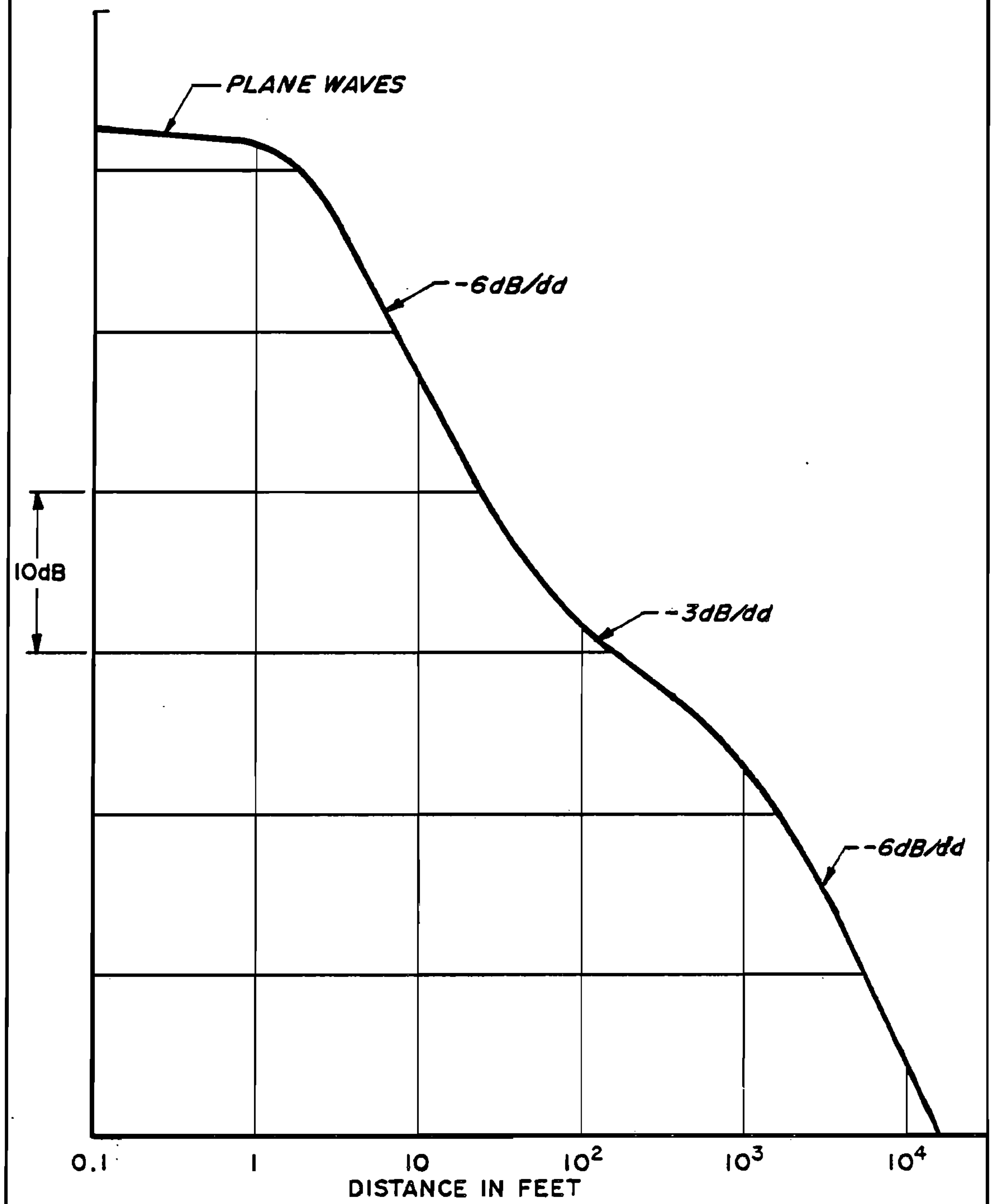
Front Loader	- 79	Crane	- 83
Backhoe	- 85	Derrick	- 88
Bulldozer	- 80	Pump	- 76
Tractor	- 80	Generator	- 78
Scraper	- 88	Compressor	- 81
Grader	- 85	Pile Driver	- 101
Truck	- 91	Jack Hammer	- 88
Paver	- 89	Pneumatic Tools	- 86
Concrete Mixer	- 82	Saw	- 78
Concrete Pump	- 83	Vibrator	- 76

NOTE: Measured at fifty feet
From Bolt, Beranek and Newman, 1971

[1] Lyon
[2] Warring, et al

At close distances ($\leq$ 10') sound pressure is characterized by plane waves with little reduction in loudness; outward from 10 feet to a margin of thirty feet, the spreading of sound follows a spherical distribution with an attenuation rate of 6 dB per doubling of distance (6 dB/dd). If multiple sources are involved, say a line of heavy trucks moving along a landfill road, noise decreases become difficult to quantify due to the complicated nature of the source. At distances from 30 to 1,000 feet, sound wave propagation from such multiple, mobile sources is more similar to the cylindrical distributions characteristic of aircraft noise and sonic booms; thus an attenuation factor of 3 dB/dd is commonly employed in this range. Outward from 1,000 feet noise again decreases in a spherical manner, consequently a drop-off rate of 6 dB/dd is utilized at these distances. Again, the assumptions presented in this discussion are very general; real life situations are comprised of a variety of attenuation parameters which function in a complicated, yet precise manner. Figure 4.1.f.1 features a hypothetical scheme of sound level attenuation from multiple, mobile sources. To a lesser extent other factors influence the reduction in loudness; among these are vegetation, physical barriers, air viscosity, molecular absorption, air temperature and humidity. Studies by Embleton, and Wierner and Keast illustrate that a grove of woods can attenuate sound pressure levels by factors of from 1 to 9 dB/100' of woods; there was no significant difference in such rates for deciduous versus evergreen species. The shear viscosity of air accounts for sound reduction, which generally

FIGURE 4.1.f.1.



Hypothetical drop off in sound level from diesel casing radiation of 0.25 mile line of trucks (geometric spreading only).

varies with the square of the frequency; molecular absorption, a seemingly intangible variable, is thought to provide approximately 10 percent of the attenuation incurred by vegetative barriers. Bulk viscosity of the air is caused by the compressional relaxation of air molecules; this relaxation, due to the vibration of oxygen molecules in the medium is highly dependent on such physical variables as temperature and humidity. Generally, a decrease in temperature produces a proportionate decrease in relative humidity; the ranges of relative humidity from 5 to 20 percent offer the greatest attenuation rates, depending on the frequency of the sound. As a whole, though, the magnitude of such factors is small with a coefficient of 0.085 for a 12.5 KHz sound noted.

When discussing noise impacts induced by facility construction one should be keenly aware of conditions endemic to the study area which greatly influence noise levels as perceived in adjacent residential areas. The general site area itself is located on highly disturbed terrain which has been subjected to landfilling activities for a number of years; thus noise from incoming and outgoing truck traffic and heavy equipment is commonplace. In addition, the location of the landfill and adjacent residential areas is within the aircraft approach zone to runway 35R of the St. Petersburg/Clearwater International Airport. All of this implies that noise levels in excess of background conditions for residential areas, and similar to construction oriented sources, already occur at the nearest residential area, approximately 0.8 mile to the southwest. Assuming that a background noise level for this residential area approximates 55 dB, a theoretical[1] increase in pressure level to 75 dB could be incurred by the operation of four trash haul trucks, two dragline cranes and one bulldozer in a fairly concentrated area of the site; this situation represents actual landfill practices. Initiation of construction and site preparation will mean an influx of similar equipment, in similar numbers. Based on the operation of two bulldozers, two scrapers and two graders in a spatially concise area, the noise level in the residential subdivision could be elevated to 69 dB. In another case, where one crane, one compressor, two trucks and five saws are operating (again, in a localized area), the residential noise level would be elevated to 71 dB. For each construction case, the imparted noise levels fall below those increments currently incurred by landfilling operations. During construction, though, landfilling and construction activities will occur simultaneously; the worst case noise source for such a situation will probably be due to lines of heavy truck traffic moving along 118th Avenue North. Assuming a case where nine trucks are equally spaced at 100 foot intervals along 800 feet of this road, the noise imparted to the nearest residences (1.015 miles south) is estimated at 49 dB, or approximately 6 dB below background levels; the interaction of noise in that area will probably result in a 1 dB increase over background. Table 4.1.f.1 summarizes the estimates of noise levels imparted to the closest residences.

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[1] Less attenuation by trees, air viscosity and molecular absorption.

TABLE 4.1.f.1

VARIOUS NOISE PRESSURE LEVELS (dB) IMPARTED BY FACILITY CONSTRUCTION TO THE NEAREST RESIDENCES				
Activity	Equipment	Combined Noise Level[1]	Distance to Residences	Incurred Noise Level
Landfilling	2 cranes 4 trash trucks 1 bulldozer	100	4287'	75
Site Preparation	2 bulldozers 2 scrapers 2 graders	94	4287'	69
Building Erection	1 crane 1 compressor 2 trucks 5 saws	96	4287'	71
Congested Truck Traffic on 118th Ave. N.	9 heavy trucks[2]	82.1	5359'	49

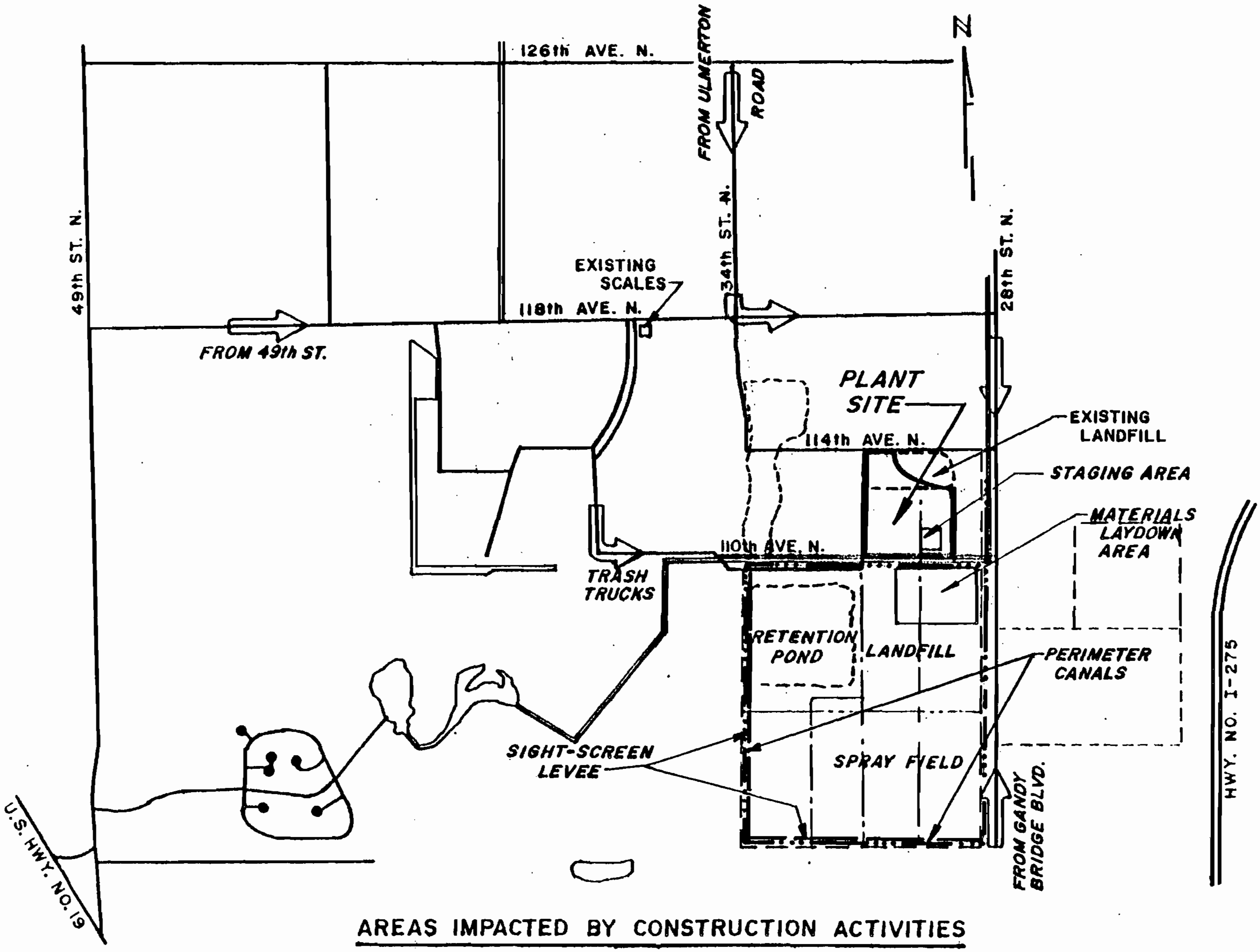
[1] Measured fifty feet from the source(s)

[2] At 80 dB each

4.1.1 Construction Areas

A schematic illustration of areas to be directly affected by construction related activities is shown in Figure 4.1.1.a. Basically, portions of the overall site immediately south of 110th Avenue North will be utilized as a primary materials laydown and storage area; alternative laydown sites include the land directly north of the oxidation pond and the eventual location of the refuse handling area. That portion of land just north of 110th Avenue North and adjacent (on the west side) to the oxidation pond will serve as a staging area for subsequent construction activity. As materials delivery trucks will enter the construction site from 28th Street North on 110th Avenue North, it will be necessary to construct several access roads to the laydown area south of 110th Avenue. In this process culverts will be installed in the drainage ditch abutting 110th Avenue on its southern boundary. By utilizing an easterly approach to the construction site from 28th Street North, there will be no interference with ongoing landfilling activities as trash trucks will continue to enter the site from the existing western approach. The addition of 114th Avenue North and other facility roads (see Figure 3.1.a) will occur towards the latter phases of plant construction.

For the completion of all the above listed activities no significant adverse impacts are noted. The only undisturbed area to be impacted is the pine flatwood stands south of 110th Avenue designated as a materials laydown area. As it is the intent of the County's contractor to maintain as much of the existing tree canopy in that area as possible for sound attenuation and aesthetic enhancement,



AREAS IMPACTED BY CONSTRUCTION ACTIVITIES

FIGURE 4.1.1.a.

site alterations will impart short term effects and will not greatly modify the terrain. Wildlife inhabiting these areas can find significant tracts of similar habitat directly adjacent to the laydown areas. Furthermore, much of that area south of 110th Avenue could be converted to a landfill for the disposal of inert boiler residue generated by recovery operations; thus clearing activities associated with construction may simply precede more extensive site alterations.

With regard to the disposal of solid and liquid wastes, debris including paper, concrete and plastic will be landfilled at the adjacent disposal site. Likewise, vegetative matter will be buried or open burned as permitted by local regulations. Scrap metals and many deleterious liquids (e.g., oil, hydraulic fluid, etc.) will be recovered and removed by selected contractors.

4.1.2 Land Impact -

As extensive soil borings of the plant construction site are lacking at this time, detailed data on site excavations and fill amounts are not available. Very conservative estimates assume that an average three foot backfill will be necessary to bring the surface elevation to an appropriate level; thus some 58,000 cubic yards of soil will be stripped and replaced by 166,800 cubic yards of material. In addition, approximately 84,400 cubic yards of fill will be needed to provide the proper elevations for the tipping area and drive-up ramp. Local soil and bedrock characteristics indicate that conventional mechanical means of site excavation are quite feasible, thereby precluding any possible need for explosives.

As discussed in a previous section, solid wastes generated by construction activities will be properly disposed of in the adjacent county landfill; scrap metals and other recyclable materials will be recovered. In all cases no adverse impacts, either long or short term, are noted.

The acts of stripping and filling of the construction site will produce locally significant dust clouds; the volume of such particulate matter is difficult to quantify but will probably approximate those levels generated by the trucks, cranes and dozers associated with the existing landfill. As landfilling and construction will occur simultaneously it is anticipated that dust levels affecting nearby roadways (i.e., 28th Street and 110th Avenue) will be aggravated. Section 4.1.6 of this document discusses the methodologies to be employed in mitigating ambient dust concentrations.

4.1.3 Impact on Human Populations -

The closest residential area to the proposed facility site is located in Pinellas Park with the nearest houses situated roughly 0.8 of a mile southwest of the plant site. Analysis of noise calculations (Section 4.1.f) reveals that sound levels imparted to this area by facility construction will be essentially the same as those already experienced from landfilling activities. As construction operations will occur only during daylight hours of the regular work week (7:30 a.m. - 3:30 p.m., Monday - Saturday), aggravating noise is not anticipated at any residential area.

Commuter vehicles associated with the construction labor force will enter the site via the following routes:

a. Eastward from 49th Street North on 118th Avenue North.

b. Northward on 28th Street North from Gandy Bridge Blvd.

c. Southward on 34th Street North from Ulmerton Road.

The 118th Avenue North route will probably serve most of the traffic and passes through industrial (light manufacturing) and undeveloped areas; the other routes are unpaved roadways which traverse undeveloped lands and a few construction sites. In no case will construction related traffic be directed through any residential or commercial areas.

The County's contractor has specified that the plant construction work force will be composed primarily of local tradesmen and mechanics (see Section 4.1.4). This precludes the possibility of complications arising from the housing, schooling, etc. of work force personnel and dependents.

There has been some public comment regarding the aesthetic impact of constructing and operating the facility and its associated exhaust stack. It should be noted that the plant itself will incorporate pleasing architectural concepts designed to enhance its visual appeal; the planned landscaping scheme will further augment the situation. In any case, one must not forget that the construction and ultimate operation of the resource recovery system will signal the end of raw refuse landfills except for emergency situations.

4.1.4 Work Force -

A representation of construction operations and manpower loading is featured in Figure 4.1.4. The County's Contractor estimates as many as 290 persons at one time will be directly involved in the erection of the plant; it is anticipated that all tradesmen will come from local labor pools as the necessary skills are available.

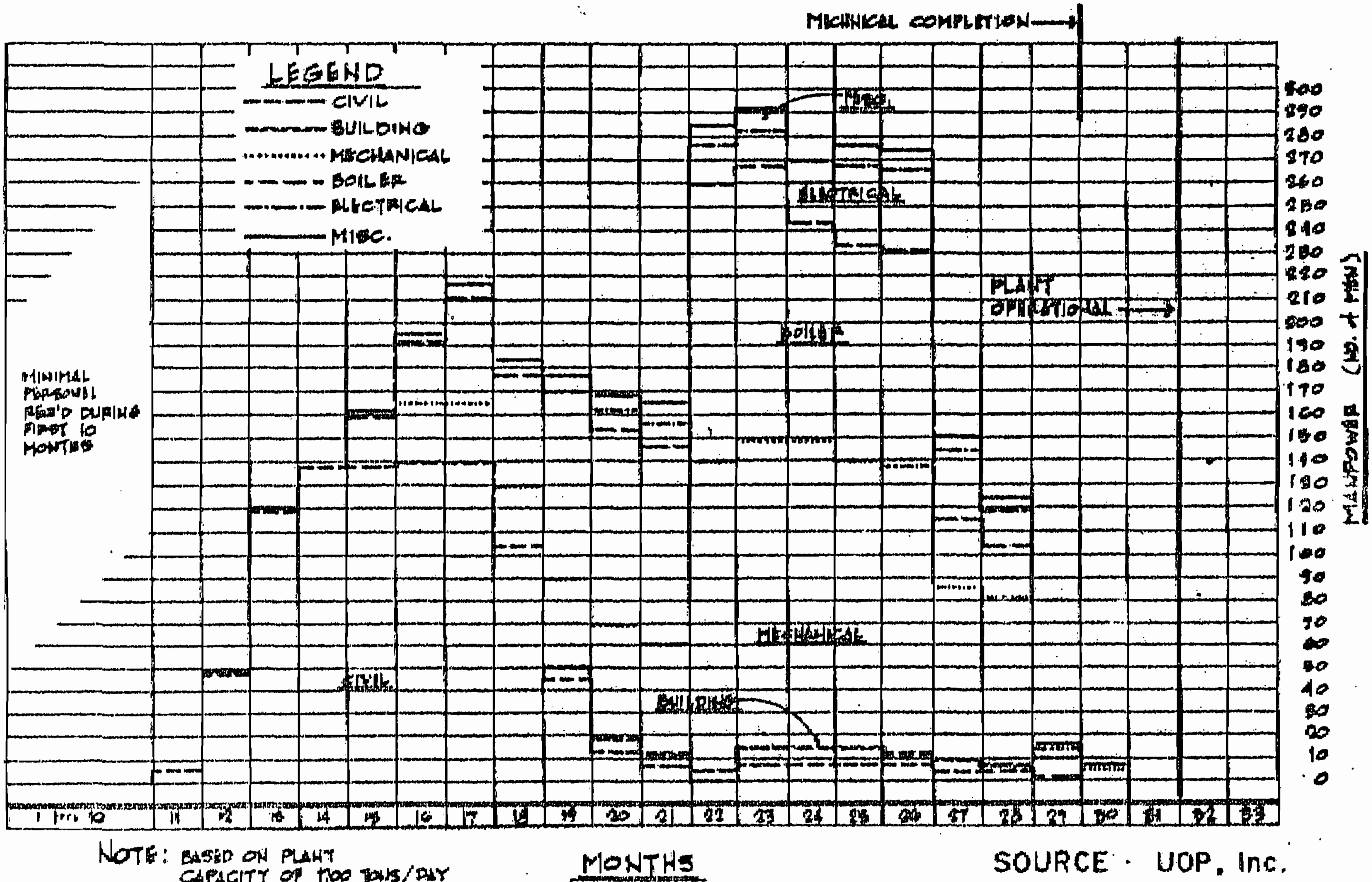
4.1.5 Impact on Accessibility -

The initial analysis described in Section 2.3 of this report indicates no cultural, historical or archaeological sites were located within the study area; consequently no activity associated with plant construction will inhibit accessibility to such an area. Confirmation of these findings presented in Section 2.3 by the Bureau of Historic Sites and Properties is featured as Appendix E.

4.1.6 Mitigating Measures -

Construction of the resource recovery plant for Pinellas County will involve the alteration of approximately 20 acres of previously disturbed terrain; in addition, some 40 acres of adjacent land will be affected by access road construction (114th Avenue) and building material storage. By the very nature of these activities a certain amount of wind and water erosion are inevitable. To minimize the adverse impacts of dust and other suspended matter on the ambient environment, several ameliorating techniques will be employed. With regard to dust control, water sprays will be applied on problem sites as necessary; considering that the typical soil components of the site are quite coarse, and that rainfall is generally abundant, the number of water spray

FIGURE 4.1.4



NOTE: BASED ON PLANT CAPACITY OF 1100 TONS/DAY

SOURCE · UOP, Inc.

ANTICIPATED MANPOWER REQUIREMENTS DURING CONSTRUCTION treatments can be expected to be few. Soil erosion via stormwater runoff will be significant despite the coarse soil particle size and nearly level terrain found at the site; the highest potential for erosion will occur along roadways and such elevated areas as the tipping floor and its vehicle access ramps. By employing the universal soil loss equation, soil losses for a common storm event (2 inches in one hour) at the most critical sites were estimated. Assuming no mitigating measures are employed on berm slopes, soil losses for that storm will approximate 2.0 tons per acre; by contouring slopes and applying hay mulches (one ton of hay per acre) erosional losses are reduced to 0.2 tons per acre. As soil loss imparts adverse economic and environmental consequences, preventative strategies will be incorporated into the project construction scheme.

As previously discussed, as much of the indigenous tree canopy will be maintained as is practical; in any case, the site environs will be suitably landscaped to enhance aesthetic appeal, provide noise attenuation and minimize erosion.

Truck traffic in and out of the construction site will be directed to 118th Avenue North. As this route currently serves similar vehicular traffic, any possible re-routing is deemed unnecessary.

4.1.7 <u>Benefits from Construction</u> -

The obvious benefit from plant construction centers on the creation of several hundred jobs for area residents during the project duration; this not only provides direct wages to local tradesmen, it also stimulates local economies by circulating additional revenues into area businesses and services. This is especially important for such construction oriented concerns as equipment rental firms, building materials suppliers and specialty subcontractors.

A direct and profound effect of constructing the plant will be the eventual elimination of environmentally costly landfill activities. Upon commencement of plant operations the life expectancy of land available for residue disposal will be dramatically extended; thus the ultimate fate of putrescible solid waste in Pinellas County will not be as a possible groundwater pollutant but a valuable fuel for the generation of electricity.

4.1.8 Impact on Water Bodies and Uses -

As the facility is to be located some distance from any large waterway, and as all plant associated water schemes (i.e., potable supplies, cooling tower makeup, etc.) are basically separated from the study area surface and groundwaters, erosion to exposed soil surfaces and, possibly, intermixing of surface waters with more nutrient enriched surficial aquifer waters present the most probable sources of untoward effects.

Sedimentation as a result of water and wind erosion may be locally significant in those existing drainage ditches which parallel 28th Street North and 110th Avenue North. Based on the large size of eroded particle, the languid characteristics of drainage ditch flow and on first hand observations following storm events, particulates entering the ditch via runoff will precipitate and settle near the runoff inlet; as these waterways are quite shallow (less than 18" depth maximum) chronic sedimentation could fill the channel thus reducing its ability to conduct stormwater away from upland areas.

Efforts to mitigate site erosion have been discussed in Section 4.1.6; regardless of these strategies some sedimentation into fringing canals is inevitable. The aquatic weeds which colonize these ditches are either emergent (cattails) or floating (duck weed); this latter type forms thick maters over most surfaces and greatly inhibits light penetration to any potential benthic flora. Thus the addition of sediment to the ditches (in the anticipated quantities) and the resultant increase in water column turbidity will do little to alter existing plant populations. With this in mind, dependent organisms (e.g., epiphytes, primary consumers, etc.) will not be greatly impacted.

The detailed soil borings necessary prior to site preparation are not available at the time of this writing; consequently, the need for and, thusly, the volume of subsurface drainage via a wellpoint system are not known. Assuming that some pumping will be required certain adverse impacts could be incurred if the pumpate were directly discharged to surface waters. As surficial aquifer waters exhibit higher concentrations of nutrients and common metals than those recorded in surface waters (see Table 2.5.4.d) the introduction of this nutrified flow could further enrich surface water, thereby enhancing the growth of noxious weeds. To prevent the introduction of aquifer water into drainage ditches, wellpoint flows will probably be pumped to the combination stormwater retention or alternative cooling water supply pond identified in Sections

3.4 and 3.10 of this document. In any event, wellpoint pumping will be of short duration, thus any adverse impacts will be relatively short-lived.

Of circumstantial importance to the construction of the resource recovery plant are the plans by Pinellas County to alter the natural drainage scheme which serves the plant site. Essentially, water entering the canal which abuts 110th Avenue North originates to the west and south. It has been proposed that all flow entering the canal west of 34th Street North be diverted west and north (through the completed landfill perimeter ditch) by imposing an artificial barrier in the 110th Street ditch near 34th Street. This will be performed during the preparation of the perimeter canals and sight-screening levee. With this change, water flowing into the 110th Street ditch will come exclusively from the facility site. This fits into the overall drainage scheme for the plant (see Section 3.10) in that all plant generated runoff, and <u>only</u> such runoff, will be routed to the retention basin for subsequent storage, landspraying or emergency withdrawal as cooling water.

4.3 Construction of Directly Associated Transmission Facilities

4.3.1 Permanent Changes to Vegetation, Wildlife and Aquatic Life

Construction of the transmission lines will warrant the permanent displacement of vegetation and, consequently, inhabiting wildlife; it is estimated that nearly nine acres of pine flatwood, Brazilian pepper or previously disturbed terrain will be affected. As the transmission line right of way is juxtaposed with 28th Street North and the existing Florida Power transmission lines for its entire length, the area of direct impact is already subject to considerable duress by roadway traffic and power line right of way maintenance.

Specifically, the transmission lines will traverse pine flatwoods terrain from the resource recovery plant southward on 28th Street to a point where County owned property on the western side of 28th Street ends; there the right of way crosses to the east side of this roadway. The vegetation existing on the east side of 28th Street is strikingly more disturbed and is characterized by Brazilian pepper trees, lantana and Johnson grass. Very near and just north of the crossing of 28th Street by the existing FPC power lines is a natural drainageway or, more appropriately, a slough; flora in this area are dominated by the coastal plains willow with scattered specimens of maple (Acer sp.). Field observations of this community indicate that some factor has caused extensive die-offs of the willows and understory in recent times; the affected flora are characterized by wholesale leaf mortality typical of those conditions induced by a wildfire; other evidence of fire (e.g. charred wood) was not noted. Once the proposed transmission line junctions the existing FPC right of way, the proposed route will parallel the existing lines, but just to the north. Terrain encountered in this length from 28th Street to the FPC northeast substation is highly disturbed land typified by Brazilian pepper trees and lantana; the transmission lines will also cross Interstate 275 in this span.

Construction activities associated with power line erection include clearing of right of way, installing pole foundations, raising and securing the towers and stringing the conductors. Land clearing will be quite extensive in the affected areas as all trees must be removed; this will be accomplished by mechanical (e.g. by bulldozer) rather than chemical (e.g. herbicides) means. Once the project is completed, subsequent right of way maintenance will be rendered by mowing the understory; small bushes and shrubs will be permitted. After the right of way is cleared the tower foundations will be laid, the poles erected and transmission hardware placed; these latter activities will have little or no impact to surrounding terrain in lieu of the drastic disturbances incurred by site clearing.

Two factors greatly mitigate the long term adverse impacts of such habitat destruction as described above. First, wildlife living in the impact area will find a substantial amount of similar habitats directly adjacent to the power line right of way. Second, the impact areas are already greatly affected by unnatural stresses such as roadway traffic (on 28th Street) and power line right of way maintenance; in fact, much of this land is occupied by biologically unproductive habitat, such as Brazilian pepper, typical of highly disturbed conditions. It is speculated that the activities of the waste water sprayfield along 28th Street are principal determinants of the biological scheme in that local area. By this the sprayfield is directly chargeable with the patterns and alterations of the associated biota. Thus it is felt that removal of pine and Brazilian pepper stands in areas near the sod farm, while causing some stresses, will not substantially impact endemic wildlife as the basis of their lifestyles (i.e. the sprayfield) is not altered.

4.3.2 Extent of Impact on Sensitive Areas

Power line right of way will be maintained at an effective width of forty (40) feet for its entire length. With regard to actual lengths of right of way to be constructed on each type of terrain the following breakdown is offered:

- Pine flatwoods - 600' along the southern side of 110th Avenue North and then 2700' along the western side of 28th Street North. The distance from pole centerline to the abutting edge of roadway right of way is 10'. Estimated affected pine flatwoods, 132,000 sq. ft. or 3.03 acres. The density of trees in the impact area is not large with a one tree per 5000 sq.ft. relationship representative.
- Brazilian pepper and other disturbed vegetation - 2000' along the eastern side of 28th Street North then 3050' along the northern perimeter of the existing FPC power line right of way to the FPC northeast substation. This vegetation is essentially continuous with the exception of 400' where Highway I-275 is crossed. Total estimated affected land is 202,000 sq. ft. or 4.64 acres.

Probably the most sensitive condition which the transmission line will impact centers on the visibility of the structures at residences to the west of 28th Street (the mainlands of Tamarac, situated 0.64 miles distant). Due to the levelness of the terrain and the limited screening afforded by trees the power lines will be very obvious, especially where they parallel 28th Street. In retrospect, the selection of the proposed transmission line route is based on an analysis of least impact/ economic feasibility criteria; thus the proposed orientation is presented as the most sound from all practical standpoints. Therefore, the adverse impact of tower visibility at nearby residences is deemed unavoidable. However, the presence of a much larger power line and right of way already transecting these same residences (see Figure 2.2.2.a) mitigates considerably the initial implications of proposed line erection.

4.3.3 New Roads

Clearing associated with transmission line construction has been discussed in previous sections; essentially a 40' wide right of way will be established and maintained. Access to power lines will be rendered via service roads within the clear area. It is not anticipated that any new roads will be constructed.

4.3.4 Erosion

As all construction activity will occur on level sites, runoff produced erosion will be negligible. Exhaustive erosion control will not be implemented unless conditions arise which warrant such applications. In such cases mulching with hay will generally be practiced.

4.3.5 Impact on Agriculture

The construction of the transmission facilities will not affect any existing or projected agricultural activities.

4.3.6 Mitigative Measures

As transmission line erection is of minor magnitude in relation to recovery plant construction, considerable adverse impacts, such as water and wind erosion, are not anticipated. Should conditions warrant control application (e.g. during unusually wet or dry periods) the techniques for erosion and dust control discussed in Section 4.1.6 will be exercised. Debris from right of way clearing will probably be windrowed and burned (again in accordance with local regulations); any non-processible wastes (concrete, lumber, plastics) will be land-filled at the existing county solid waste disposal site.

No activity associated with plant and associated transmission line construction will adversely impact a rare or endangered species. The eventual enhancement of surficial and aquifer water quality as a direct result of the termination of putrescible waste disposal practices will benefit important (i.e. sport, endangered, etc.) species in the study area and in watershed termini.

4.4 Resources Committed

Construction of the resource recovery plant will necessitate the permanent alteration of approximately 30 acres of land. Most of this land is composed of the pine flatwoods community while lesser tracts are characterized by man-induced disturbances (e.g. landfills) and subsequently established vegetation (e.g. Brazilian pepper, lantana, etc.). When evaluating the impacts of losing such terrain as wildlife habitat one should be keenly aware of the alternative situation; that is, the consequences of continued solid waste disposal by landfilling and the extremely large expanses of identical habitat which will be destroyed. In essence, by switching to the proposed resource recovery method over conventional solid waste handling techniques, the amount of land needed to meet the crescive demand of waste disposal in Pinellas County is drastically reduced.

Long term economic benefits also are probable by construction of the proposed facilities in lieu of the continuation of current landfilling practices. Analysis has shown (reference Chapter 7) that a savings of over 50 million dollars could be realized over a 20 year operating period. While this figure is abstract, it does illustrate the potential economic impact of selecting the resource recovery option in addition to the social and environmental factors.

CHAPTER 5

ENVIRONMENTAL EFFECTS OF PLANT OPERATION

5.1 Effects of the Operation of the Heat Dissipation System

5.1.1 Temperature Effect on Receiving Body of Water

As presented in Chapter 3, cooling water make-up for the mechanical draft cooling towers will come from the City of St. Petersburg and City of Largo non-potable water supplies (treated wastewater effluent). Make-up water may be withdrawn from the stormwater retention pond just south of 110th Avenue (see Figure 4.1.1a), if water levels approach overflow conditions. Cooling tower blowdown will either be further utilized (as residue quench water) and ultimately discharged into the Pinellas Park domestic sewer line, or mechanically entrained or evaporated to the atmosphere. No related effluent will be discharged to any hydrologic unit, be it surficial or ground water. With this, discussions of thermal impacts on receiving waters are not germane to this application.

5.1.2 Thermal Limits - See Section 5.1.1.

5.1.3 Effects on Aquatic Life - See Section 5.1.1.

5.1.4 Effects and Implication of Entrainment

Following prolonged periods of excessive rainfall the water level of the retention pond may approach an overflow condition; to prevent such spillage and subsequent flooding (thereby retaining all stormwater on site) it will be necessary to pump the excess to an alternative fate. So that the overall drainage design will continue to be site oriented and closed to adjacent surface waters, it is being considered that such excess flows be diverted to the cooling tower as an auxiliary make-up supply. Once the optimum pond water level is achieved, cooling water withdrawals will cease.

The 22 acre pond was originally a borrow pit which has subsequently filled with water via seepage from the water table aquifer. It is estimated that the average depth of the rectangular pond approximates 5 feet. Empirical data on pond water quality are lacking; however, it is probable (from field observations) that nutrient concentrations are in relative imbalance with system assimilative capacities. This phenomenon is also evident in all study area surface waters. As the pond is located upgradient of both existing and former landfills, an absolute source of nutrients is not readily discernable; two potential contributors, however, are speculated. First, the water table at the pond site could be affected by a landfill leachate plume which migrates into pond waters during excessive wet periods. Second (and more probable) large flocks of seagulls very frequently concentrate on and around the pond; wastes from these birds are high in nitrates and phosphorus and could conceivably exacerbate nutrient concentrations in this lentic system. In either case, based on the visual similarities of this pond to adjacent surface waters (with respect to obvious eutrophic characteristics) it is assumed that data from the perimeter ditch (Table 2.5.4.a) are likewise representative of pond conditions.

Approximately 50 percent of the pond littoral zone is moderately vegetated with cattails; the remaining shoreline is composed of exposed soil. While submergent vegetation (i.e. macrophytes) is profuse in many areas, it appears that the unidentified specie(s) suffer(s) from photosynthetic stress incurred by enwrapping growths of epiphytic algae. This same excessive algal growth covers all of the observed benthic substrate. With regard to endemic fauna, it is speculated that pond fish species will be restricted to typical eutrophic organisms, specifically, the Poeciliidae and Centrarchidae; Several unidentified amphibians (frogs) and reptiles (turtles) were also observed. The pond is probably most significant to birds, especially those hundreds of seagulls which often invade the pond surface.

With these ecologic conditions in mind and in lieu of the very limited water withdrawals proposed (i.e. only to regulate pond levels), it is anticipated that implications of entrainment, impingement and entrapment will not severely stress the functional aspects of the pond ecosystem. As algal concentrations and vegetative debris within the pond are substantial, sophisticated screens, representing the best available technology will be installed at the cooling water intake, thereby minimizing adverse environmental impact (in accordance with Section 316.b, PL 92-500) and potential interruption of the cooling tower processes.

5.1.5 Biological Effect of Modified Circulation

The retention pond in question is a closed, very shallow surficial water body. With this it can be stated that circulation within the pond, while limited, is probably in direct response to wind conditions and, to a lesser degree, groundwater flow; thermal stratification is not probable, thus seasonal mixing is not a plausible factor. The limited withdrawals of water proposed will produce short-term modifications of an already restricted circulation. At a maximum pumping rate of 300 GPM the impact of altered flow will probably prevade through most of the pond. Turbidity and sedimentation from scouring will be confined to the immediate vicinity of intake structure. However, given that the withdrawals will occur only when water levels are excessive, overall long-term alterations in ecologic schemes due to such phenomena are deemed negligent.

5.1.6 Plant Operation Effects

As previously discussed, utilization of pond water will not occur with any degree of regularity; it is reasonable to assume that no withdrawals will occur for months, possibly years, at a time. Thus, the relative dependence of the pond ecosystem on plant operation will be basically non-existent.

5.1.7 Effects of Offstream Cooling

The potential for fogging from cooling tower emissions was evaluated by analyzing the saturation deficit with respect to ambient meteorologic conditions (STAR program) and cooling tower emission specifications. Based on this analysis, plant induced fog is anticipated to occur at an average rate of 14.08 days per month with heaviest occurrences noted during the winter months. As this potential is measured at the stack outlet, fogging in outlying areas is expected to decrease as a function of the ambient saturation deficit.

Section 5.2.2 and Appendix B of this application feature the expected disposition of mechanically entrained water droplets in the environment; the dispersion of this water is considered significant in that the droplets will contain the chemical constituents of the cooling tower make-up supply.

5.2 Effects of Chemical and Biocide Discharge

5.2.1 Aquatic Discharge from Industrial Type Wastes

Corrosion inhibitors and anti-fouling agents, as identified in Section 3.5, will be collected in the cooling tower and boiler blowdowns. These wastestreams (with an average combined flow of 339 gpm - Figure 3.3.a) will be augmented by flow from the demineralizer backwash (average flow of 6 gpm). All wastes will be temporarily stored in a holding tank, monitored and stabilized for pH and, with the exception of a 20 gpm flow diverted as a residue quench supply, eventually discharged to the Pinellas Park sanitary sewer system. All domestic wastewater and effluent from tipping area washdown will likewise be routed to the above cited holding tank for stabilization and discharge. No process or sanitary wastewater will be discharged to any surficial or ground water. Impacts of the proposed stormwater treatment system are discussed in Section 5.3

5.2.2 Cooling Tower Blowdown and Drift

Cooling tower blowdown is discussed in Section 5.2.1 above as a constituent of aquatic discharge from the plant.

Drift on the other hand is that portion of the cooling system flow stream which is entrained in the forced air stream in the tower and which is carried out of the tower in the rising plume. This drift discharge unlike the evaporated portion of the plume has physical and chemical characteristics the same as those of the cooling system water (see Table 3.4.5.a). The drift discharge flow rate will average 37 gpm. The droplets within the drift stream will be deposited on the terrain about the point of discharge at radii varying with meteorologic conditions. The most compact profiles of distribution will occur during both very low velocity winds and very high velocity winds. A detailed discussion in Appendix B presents the effects of wind velocity and temperature on areas over which the droplets are deposited. A typical example based on average January conditions shows the deposition of drift in the following manner:

Cumulative % of drift	radius to deposition (km)
2	.075
11	.091
27	.123
48	.191
70	.413
90	2.1

5.2.3 Effects on Sources of Drinking Water

Potable water will be withdrawn at an average rate of 116 gpm from the Pinellas Park water supply. An estimated 66 gpm of this flow will be used as boiler feed water make-up with the remainder utilized for resident potable and sanitary needs. At such a small flow rate no adverse impacts on local water supplies (which are obtained remote from the site) are noted.

5.3 Effects of Sanitary and Other Wastes

As discussed in Section 3.6, discharges to the Pinellas Park sewer line will be composed of sanitary and process blowdown wastes. It is estimated that the total effluent flow will average 375 gpm.

A unique feature of system design is the provisions made for the storage and treatment of site generated stormwater runoff and landfill cell water; pertinent details are presented in Section 3.10. As a result of drainage system operation, essentially no water will be discharged from the plant site (including landfills) into any surficial watershed or aquifer except in the event of extremely heavy rainfall.

Two options for emergency flood control are proposed. First, as discussed in Section 5.1.4, excessive water will be diverted to the 22 acre retention pond for subsequent utilization as cooling water make-up. The second alternative centers on an emergency spillway situated in the perimeter ditch at the extreme southeast corner of the sprayfield. Theoretically, the sprayfield water which would be discharged at that point will be of higher chemical quality than that cited in the receiving 28th Street ditch. This is due to the treatment afforded in the oxidation/hyacinth/chlorination ponds and the further dilution of this water by rainfall. Based on the expected good quality of discharged water (as opposed to ambient receiving surface waters) and of the low probability of such discharges occurring, adverse impacts to surficial waters are not apparent. Likewise, the chemical characteristics of the sprayfield effluent should not exacerbate water quality in the underlying water table aquifer. On the contrary, by applying the treated water to the soil as proposed, some amelioration of poor water quality in the surficial aquifer underlying the sod farm is possible. In light of the water quality data from shallow wells beneath the sod farm (which indicate poorer quality water than noted in surface waters - see Table 2.5.4.d), and as the groundwater gradient slopes toward the sod farm from the proposed sprayfield, the dilution and subsequent improvement of adjacent groundwater quality due to spray irrigation is a conceivable assumption.

The hardware to be utilized at the sprayfield proper is discussed in Section 3.10. With regard to high pressure jet sprays, untoward impacts are historically attributed to the downwind drift of fine spray particles. In addition, the visual impact of a sprayfield often fosters antagonistic reactions from nearby residents. Selection of appropriate nozzle apertures coupled with prudent operation and maintenance programs can drastically reduce fine aerosol production, thus greatly limiting areal dispersion. The proposed construction of a 20 foot berm around the sprayfield, subsequently planted with fast growing evergreen trees (i.e. red cedar, slash pine), will further attenuate the drift of fine aerosols off of sprayfield properties while visually screening the sprayfield from any nearby residences.

Certain characteristics of hyacinth (Eichhornia crassipes) usage as a biological waste filter warrant consideration so as to minimize potential adverse environmental impact.

The ability of this floating vascular plant to efficiently reduce suspended solids, nitrogen species and oxygen demanding substances in waste streams is well documented; these plants have also demonstrated promissing results with regard to metals uptake and pH stabilization. It is anticipated that the hyacinth pond substrate will contain water originating primarily from stormwater runoff and inert residue landfill cell water. Typical parameters associated with runoff include suspended and volatile solids, Kjeldahl nitrogen, biochemical and chemical oxygen demands and total organic carbon. As the site will accommodate a heavy flow of truck traffic, heavy metals such as lead and chromium will probably enter the runoff stream in considerable quantities. With this it can be assumed that the hyacinths harvested from the pond will contain some traces of these potential toxins. To minimize possible ill effects fertilizer and mulch rendered from the hyacinths should be applied judiciously to non-edible plantings, such as landscape vegetation. If hyacinth metal concentrations approach hazardous levels, disposal should be accomplished by incineration in the resource recovery plant. A viable alternative for such cases centers on the incineration of hyacinths to generate methane gas; heavy metals are subsequently recovered from the waste stream. This option, while having seen limited application, represents a feasible consideration should a chronic metal problem persist and a materials recovery scheme be sought.

The very rapid growth of hyacinths in a suitable medium is further characterized by the continuous shedding of root tissue. This material settles to the bottom and can rapidly accumulate to problem levels. While data on the chemical constituents of this material are lacking, it is speculated that assimilated nutrients and absorbed metals will also be present in this settled detritus. Disposal of this precipitate then must be accomplished either by landspreading or incineration and landfilling, depending on the toxicity of the material.

Other potential problems associated with hyacinth ponds include mosquito propogation, putrid odor production and hyacinth predation.

Mosquito populations have been effectively suppressed by the introduction of predatory species to the pond; such organisms include the eastern mosquitofish (<u>Gambusa affinis</u>) and dragonfly nymphs (Order Odonata). It has also been noted that even slight circulation of the water column is effective in discouraging the female mosquito from depositing eggs. This factor could be jointly employed for anthropod control and for increased nutrient uptake efficiency by the hyacinths. That is, studies have shown that nutrients tend to stratify near the surface. A slight turbulence in the water column enhances nutrient flow through the root zone, thereby facilitating absorption.

With regard to odor problems, hyacinths allowed to completely blanket the water surface will greatly inhibit sunlight penetration to euphotic algae and benthic macrophytes. A reduction in photosynthesis and, consequently, the dissolved oxygen concentration will subsequently occur. When oxygen levels fall below the 2-3 ppm productivity range by anaerobic bacteria in the benthic sediments, detritus and hyacinth roots are stimulated with the resultant generation of pungent hydrogen sulfide gas. To minimize such occurrences hyacinth growth will be regulated in a manner which permits adequate illumination of subneustonic areas. If such control is considered infeasible oxygen levels could be maintained by outfitting the pond with aeration equipment.

Experimental applications of hyacinth filtration indicate that predation on these succulent plants by coots (<u>Fulica americana</u>) and nutria (<u>Myocastor coypus</u>) can greatly inhibit hyacinth productivity and, thus, the operational efficiency of the system. On-site observations reveal that while coots do frequent study area ponds, they prefer to forage on the more abundant duck weed than on the hyacinths which occur in scattered clusters. Nutria are not known to occur at the site. A successful method for limiting such predation involves the utilization of scare sirens or horns.

5.4 Effects of Air Emissions

For both the Prevention of Significant Deterioration (PSD) and the Ambient Air Quality Standard (AAQS) evaluations it is concluded that the air quality impacts associated with emissions from the Pinellas Solid Waste Resource Recovery Facility will be minimal. It should be noted that, in accordance with Part 52, 1977 Amendments to the Clean Air Act (as promulgated on June 19, 1978) the area of significant impact of the proposed facility is virtually non-existent.

A detailed assessment of expected impacts is presented as Appendix A.

5.5 Effects of Operation and Maintenance of the Directly Associated Transmission System

5.5.1 Effects of Operation and Maintenance

There are no impacts associated with the operation of the transmission line which are considered significant. Conversations with transmission engineers of the Florida Power Corporation reveal that no problems (e.g. fire, vandalism, noise) have been associated with existing FPC power lines. Bird collision with aerial hardware is an unavoidable circumstance, although actual quantification of the problem is non-existent. Based on the preliminary sizing of the proposed transmission line, it is anticipated that some mortality will occur.

All power line rights of way are maintained by mowing; herbicides and fire are not employed. Allowed vegetation in the clear zones is limited to low bushes and shrubs. As is typical for the geographic area, cleared areas will probably be revegetated by the prolific Brazilian pepper tree. Indeed, these trees form low dense thickets under existing FPC lines in the study area. Where the proposed transmission line transects disturbed vegetation areas (see Section 4.3.2) no substantial long-term changes in the biota are noted; however, installation of the power line along the west side of 28th Street will bring about the eventual displacement of pine flatwoods habitat with less productive communities, notably the Brazilian pepper coppice. The long-term adverse impacts on endemic fauna are greatly mitigated, though, by the availability of considerable pine flatwoods habitat in directly adjacent areas.

As discussed in Section 4.3.2 the visibility of the transmission line at nearby residences represents a major consideration. Again, though, the proposed route represents the most economically and environmentally sound alternative posed. By juxtaposing the proposed power line with the existing structures, unsightly aspects are essentially concentrated.

5.5.2 Effects of Public Access

The entire route of the proposed transmission line will cover terrain already accessible (although somewhat limited) to the public; specifically, via 28th Street or the existing FPC right of way. Thus, no resultant adverse impacts on the surrounding biota are projected.

5.6 Directly Associated Facilities and Other Effects

5.6.1 Effects of Directly Associated Facilities

Upon commencement of plant operations it is estimated that 2.1 percent of the total incoming solid waste volume will require landfilling; Section 3.6.3 identifies the expected materials composition of the resultant inert residue to be subsequently landfilled. Provisions are also included for the handling of non-processible wastes (e.g. demolition debris) and the emergency landfill disposal of unprocessed solid waste in the event of partial or total plant shutdown. The specifications for the receiving landfills are presented as Appendix D of this application.

Adverse impacts associated with landfilling center on the contamination of critical hydrologic units through leachate infiltration. Due to the hydraulic characteristics of aquifer systems, leachate plumes can continue to impact groundwater quality long after the termination of putrescible waste disposal. Short term improvements in aquifer water quality, then, are not expected following initial plant start-up; rather gradual melioration, compounding with increased time, is more likely.

5.6.2 Other Plant Effects

Noise levels incurred by a worst case situation of heavy truck traffic were estimated in Section 4.1.f. The results of this analysis indicate no significant increases in ambient noise at the nearest residences. With regard to plant operation, the loudest exposed source is the turbine generator with an expected sound pressure level of 85 dBA (measured at the unit). With this in mind, and employing the same methodology as demonstrated in Section 4.1.f, this unit could impart a noise level of 48 dBA to nearest residences; again, assuming a residential area background level of 55 dBA, it is estimated that, at most, an increase in noise of 1 dBA is a very conservative appraisal. As the turbogenerator will be enclosed in louvered panels and as some trees do screen the noise source, further attenuation is highly probable.

There is also some concern regarding the visibility of the plant at nearby residences and thoroughfares. The UOP plant features several options for architectural masking designed to enhance aesthetic appeal; moreover on-site roadways and plant grounds will be landscaped. While some individuals still maintain that any industrial facility is unsightly, the alternative choice (i.e. continued landfilling of solid wastes) offers only vistas of seagulls, garbage mounds and blowing trash.

5.7 Resources Committed

Construction and operation of the solid waste resource recovery plant represent a major commitment of capital and real estate to solve a crescive problem in Pinellas County. As discussed in Section 7.1, the monetary costs of the proposed plant could be greatly exceeded if landfilling of solid wastes was the selected alternative. By drastically reducing land requirements for accommodating solid waste generation, larger undeveloped tracts in the study area can be economically developed or reserved as wildlife habitat.

5.7.1 Lost Revenues

It is apparent that the cessation of landfill disposal of solid waste will be cataclysmic to dependent scavengers, primarily the seagulls. As such large populations of these animals derive most of their sustenance from wastes at the site and nearby at Toytown, the fate of a large number of organisms is uncertain. As it is not probable that alternative food supplies are readily available in the surrounding bay area, a reduction in species population can be expected. Since predation on most of the animals is non-existent no impacts to higher trophic level organisms will occur. In any case, the types of species affected occur in great abundance throughout the bay system, the Gulf Coast and the Coastal Plains Biome; therefore, localized population reductions will not directly or indirectly compromise the perpetuation of any species.

With regard to energy supplies the amount of fossil fuel necessary to generate the equivalent electricity produced by the plant from solid waste is discussed in Section 8.2; operation of this plant, then, represents a significant step in conservation of these scarce resources.

5.7.2 Land Area Lost

Implementation of the proposed resource recovery program, as opposed to continued landfill disposal, will drastically reduce the acreage required to accommodate future solid waste generation. A cost analysis of this relationship is featured in Section 7.1 of this application.

5.7.3 Changes in Species Population

Discussions of expected alterations due to plant construction and operation are presented in Chapters 4 and 5, respectively; below is a synopsis of anticipated ecologic changes:

- The Plant Site - To be modified from partially disturbed, partially wooded (pine flatwoods) site, to a landscaped industrial tract.
- Power Line Right of Way - Pine flatwoods area will be displaced by disturbed vegetation (e.g. Brazilian pepper trees).
- Exclusive food supply for landfill scavengers will be removed; considerable localized reductions in ubiquitous species populations (primarily seagulls) is anticipated.

CHAPTER 6

ENVIRONMENTAL MEASURES AND MONITORING PROGRAMS

6.1 General

This section will review those methodologies employed in the formulation of the PPSC document; in appropriate sections those monitoring programs proposed for post-construction environmental evaluation will be discussed.

6.2 Pre-Application Monitoring

With few exceptions, pre-application monitoring did not occur; baseline data collection relied primarily upon literature review, interviews with relevant technical and administrative personnel, and the expertise of the applicant and their consultant in the formulation of such evaluations. It is anticipated that the following pre-application monitoring programs will be implemented:

- On-site soil borings - for design purposes
- A hydrogeologic evaluation of the site by the United States Geological Survey

Final design borings will be performed by a certified testing laboratory; a specified contractor has not yet been designated. The U.S.G.S. has been under contract by Pinellas County for approximately 3 years gathering data pertinent to the County's landfill operation and proposed resource recovery program. A report of findings is being finalized at this time. Draft information from this report was utilized in the preparation of this document. A comprehensive listing of data sources are featured in the reference section of this document; extracts dealing with specific figures and conclusions are documented and cited at the bottom of the respective page.

6.2.1 Surface Waters

Surface water data for the perimeter canals of the landfill were obtained from the U.S.G.S. data retrieval network (WATSTORE); this data encompassed a continual regimen with six observations from May 1975 through October 1976. A detailed study specific to the facility site is currently being prepared by the U.S.G.S. By comparing the concentrations of critical parameters with those recorded at nearby locations (Cross Bayou Canal, Toytown Landfill, etc.) and those proposed in Chapter 17-3, FAC, an assessment of water quality was provided.

6.2.2 Physical and Chemical Parameters

The U.S.G.S. monitors certain surface water quality parameters on a routine basis; these include arsenic, cadmium, chromium, lead, mercury, nitrates, ammonia, chlorides, copper and pH. In addition, the U.S.G.S. has the capability to monitor the following parameters: radium, gross alpha particle activity, selenium, silver, 2,4-E, alkalinity, aluminum, antimony, fecal coliform, beryllium, bromine, dissolved oxygen, hydrogen sulfide, iron, nickel, polychlorinated biphenyls (PCB's), zinc and phosphorus. All U.S.G.S. samples are filtered in the field; nutrient samples are analyzed in Ocala, Florida, while all other parameters are shipped to Atlanta for analysis.

6.2.3 Ecologic Parameters

Independent field investigations were conducted by qualified personnel from the Pinellas County Department of

Environmental Management and by the County's environmental consultant. As the site occupies a highly disturbed tract currently subjected to landfill activities, a comprehensive field study was deemed unnecessary. In essence, some tracts identified as pine flatwoods during the field surveys are today mounds of debris and fill material. Therefore, no attempt was made to develop such an ecologic parameter as a species diversity index; rather, it was the intent of the survey to identify the major plant communities of the site and to observe the indigenous biota, thereby developing cursory judgments on specific populations. From this initial data, evaluations of interspecific relationships, habitat characteristics, and other functional ecologic aspects (e.g., trophic structures, species/substrate dependence, etc.) were evaluated by individuals well versed in the local flora and fauna.

6.2.4 Groundwater

The data from the U.S.G.S. were also utilized for the qualitative evaluation of study area groundwaters. As well data from the plant site were insufficient at the time of this evaluation, observations from nearby wells were employed in the water quality assessment. For water table aquifer evaluation, data from U.S.G.S. well number 275157082401901, located next to 28th Street North approximately 1200 meters south of 110th Avenue North, were used; limestone aquifer water quality assessments are based on data from a St. Petersburg sod farm deep well, U.S.G.S. number 275210082395901, located some 930 meters southeast of the proposed facility site. As was discussed for surface water monitoring, the U.S.G.S. filters all samples in the field; nutrients are analyzed in Ocala; all other parameters are measured in Atlanta. The U.S.G.S. routinely monitors arsenic, cadmium, chromium, lead, mercury, and nitrates in groundwater samples; other parameters commonly evaluated include barium, fluorides, radium, gross alpha particle activity, selenium, silver, 2,4-D, toxaphene, endrin, lindane and methoxychlor.

It was the intent of the quality assessments to correlate the conclusions with those pertinent sections of Chapter 17-3, FAC (i.e., Section 17.3.101) as written prior to the submittal of this application.

6.2.5 Air Quality

The air quality data collected by the Pinellas County Department of Environmental Management, Air and Water Quality Division, were utilized to assess baseline ambient air quality conditions.

County monitoring sites which assess the air quality in the vicinity of the proposed facility are: Airport, Koger, Largo, Oakhurst, and Woodlawn (Figure 2.8.2.a). Nitrogen dioxide, sulfur dioxide and particulates are measured once every six days for twenty-four hours at each of the above locations. Federal reference procedures are used for sample collection and analysis. Bubblers have been temperature controlled since June 1977.

Specific analytical methodologies employed are featured in Section 2.8.2 of this application.

Atmospheric dispersion models represent the state of the art in air pollution and source evaluation studies. To assess the impact on ambient air quality incurred by the commencement of operations at the proposed facility, certain models comprising the EPA UNAMAP-III series were employed. Appendix A of this document provides a complete assessment of air quality impacts imparted by proposed facility air emissions including a discussion of specific model applications.

6.2.6 Geology

Geological cross sections, strata profiles and morphologic discussions were extracted from U.S.G.S. publications and reports concerning the Toytown Landfill (one mile east of the facility site) and from data assembled for a U.S.G.S report on the hydrogeologic characteristics of the facility site.

Topographic data, including flood prone area determinations, were obtained from 7.5 minute quandrangle sheets of the area.

Soils data were compiled from the Soil Conservation Service soil survey of Pinellas County.

6.2.7 Archaeology

The cursory review of historical and cultural sites of local significance is based on literary research. A portfolio of these findings and of pertinent development aspects was sent to the Bureau of Archives and Historic Records; their evaluations and response are presented as Appendix F.

6.2.8 Noise

No noise surveys have been conducted at the facility site. All calculations and assessments featured in Chapters Four and Five of this document are based on theoretical assumptions proposed in Bolt, Beranek and Newman, and Lyons.

6.3 Construction and Operational Monitoring

6.3.1 Sampling Techniques

Subsurface profiles will be determined by a certified contractor employing a standard penetration test. This technique utilizes an open-ended, split barrel sampler driven into the soil to collect samples. At each sample depth the standard 140 pound hammer, attached to the required length of drill rod, will be repeatedly raised and dropped 30 inches to drive the sampler into undisturbed soil. Driving of the sampler is continuous for either 100 blows or for 18 inches of total sampler penetration, whichever occurs first. The number of hammer blows required to drive the soil sampler each 6 inch increment is recorded. The sampler is then dislodged and brought to the surface where soil retained in the split barrel is removed and classified, with a portion sealed in a labeled jar for storage. Samples are stored a minimum of 90 days.

Hydrologic sampling will be conducted by the U. S. Geological Survey. It is anticipated that new well clusters will be drilled at the hyacinth ponds and along 28th Street just northeast of the oxidation/hyacinth ponds (north of well 26, Figure 2.5.4.a). Initially, a "shotgun" sampling regimen will be employed to assess the baseline concentrations of those parameters cited in Sections 6.2.3.1 and 6.2.3.4; subsequent continual sampling will focus on the following critical parameters: specific conductance, dissolved solids, chloride, total organic nitrogen, ammonia nitrogen and chemical oxygen demand. Surface water sampling will probably be conducted in the proposed stormwater retention pond; the sampling regimen will be essentially the same as discussed for the well clusters. To evaluate the water budget for the proposed sprayfield and stormwater drainage system, U.S.G.S. has proposed that a rain gauge and evaporation pans be situated in pertinent areas; details of specific methodologies are at this time unavailable.

6.3.2 Modifications

Modifications to natural drainage will be indirectly monitored by the hydrologic sampling discussed in the previous section.

6.3.3 Use of Previously Gathered Data

Documentation of data sources are presented throughout the application; data reports supported by the applicant are identified in the reference section.

6.3.4 Surface Waters - See Section 6.3.1.

6.3.5 Physical and Chemical Parameters - See Section 6.3.1.

6.3.6 Ecological Parameters

No programs for monitoring the ecologic impacts of plant installation and operation are proposed.

6.3.7 Groundwater - See Section 6.3.1.

6.3.8 Air

It is proposed that air quality data measured at the airport receptor (approximately 3.22 km north) will adequately represent site conditions; monitoring methods for this receptor are presented in Section 2.8.2.

6.3.9 Geology

Soil boring will be performed as discussed in Section 6.3.1.

6.3.10 Archaeology

No pre- or post-construction archaeologic monitoring will occur; as specified in Appendix E no historically or culturally significant areas will be impacted by plant construction or operation.

CHAPTER 7

ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATIONS

7.0 The County has made a commitment to take a leadership role in resource recovery and to provide a system for the disposal of solid waste which is ecologically sound, will recover useable materials, will generate energy from solid waste material and will reduce the amount of land required for the final disposal of the waste. The major economic and social consequences of building and operating the facility are not readily quantifiable but, at the same time, must be weighed against monetized effects. The cost-benefit comparisons at times appear to be irrational with the costs outweighing the measurable benefits, and this represents the County's willingness to pay for these non-quantifiable benefits.

7.1 Benefits

Pinellas County, Florida, has been faced with the problems associated with land disposal for many years. Land prices have risen rapidly, land has become less available, and public resistance and regulatory control have restricted the permitting of additional landfill sites. The County's progressive leaders have seen the need to provide a more efficient method of solid waste disposal. To this end, the County has committed itself to provide a modern resource recovery facility with the following benefits as incentive.

Initially the facility will receive some 530,000 - 570,000 tons of solid waste per year (a capacity of 728,000 tons/year will be provided). Certain forms of non-combustible demolition debris will still go directly to the landfill, however, of the 530,000 - 570,000 tons processed by the facility it is anticipated that less than 3 percent (containing less than 0.2 percent putrescible matter) will ultimately have to be landfilled. This substantial reduction in the waste tonnage represents a corresponding volume reduction and, therefore, a similar savings in the amount of land annually consumed by landfilling operations.

In addition to reducing the amount of land required for solid waste disposal, conversion from landfilling of raw garbage to process residue landfilling will reduce further damage to the water table since the processed material is relatively inert (i.e. less than 0.2 percent putrescible matter) consisting of the burned out material discharged from the grate and flyash having had recoverable materials removed. Landfilling this material will have the added benefit of materially reducing the number of seagulls that are attracted to the site by the presence of raw garbage. The seagulls present a potential hazard to aircraft climbing from or descending to the St. Petersburg-Clearwater International Airport, since the site lies close to the extended main runway centerline of this airport.

As part of the waste disposal program, the plant will generate a minimum of 262 million kilowatt hours of electrical energy per year (based on the guaranteed tonnage of 530,000 ton/year and 495 KWH/ton net output) which can be related to a reduction in the use of imported crude oil of 742,000 barrels per year. Over a 20 year period, this will amount to a minimum 14.8 million barrels. Although oil prices in the future are difficult if not impossible to predict, at present oil prices this reduction in imported crude oil conservatively will amount to a reduction of approximately $200 million in foreign spending. This is an extremely conservative figure since no inflation was accounted for.

The recovery and recycling of marketable materials (ferrous metals and non-ferrous metals such as brass and copper) will help to abate the existing scarcity of these resources. Annually a minimum of 33,000 tons of ferrous metals, 1,600 tons of aluminum and 636 tons of heavy non-ferrous material will be recovered from the waste stream. Other materials (such as glass, aggregate material, and segregated non-ferrous metals) will be recovered at such time as is economically feasible.

In addition to providing electrical energy, reducing the requirement for imported oil, and the recovery of processed resources, these recovered resources will generate revenues which will be applied to offset the overall cost of owning and operating the facility. Although initially somewhat more expensive than landfilling, the resource recovery system of disposal, in addition to being an ecologically sound method, could become less expensive than landfilling if energy prices and real estate prices continue to rise.

To quantify the estimated cost benefits of constructing the plant, as opposed to the continued landfilling of solid waste, a cursory analysis was conducted by the County's consultant. This evaluation examined the comprehensive aspects of constructing and operating the plant over a twenty year financing period; such items included tipping or user's fees, bonding costs, recovered materials revenues, energy revenues and general overhead and maintenance. All costs were adjusted to reflect projected inflationary trends. Similiary, landfill costs were rendered through the analysis of existing and expected waste disposal costs, land requirements to meet forecasted demand, and the anticipated price of the necessary land, all in the light of inflationary trends. Based on this evaluation, it is estimated that the total net resource recovery costs to the users through 2001 are estimated to be $62,000,000, while continued landfill disposal of solid wastes will approximate $83,000,000 in cost to the users. Therefore, it is anticipated that an overall savings of approximately $21,000,000 could be realized. Furthermore, at the end of the twenty year finance period Pinellas County will have purchased this complex recovery plant. Assuming proper maintenance, the twenty year old plant may be worth 50 percent of the new facility, whereby the present worth of the County owned plant could enhance the overall savings by approximately $29,000,000; total cost savings are estimated at $50,000,000. In addition, the advantages of selecting the resource recovery option on social and environmental factors, while abstract quantities, will certainly impart profound economic benefits.

Since the selected resource recovery system will most likely be one of the first of its kind in the United States (raw solid waste fuel to electricity), it can be expected that its operation will contribute significantly to the advancement of the resource recovery activity in the country. Reception and viewing areas provided for the public will serve as an educational tool to promote the understanding and support for this type of solid waste disposal.

The structure itself will be aesthetically pleasing with extensive landscaping on the ground surrounding the structure (refer to artist's rendering in Figure 3.1.b). The phasing out of raw refuse landfill operations which will be made possible by the existence of the facility will enhance the value and appearance of the area.

Operation of the plant will require a staff of 51 people (8 administrative, 32 operations and 11 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 $765,000 will put $15.3 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 $60,000,000 construction project in the area. This will provide jobs for local construction labor, as well as an input to the local economy through the purchase of construction materials and services.

7.2 Costs

The land on which the facility will be built, although presently owned by the County, must be counted as a cost associated with obtaining the facility. Approximately 20 acres of industrial zoned land will be utilized exclusively for the facility and restricted from other uses. At an estimated $15,000/acre this amounts to $600,000. It should be noted, however, that this land is presently within the permitted landfill area (Bridgewater Acres Phase I). If landfilling were to continue as is the existing practice, this area would be consumed in approximately two (2) years and its monetary value as industrial land would be severely reduced, since heavy construction on landfilled property is not generally practical.

The cost of site preparation, construction of access roads, construction of the facility, utilities extension and all other legal, administrative and financing costs are estimated to be approximately $80 million. These costs are expected to be financed by the County. A variety of financing arrangements are being investigated to determine the most suitable method. As a breakdown of cost plus interest is not available at the present time. It is impossible to compute the total cost discounted to present dollar value. The figures below indicate an approximate breakdown of the cost as available at this time.

(all costs subject to minor change during final negotiations and bond sales)

	$ x 1,000
Contractor Cost	$58,649
Permits & Fees	1,801
Additional County Costs	2,125
TOTAL CAPITAL COSTS	62,575[a]
Bond Costs	14,642
TOTAL BOND ISSUE	$77,217

[a] contains escalation allowances

In addition to the initial cost of the facility, the County will pay the operator of the facility an annual operating and maintenance fee of $3,550,000 (based on 530,000 tons/year and 1978 costs). These costs will be adjusted periodically, in accordance with certain selected price indices, during the duration of the operating agreement. It is difficult if not impossible to estimate the present value of the operating and maintenance over the full 20 year period.

The facility will be constructed at the present landfill location. Traffic volume may be expected to increase since once the facility is operational, all of the County's waste can be expected to be delivered there. At present, approximately 26 to 32 percent of the refuse generated in the County is disposed of at this site. During the construction period there will also be an increase in traffic at the site, however, this will be of relatively short duration (32 months) and the traffic increase will generally be at the access to the site (118th Avenue) which is not a through road to the east.

As mentioned in Section 5.2.3, ecological losses, i.e. displacement of wildlife and disruption of environmental services, will be minimal and therefore have not been included in the costs of the project.

Table 7-1 summarizes the cost-benefit comparisons for the Resource Recovery Project.

TABLE 7-1

COST - BENEFIT SUMMARY

RANGE	COUNTY	UOP	PUBLIC AT LARGE
		COSTS	
Short range	Permits, insurance and other fees - $1,801,500. Additional county costs for adjunct facilities - $2,125,700	Pre-construction monies prior to progressive payments to County.	
Long range	Annual debt service on bond issue - $7 million/yr. Initial increase in cost of solid waste disposal (estimated to be less than $1.00/household per month above current rates - initial year). Total tipping fee revenues $4,970,000/yr initially Operating fee to UOP ($3,904,000/yr initially). Additional County costs ($1,460,000/yr initially)	Maintenance and operation of Resource Recovery Facility ($3,904,000/yr initially)	

TABLE 7-1 (con't)

RANGE	COUNTY	UOP	PUBLIC AT LARGE
		BENEFITS	
Short range	Reduction in seagull hazard at St. Petersburg/Clearwater International Airport	Profit fees associated with rewarding of $58.6 million construction project.	
	Allows "phasing-out" of numerous small landfill operations.	Public awareness of capabilities of firm to construct resource recovery facility.	
	Jobs created in County for $58.6 million construction project.		
Long range	Efficient disposal of solid waste.	Revenue provided by 20 year operating contract.	Reduction in crude oil imports displaced by solid waste fuel and resulting reduction in foreign payments
	Large reduction in land requirements for solid waste disposal.	Marketing advantage of having a domestic plant in operation for potential clients' observation.	Reduction in habitat of pathogenic vectors.
	This method of disposal as compared with continued landfill operation will likely result in long term savings.		Prevention of further damage to the surficial aquifers.
	Less public opposition to proposed method than to continuation of landfill operation.		Facility will be used as an educational facility to inform visitors of the proposed method of resource recovery.
	Payrolls into economy ($765,000/yr initially)		

TABLE 7-1 (con't)

BENEFITS (con't)

RANGE	COUNTY	UOP	PUBLIC AT LARGE
Long range (con't)	Revenues derived from sale of electricity to FPC ($5,745,000/yr initially)- will likely increase due to inflationary forces. Revenues derived from materials and other revenues ($1,042,000/yr initially)- will likely increase due to inflationary forces. Tipping fees from users of the facility ($4,970,000/yr initially) - will be buffered from inflation due to offset effect of revenue increases		

NOTE: All costs subject to minor change as a result of final negotiations and bond sales.

CHAPTER 8

ALTERNATIVE ENERGY SOURCES AND SITES

8.1 Assessments of Alternative Sites

The primary purpose of constructing the type facility described in Chapter 3 of this application is to dispose of solid waste material generated in Pinellas County. The site selected is located in the same area as the existing landfill operation on land to which the County holds title. Alternative methods of solid waste disposal were investigated to ascertain the most effective plan. Most systems investigated would have been sited at the same location as the site presently selected for the resource recovery facility. The selected site is centrally located within the County which makes it logistically effective for the delivery of solid waste. The availability of land will provide proximate landfilling for many years since the volume of solid waste will be greatly reduced by combustion in the boilers.

An alternative solid waste disposal method that was investigated consisted of shredding and classifying equipment for the preparation of a refuse derived fuel (RDF) for combustion in some existing boiler. This would effectively have been power generation at an alternate site, however no firm market for the RDF was obtained due to incompatibility of existing equipment at local power plants and other sizeable boiler installations. Additional freight to more distant locations caused the project to become economically less viable.

8.2 Alternative Fuel Analysis

As mentioned in 8.1 above, the electrical generating facility would not exist except for the fact that it provides for the disposal of the County's solid waste. For this reason, no investigation was made into alternative fuels for the generation of electrical power. The electricity generated will, however, replace power which is presently generated by other type fuels (fossil and nuclear fuels).

As a means of comparison, the benefit in oil saved is substantial, especially if expressed in terms of imported crude oil. Processible solid waste will produce an average gross generation of 550 KWH/ton. Although "in-plant" consumption of electrical power will reduce the net output to approximately 495 KWH/ton, this represents roughly 1.4 times the net electrical energy available from 1 barrel of crude oil.

On this basis and an assumed minimum annual throughput of 530,000 tons, a reduction of 742,000 barrels/year will be realized. Over the 20 year project period this will amount to 14.8 million barrels.

8.3 Reasons for Selecting Final Site and Fuel

Site Selection

1. Centrally located within the County on County owned land.

2. Close proximity to existing Florida Power Corporation substation.

3. Contiguous with existing County landfill operation allowing efficient routing of nonprocessible material from the scales to the landfill as well as affording a short haul distance for the disposal of boiler residue.

Fuel Selection:

1. The disposal of the solid waste material (which is the fuel) was the problem. The powerplant was selected as the most effective solution to the problem and no other fuels were considered.

CHAPTER 9

PLANT DESIGN ALTERNATIVES

The selection of the design of the facility was based upon a two part procurement process. Initially a request for qualifications (RFQ) was made available to any firm wishing to submit its qualifications for appraisal by the County and its agents. Twenty-two responses were made to the RFQ from which seven firms were selected as fully qualified to design, construct and operate a facility for Resource Recovery in Pinellas County. A second document, the Request for Proposals (RFP) was sent to the seven qualified firms asking for the type of facility they would propose to build and operate in the County. Prices for the facilities and the operation were also submitted in the proposal. Detailed analysis was made of each proposal with primary emphasis upon the following areas:

1. Economic Feasibility
2. Technical soundness
3. Environmental acceptability
4. Level of experience

Site visitation trips were made by the evaluation team to several domestic and European installations that had been constructed by the selected firm.

Since the design of the system is the culmination of many years of experience in solid waste systems by the selected firm, UOP, Inc., no alternatives were selected on the basis of electric generation alone.

REFERENCES

REFERENCES

Wiener, F.M. and D. N. Keast, "Experimental Study of the Propogation of Sound Over Ground." J. Acoust. Soc. Am. 31, 1959.

Embleton, T., "Sound Propogation in Homogeneous Deciduous and Evergreen Woods." J. Acoust. Soc. Am. 35, 1963.

Lyon, Richard H., Lectures in Transportation Noise, MIT Press, 1973.

U. S. Environmental Protection Agency, Noise from Construction Equipment and Operating Building Equipment and Home Appliances, prepared by Bolt, Beranek and Newman, 1971.

American Meteorological Society, Lectures on Air Pollution and Environmental Impact Analyses, 1975

PEDCO-Environmental, Air Quality Modeling in Hillsborough, Pinellas and Polk Counties, Florida, Volumes I and II, prepared for the U.S. E.P.A. and F.D.E.R., 1976.

Cavender, James H., Davis S. Kircher and Alan J. Hoffman, Nationwide Air Pollutant Emission Trends 1940-1970, Publication No. AP-115, U.S. E.P.A., 1973.

National Climatic Center, "Local Climatological Data: Hourly Observations, 1970-1974 for Tampa, Fla.", U.S. Department of Commerce, NOAA, Environmental Data Service, Asheville, N.C.

U.S. Environmental Protection Agency, User's Manual for Single-Source (CRSTER) Model, E.P.A.-450/2-77-013, 1977.

U.S. Environmental Protection Agency, User's Guide for the Climatological Dispersion Model, EPA-R4-73-024, 1973.

U.S. Environmental Protection Agency, Addendum to User's Guide for Climatological Dispersion Model, EPA-450/3-77-015, 1977.

U.S. Environmental Protection Agency, "User's Guides to the Interactive Versions of Three Point Source Dispersion Programs: PTMAX, PTDIS and PTMTP", Preliminary Draft, 1973.

U.S. Environmental Protection Agency, Workbook of Atmospheric Dispersion Estimates, Publication No. AP-26, 1974.

U.S. Environmental Protection Agency, Guidelines for Air Quality Maintenance Planning and Analysis Volume 10 (Revised): Procedures for Evaluating Air Quality Impact of New Stationary Sources, EPA-450/4-77-001, 1977.

U.S. Environmental Protection Agency, Interim Guideline on Air Quality Models, OAQPS No. 1.2-080, 1977.

Walden Research Division of ABCOR, Inc., Handbook for UNAMAP, 1976.

Cheremisinoff, Paul N. and Angelo C. Morresi, "Predicting Transport and Dispersion of Air Pollutants from Stacks," Pollution Engineering, 1977

U.S. Air Force (USAFETAC) Air Weather Service (MAC), "Revised Uniform Summary of Surface Weather Observations", MacDill AFB, Florida, 1941-1972.

Pinellas County Planning Department, Research & Special Studies Division, Population Forecasts, August 19, 1977.*

Pinellas County Planning Department, Pinellas County Population Estimates 1970-1977, May, 1977.*

Conery, Charles, U.S. Department of Agriculture, Soil Conservation Service (Largo), personal communication to K. S. Frahn, May 3, 1978.

Chen, Chih Shan, The Regional Lithostratigraphic Analysis of Paleocene and Eocene Rocks of Florida, No. B45, Florida Board of Conservation, Division of Geology, Tallahassee, Florida, April 1965.

Briley, Wild & Associates, Inc., Central Pinellas County 201 Facility Plan, Task I-IV (draft), 1978.*

Vanatta, Earl S., Sr., et al, Soil Survey of Pinellas County, Florida, U.S. Department of Agriculture Soil Conservation Service, September 1972.

Heath, Ralph C. and Peter C. Smith, Ground Water Resources of Pinellas County, Florida, Florida Geological Survey, Report of Investigations No. 12, Tallahassee, Florida, 1954.

Cooke, C. Wythe, Geology of Florida, No. B29, Florida Department of Conservation, Geological Survey, Tallahassee, Florida, September 1945.

John E. Moore, J.S. Geological Survey, Water Resources Division, Written Communication to D. F. Acenbrack, February 4, 1977.

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*Prepared for applicant

Puri, Harbans S. Stratigraphy and Zonation of the Ocala Group, Florida Geological Survey Bulletin No. 38, Tallahassee, Florida, November 1957.

Cherry, R.N., J.W. Stewart, and J.A. Mann, General Hydrology of the Middle Gulf Area Florida, Florida Geological Survey, Report of Investigation No. 56, Tallahassee, Florida, 1970.

Hutchinson, C.B., Stewart, J.W., Geohydrologic Evaluation of a Landfill in a Coastal Area, St. Petersburg, Florida, (Water Resource Investigations 77-78), U.S. Geological Survey, February 1978.

U.S. Geological Survey, Map of Flood-Prone Areas, 1973.

Air Pollution Control Association, Recognition of Air Pollution Inquiry to Vegetation, Pittsburgh, 1970.

American Industrial Hygiene Association, Air Pollution Manual - Part 1, 1960.

Bishop, Ernest W., and Lawrence L. Dee, Jr., Rocks and Minerals of Florida: A Guide to Identification, Occurrence, Production and Use, Florida Geological Survey, Special Publication No. 8, Tallahassee, 1961.

Davis, John H., Jr., The Peat Deposits of Florida, Their Occurrence, Development and Uses, Florida Geological Survey, Geological Bulletin No. 30, Tallahassee, Florida, 1946.

Eco Impact, Inc., An Ecological Reconnaissance of Clearwater Bay Estuarine Ecosystem, Gainesville, Florida, 1973.

Pinellas County Planning Department, Zoning Maps for Pinellas County, 1978.*

U.S. Environmental Protection Agency, Guideline for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment, 1977

U.S. Environmental Protection Agency, Biological Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents, EPA-670/4-73-001, 1973

UOP Solid Waste Systems, "Proposal for Solid Waste Recovery Program for Pinellas County, Florida", 1977.*

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* Prepared for applicant

Pinellas County, Florida, "Request for Proposals" for a Solid Waste Resource Recovery Program, prepared in July 1977.*

Henningson, Durham and Richardson, Solid Waste Energy and Resource Recovery for Pinellas County, Florida, prepared for the Board of County Commissioners, Pinellas County, Florida, May 1976.*

Wolverton, B.C. and R.C. McDonald, Water Hyacinths for Upgrading Sewage Lagoons to Meet Advanced Wastewater Treatment Standards: Parts 1 and 2. NASA Technical Memoranda TM-X-72729 and TM-X-72730, October 1975 and 1976, respectively.

Texas Department of Health Resources, Water Hyacinth Culture for Wastewater Treatment, Austin, 1976.

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* Prepared for applicant

APPENDIX A

ASSESSMENT OF AIR QUALITY IMPACTS RESULTING FROM THE OPERATION OF THE PROPOSED SOLID WASTE RESOURCE RECOVERY FACILITY FOR PINELLAS COUNTY, FLORIDA

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SEPTEMBER 1978

PREPARED BY

HENNINGSON, DURHAM & RICHARDSON

PURPOSE

It is the intent of this air quality analysis to identify the nature and characteristics of air emissions generated by the proposed solid waste resource recovery facility for Pinellas County and their impacts on the Ambient Air Quality Standards (AAQS) for total suspended particulate (TSP) and sulfur dioxide (SO_2) concentrations. The calculated consumption of Prevention of Significant Deterioration (PSD) increment by this facility and those pertinent major air pollution sources permitted since January 6, 1975, will also be estimated.

METHODOLOGY

- Atmospheric Dispersion Models -

The application of dispersion models represents the state of the art in air pollution and source evaluation studies. To assess the impact on ambient air quality incurred by the commencement of operations at the proposed facility, certain models comprising the EPA UNAMAP-III series were employed. Specifically, the following applications were conducted:

1. PTMAX - The maximum allowable emission rates for both SO_2 and TSP from the resource recovery facility were input; the areas of maximum concentration for a variety of wind speeds and atmospheric stabilities were thus determined.

The derived calculations of distances to maximum concentrations were cardinal factors in the selection of receptor ring distances for the CRSTER model.

2. CRSTER - This single source model was utilized to delineate the spatial and temporal distribution of both SO_2 and TSP concentrations on a specific receptor array for a one year period. Pollutant interactions of the resource recovery facility with those sources permitted since January 6, 1975, were also estimated via the CRSTER model. These were rendered by inputting each other facility's emission parameters and establishing a receptor array which coincided with the "hot spots" from the resource recovery facility. Finally, CRSTER was employed to demonstrate the potential TSP emissions from the facility (i.e., without electrostatic precipitators) as well as to evaluate the effectiveness of employing four versus three electrostatic precipitator fields; this latter effort was conducted as a part of the Best Available Control Technology (BACT) review, featured in Appendix C.

3. CDMQC - The Climatological Dispersion Model (CDM) was expanded to include a source contribution mode, internal calibration and the Larsen statistical analysis for the conversion of averaging times. This model was utilized to identify the long-term pollutant concentrations at selected receptors originating from point and area sources located in the study area. Two types of receptors were selected for

analysis. First, those air quality monitoring sites maintained by the Pinellas County Department of Environmental Management were employed for model calibration; second, receptors were specified at those areas which the CRSTER model identified as probable maximum concentration areas of pollutants generated by the resource recovery plant.

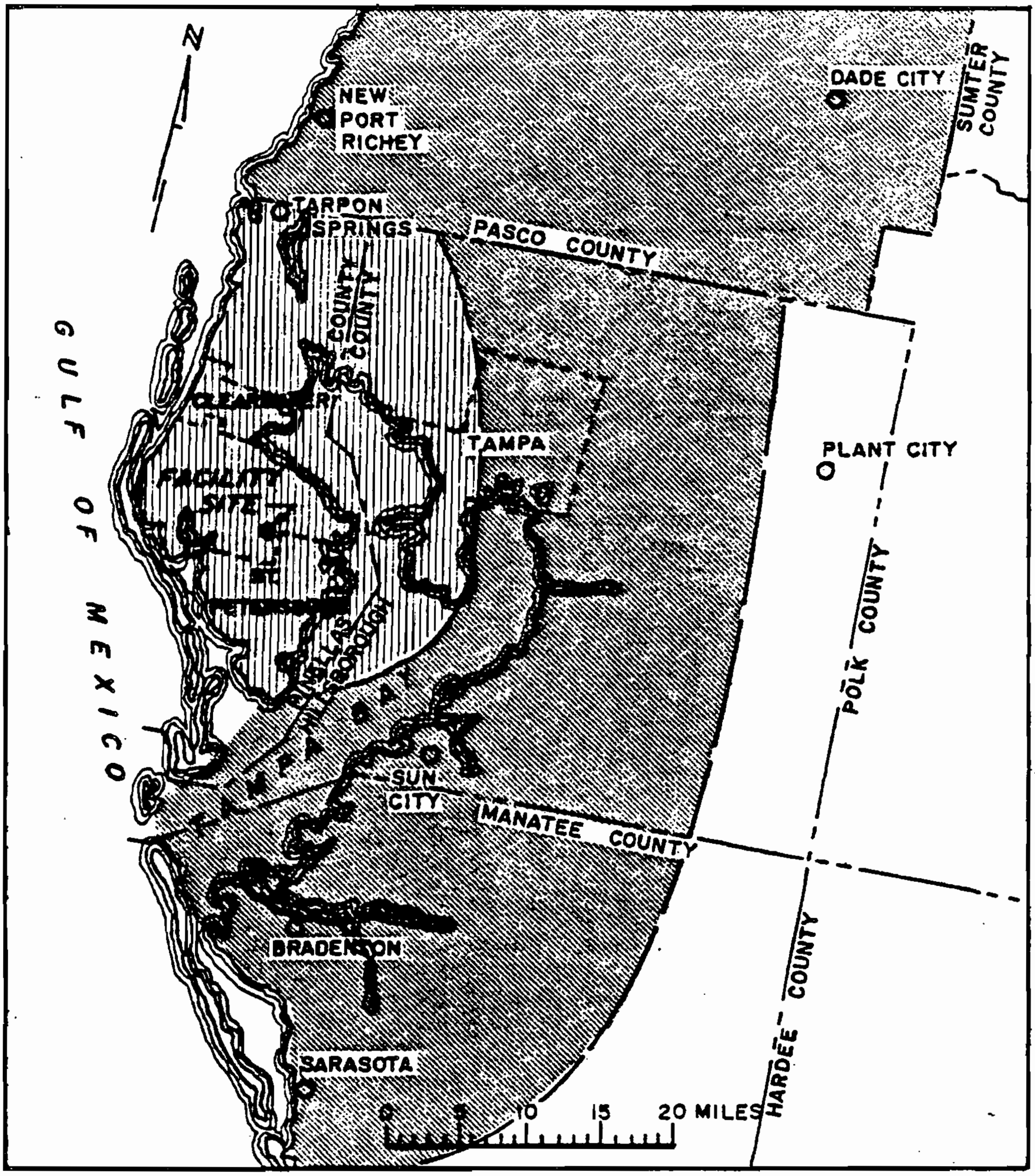
4. PTMTP - This multiple source, Gaussian plume model was utilized to demonstrate short-term pollutant concentrations incurred by the interaction of the proposed facility and those major sources permitted since January 6, 1975, under probable, worst case meteorologic conditions. Specifically, actual weather data were judiciously manipulated to simulate maximum likelihood of plume trapping atmospheric conditions; prevailing wind directions were input so as to illustrate the maximum interaction of the proposed facility and the post-baseline sources located upwind.

5. PTDIS - Using maximum emission rates for SO_2 and TSP, the model calculates selected ranges of ground level concentrations when specific meteorological input parameters are given. A single emitter is considered for each pollutant. The model uses the Gaussian and Briggs plume rise equations.

- Emissions Inventories -

The areal coverage of the emissions inventory for CDMQC model input was determined through analysis of local meteorologic conditions and model limitations (with distance), interpretation of historical reports (PEDCO, etc.), and discussion with state and private air quality modelers. Figure 1

FIGURE I



AREAL COVERAGE OF CDMINP FILE

AREA INVENTORIED FOR AREA AND POINT SOURCES

AREA INVENTORIED FOR POINT SOURCES ONLY

identifies those areas which were evaluated for point and area sources.

All source emissions data for the 1976 inventory were obtained at the Southwest District Office of the Florida Department of Environmental Regulation. Specifically, emission rates for TSP and SO_2 and pertinent stack parameters were laboriously extracted from official agency forms[1] located in the air quality files. As a substantial amount of necessary data was not available from these sources, further consultation with agency personnel was sought. The initial compiled inventory was then contrasted and compared with the information listed in the 1976 FDER "Air Emission Source Permit Inventory" (API); 1977 update material was being processed at that time by the DER staff and was also included in the evaluation for inventory completeness. Thus, the emissions data listed in the 1976 inventory (CDMINP file) represent the latest permitted emission rate for each source's respective pollutants.

To estimate ambient air quality once the resource recovery facility becomes operational, it is necessary to project those emission rates in the 1976 CDMINP file to reflect future flows. As the scope of the air quality analysis for the PPSC precludes detailed evaluation of emission changes, those figures presented in Appendix "A" of the PEDCO report were consulted. In this study emission rates

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[1] FDER "Application for Operating an Air Emission Source", and USEPA "Air Pollutant Emissions Report".

were given for 1973, 1975, 1980 and 1985. The method PEDCO employed to project emission rates is as follows:

Projected Emission Rate		=	Base Year Emission Rate x Growth Factor x Control Factor
Where:	Growth Factor	=	Ratio of Future Production Rate to Existing Rate
	Control Factor	=	Ratio of Projected Emissions per Unit Production to Existing Emission per Unit Production

Unfortunately, the PEDCO emissions inventory differs from the one developed for this analysis, consequently direct utilization of PEDCO projections was impossible. Therefore, an analysis of emission rate changes in the PEDCO report from 1975 to 1985 was undertaken. The overall plan for arriving at future emissions was to extrapolate those PEDCO rates of change for a particular type of source (e.g., power plant, cement batch plant, etc.) to identical or similar sources in Pinellas emissions inventory. In some cases there was good correspondence between the inventories; as a whole, though, they were markedly different. It was further decided to employ the PEDCO 1985 projections for this analysis; by this, our future emisssions inventory is a 1985 projection. The 1976 and 1985 CDMINP files employed in the CDMQC model runs are featured in Appendix C.

- Calibration Data -

Air quality monitoring data were procured from the Pinellas County Department of Environmental Management, Air and Water Quality Division. TSP and SO_2 data spanning a minimum one year period from the Koger, Airport, Oakhurst and Largo receptor sites (Figure 2) were subjected to log normal analysis and input to the CDMQC model. More detailed discussions of specific monitoring techniques and data summaries are featured in Section 2.8.2 of the PPSC document. It should be noted that the listings for SO_2 concentrations on the raw data sheets were frequently less than 5.0 ug/m^3; as bubbler detection limits are generally assumed to approximate 5.0 ug/m^3, all entries below this critical level were interpreted as 5.0 ug/m^3. Consequently, SO_2 calibration data is somewhat inflated.

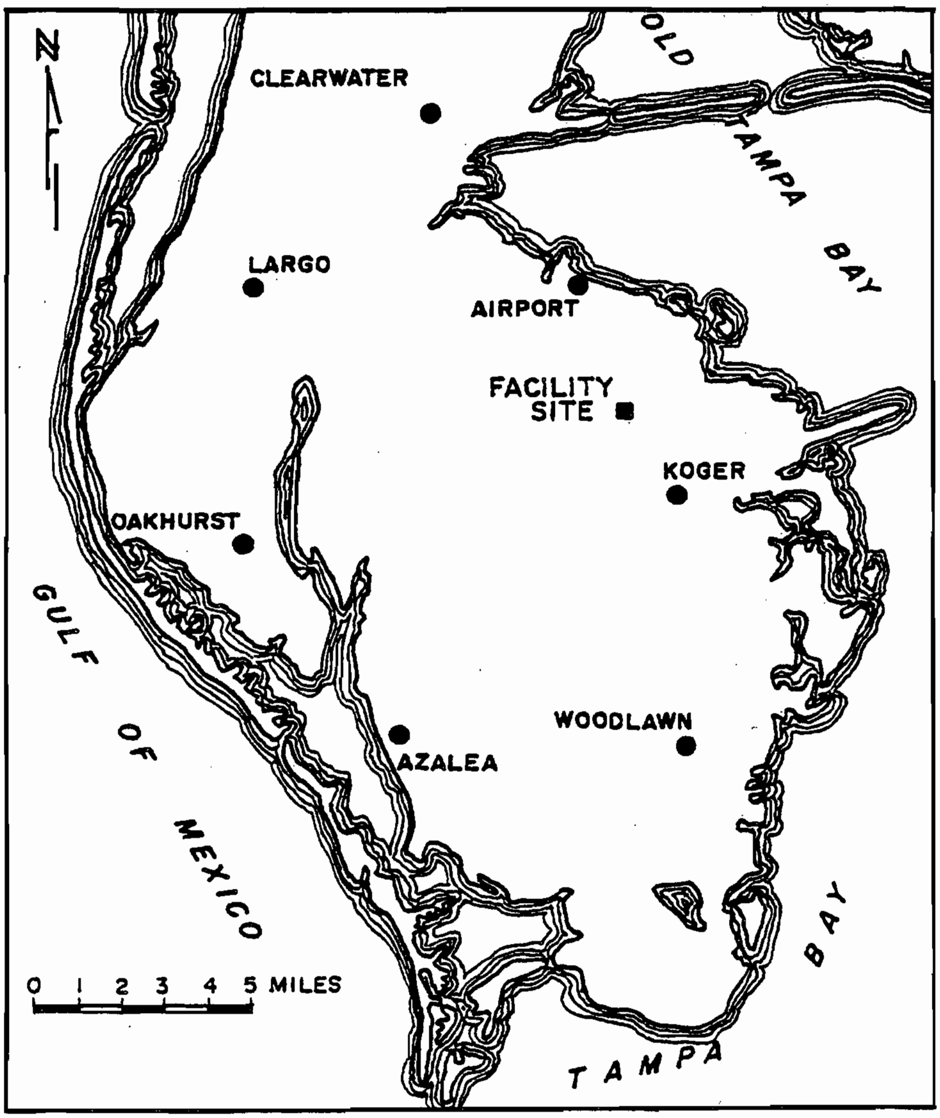
Based on technical guidance from state, municipal and private air quality principals, and on the results of an initial, uncalibrated CDMQC model run, background values of 40.0 and 0.0 ug/m^3 were utilized for TSP and SO_2, respectively.

- Meteorology Data -

Hourly meteorologic data covering the five year 1970-74 observation period for Tampa WSO were input to CDMQC; 1974 data from that receptor were utilized for all CRSTER model runs. To further delineate the extraordinary effects of marine influences on the Pinellas peninsula, the data from MacDill AFB Weather Station and the St. Petersburg/ Clearwater Airport were employed in the evaluation of model results.

FIGURE 2

LOCATION OF PROPOSED FACILITY
AND PINELLAS COUNTY AIR QUALITY MONITORS



LOCAL METEOROLOGICAL EFFECTS

Pinellas County is situated on a peninsula and is thus subject to a pronounced land/sea breeze effect as well as other local marine effects typical of a subtropical environment. Standard pollution models do not treat these effects. However, both the long term climatology and daily meteorological records do reflect the diurnal variations produced by these local phenomena as long as the observing stations used are within the same local regime as the pollution sources being modelled. Both the Tampa National Weather Service observing stations (surface and upper air) and the USAF Weather Station at MacDill AFB do reflect the local effects rather well. While these effects do show up on the diurnal mixing heights, diffusion calculations for a plume crossing a coastline are undoubtedly subject to considerable error. Lyons[1], and others, have studied the shoreline diffusion effects in the vicinity of the Great Lakes and have observed sharp deviations in stabilities in a shoreline environment. One would expect that these effects would be more severe in the Great Lakes region due to the larger temperature differences between the water and land surfaces. In the Tampa Bay region, the relatively shallow bays act as a heat source during night time hours which serves to inhibit the establishment of strong surface inversions that trap plumes. During

[1] Lyons, W.A., 1975, Turbulent Diffusion and Pollutant Transport in Shoreline Environments, Lectures on Air Pollution and Environmental Impact Analyses, American Meteorological Society, Boston, Massachusetts, 1975.

daytime under sunny conditions, strong heating over land causes a pronounced sea breeze effect which converges over the peninsula resulting in convective instabilities which elevate the mixing height rather quickly after onset of the seabreeze. Both of these effects serve to enhance pollutant dispersion. The only condition which could result in fumigation would be under clear night time conditions with near calm winds where strong land surface cooling produces subsidence over the peninsula. The land breeze generated would then trap the plume until it moved over warmer coastal waters where convective activity would elevate and disperse it. Under calm prevailing synoptic wind conditions, the plume would drift toward the bay and fumigation would be limited to a relatively unpopulated coastal marsh area upon onset of the land breeze effect. If a light prevailing synoptic wind with an easterly component were superimposed on these conditions, plume fumigation within a few hundred meters west of the plant site would be possible. However, advection of air from over warm water sources would produce positive buoyancy forces once overland; thus the mixing depth would increase and the fumigation potential, if any, would be limited to a relatively short distance from the source.

EXISTING CONDITIONS - CDMQC

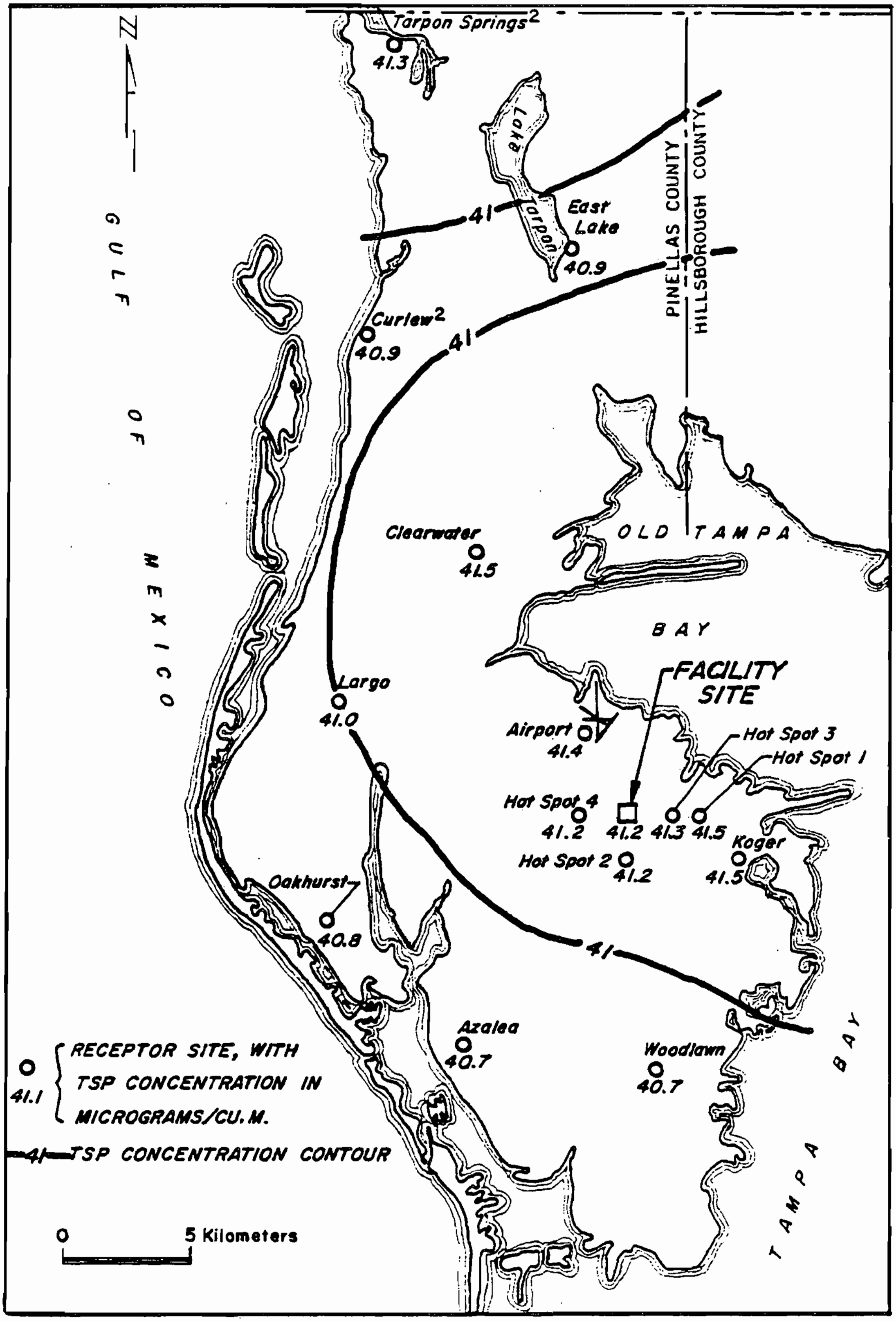
- Calibration -

The receptor data discussed in the methodology section were statistically evaluated and input to CDMQC. For each model run the observed (theoretical) concentration for particulate matter exceeded the calculated amount; thus default values (slope = 1, intercept = 0) were employed in all model calculations.

° Results -

The calculated concentrations of TSP and SO_2 at selected receptors are depicted in Figures 3 and 4, respectively; those receptors designated as "hot spots" correspond to areas of maximum pollutant concentration resulting from proposed resource recovery plant emissions. These isopleths and the pollutant roses in Figures 5 and 6 point out the substantial influence of emission sources located outside of Pinellas County. This phenomenon is due to the easterly orientation of prevailing winds (see Figure 2.6.8) and the profusion of major point sources on the eastern shore of Tampa and Hillsborough Bays (e.g., Big Bend - Port Sutton areas, etc.). Further analysis of source contributions at selected receptors (Table 1 and Figure 7) reveals the predominating impacts of point sources to SO_2 concentrations and background origins to TSP levels; the relative insignificance of area source contributions to ambient air pollution is apparent for both pollutants. With regard to specific major point sources, Tables 2 and 3, respectively, identify those emitters contributing the largest portion of the SO_2 and TSP increment to the Koger and Airport receptors. These

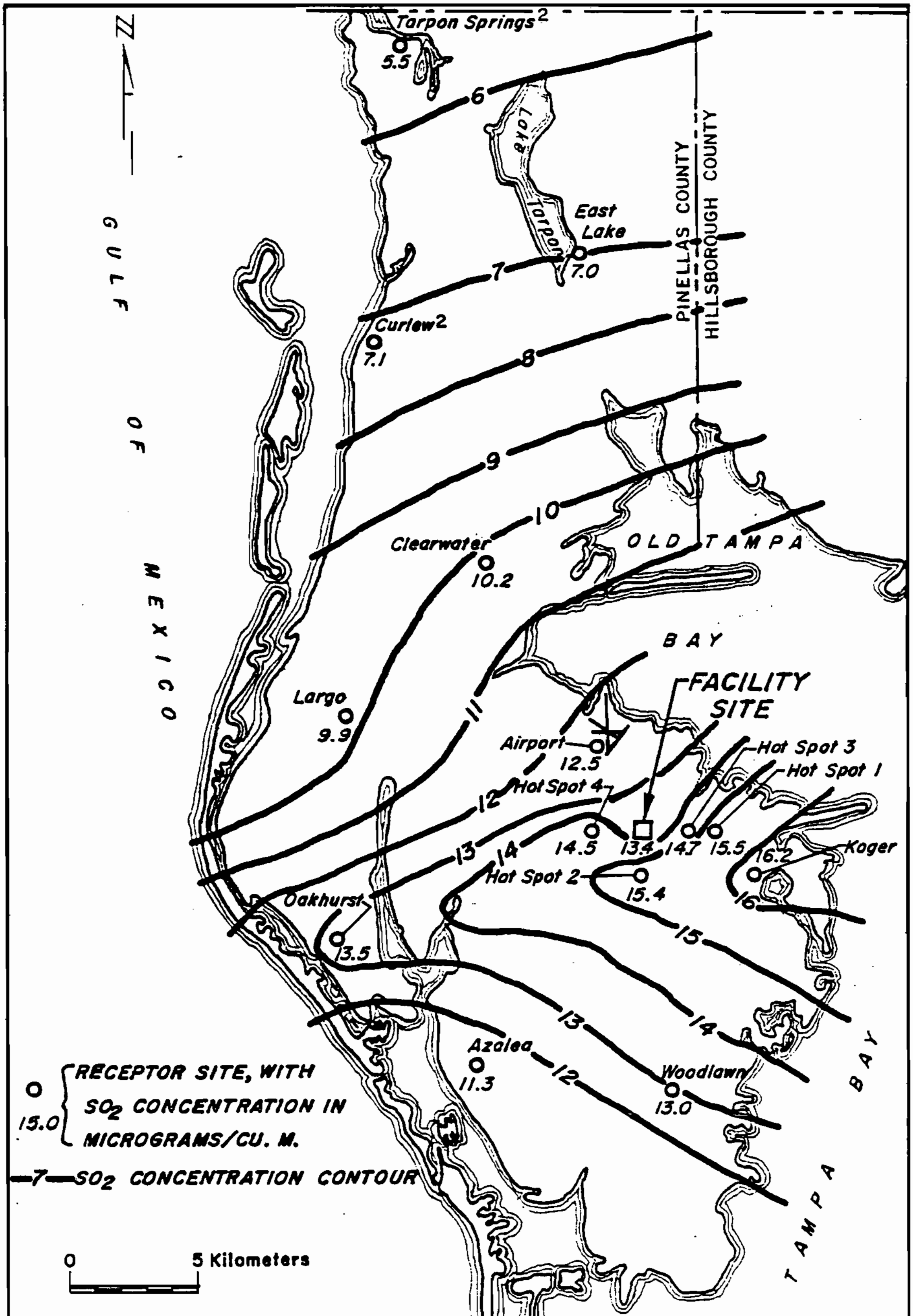
FIGURE 3



ESTIMATED AVERAGE ANNUAL[1] TSP CONCENTRATION–1976 (FROM CDMQC)

[1] ANNUAL ARITHMETIC MEAN

FIGURE 4

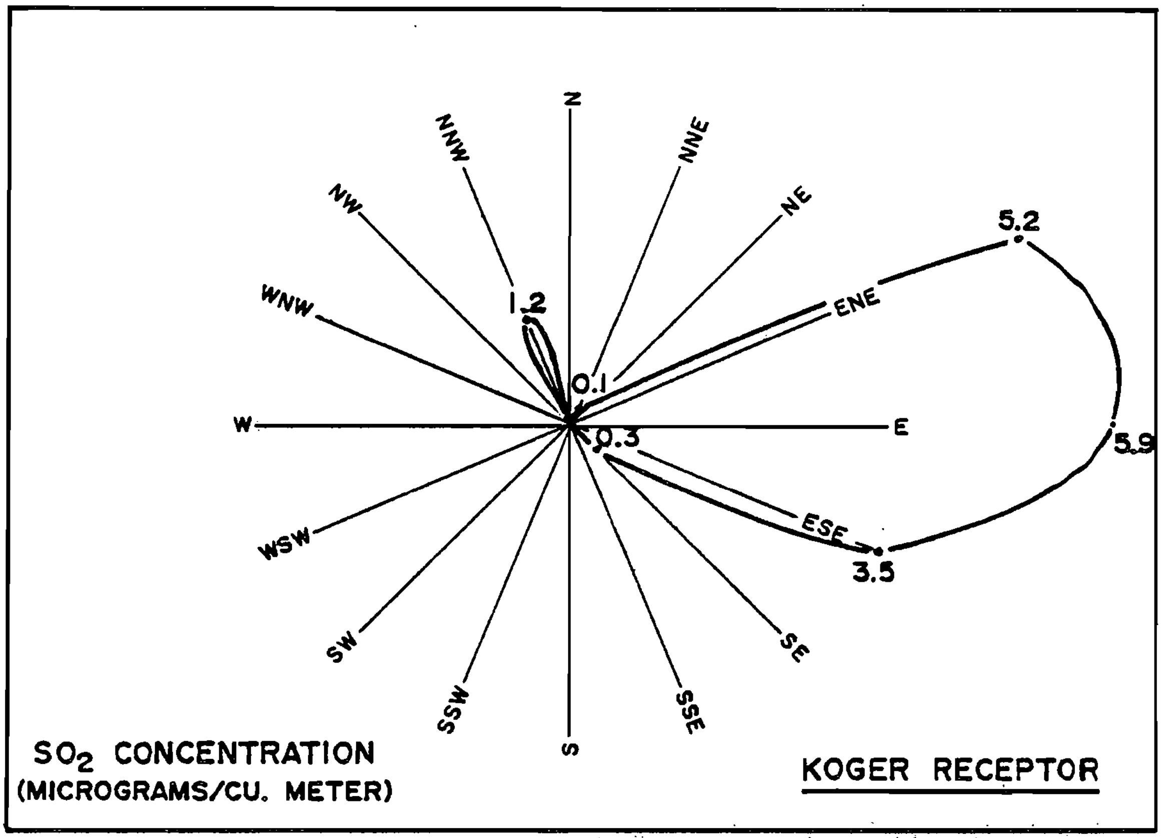


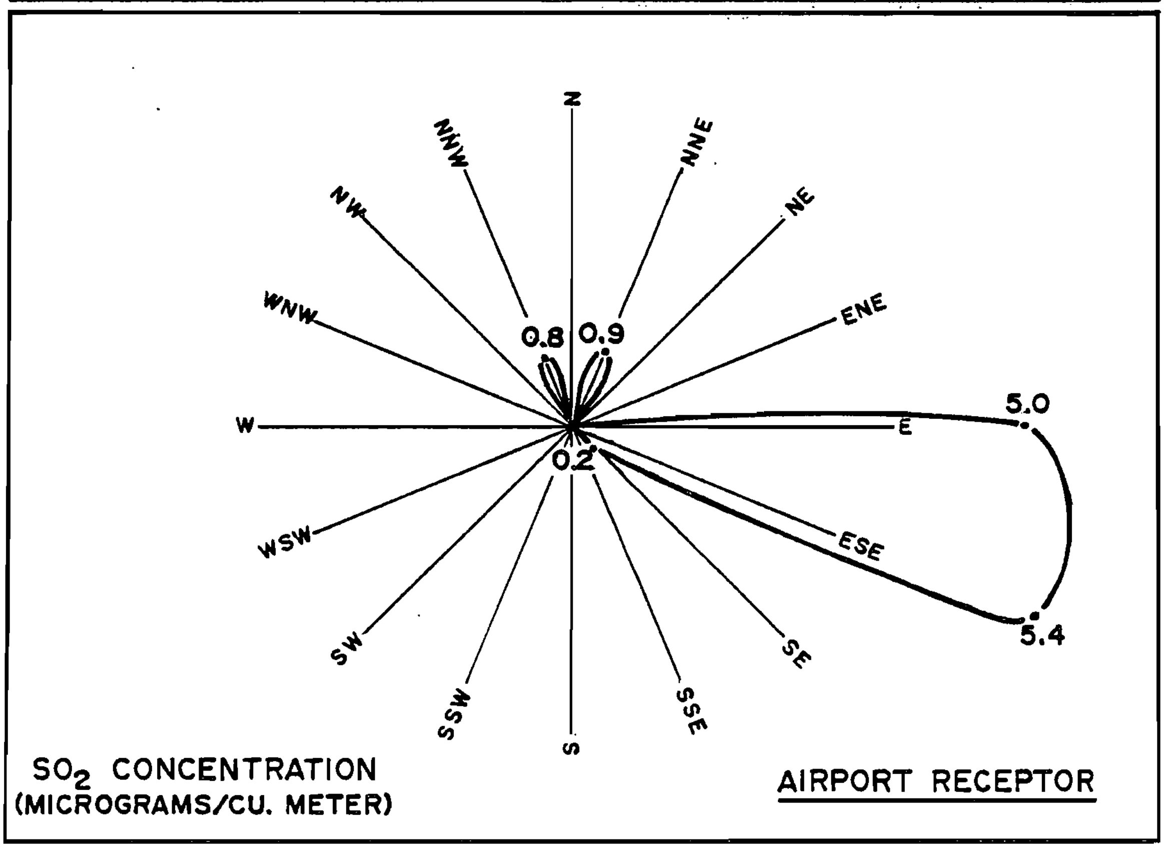
ESTIMATED AVERAGE ANNUAL[1] SO_2 CONCENTRATION-1976

(FROM CDMQC)

[1] ANNUAL ARITHMETIC MEAN

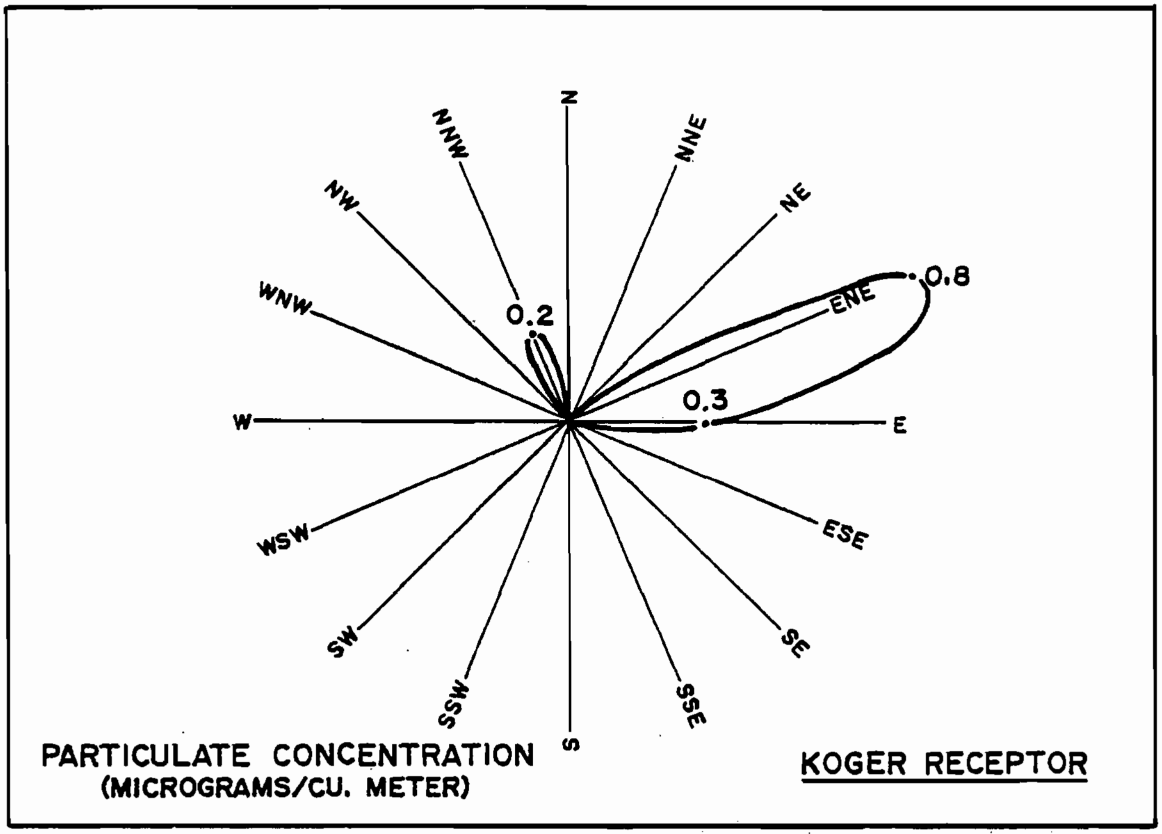
FIGURE 5

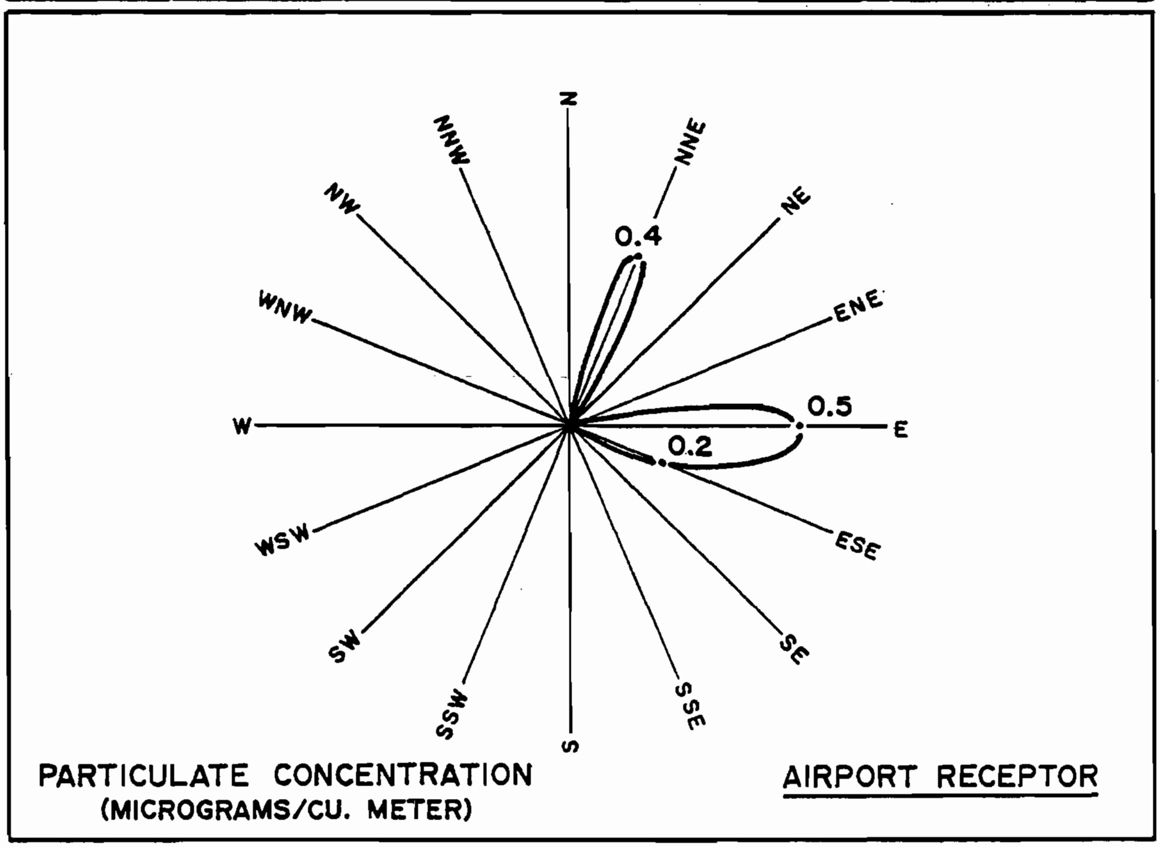




POINT ROSES FOR SO_2, 1976
(FROM CDMQC)

FIGURE 6

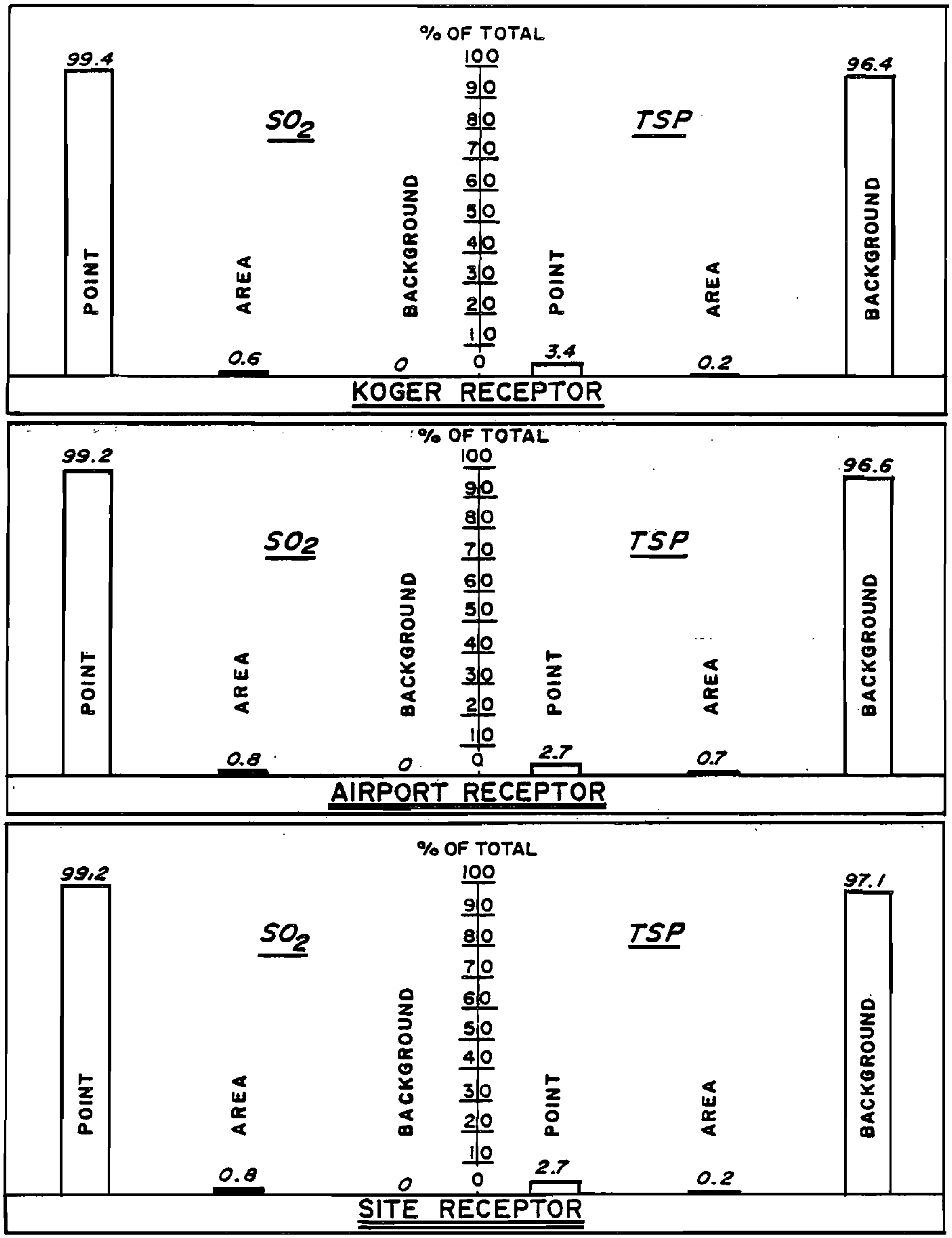




POINT ROSES FOR TSP, 1976

(FROM CDMQC)

FIGURE 7



HISTOGRAMS OF RELATIVE CONTRIBUTION OF TSP AND SO_2

TO SELECTED RECEPTORS, 1976

(FROM CDMQC)

TABLE 1

RELATIVE CONTRIBUTION OF TSP AND SO_2 TO SELECTED CDM MODEL RECEPTORS, 1976

RECEPTOR	UTM Coord. X	UTM Coord. Y	Point Sources ug/m^3	Area Sources ug/m^3	Background ug/m^3	Total
Oakhurst	323.14	3080.59				
TSP			0.8	0.0	40.0	40.8
SO_2			13.4	0.0	0.0	13.5
Largo	323.55	3088.85				
TSP			0.8	0.1	40.0	41.0
SO_2			9.9	0.0	0.0	9.9
Koger	339.85	3082.74				
TSP			1.4	0.1	40.0	41.5
SO_2			16.2	0.0	0.0	16.3
Airport	333.50	3087.73				
TSP			1.1	0.3	40.0	41.4
SO_2			12.4	0.0	0.0	12.5
Woodlawn	336.49	3074.28				
TSP			0.7	0.0	40.0	40.7
SO_2			12.9	0.0	0.0	13.0
Clearwater	329.23	3095.00				
TSP			1.4	0.1	40.0	41.5
SO_2			10.1	0.0	0.0	10.2
Site	335.26	3084.39				
TSP			1.1	0.1	40.0	41.2
SO_2			12.8	0.1	0.0	12.9

TABLE 2

TSP AND SO_2 CONTRIBUTIONS OF
MAJOR SOURCES AT THE KOGER RECEPTOR, 1976

	Source	Contribution ug/m^3	Percent of Total Calculated Pollutant Concentration*
∘ TSP	-Florida Power Corp., Bartow Pipeline Heater	0.49	1.19
	-Florida Power Corp., Higgins Unit #2	0.20	0.48
∘ SO_2	-Florida Power Corp., Bartow Unit #1	1.76	10.8
	-Florida Power Corp., Bartow Pipeline Heater	1.74	10.7
	-Florida Power Corp., Bartow Unit #3	1.42	8.7
	-Tampa Electric Co.,** Big Bend Unit #1	1.37	8.4
	-Tampa Electric Co.,** Big Bend Unit #2	1.37	8.4
	-Florida Power Corp., Bartow Plant	1.34	8.2
	-Tampa Electric Co.,** Gannon Unit #6	0.87	5.4

* Including all area, point and background sources.

**Distant sources; indiscriminante acceptance of respective contributions for these stacks may compromise model limitations.

TABLE 3

TSP AND SO_2 CONTRIBUTIONS OF
MAJOR SOURCES AT THE AIRPORT RECEPTOR, 1976

	Source	Contribution ug/m^3	Percent of Total Calculated Pollutant Concentration*
∘ TSP	-Florida Power Corp., Higgins Unit #2	0.35	0.84
∘ SO_2	-Tampa Electric Co.,** Big Bend Unit #2	1.22	9.76
	-Tampa Electric Co.,** Big Bend Unit #1	1.22	9.79
	-Tampa Electric Co.,** Gannon Unit #6	1.21	9.73
	-Florida Power Corp., Bartow Unit #1	0.68	5.45
	-Florida Power Corp., Bartow Unit #3	0.67	5.38
	-Tampa Electric Co.,** Big Bend Unit #3	0.64	5.12

* Including all area, point and background sources.

**Distant sources; indiscriminante acceptance of respective contributions for these stacks may compromise model limitations.

data, along with the complete source contribution listing, emphasize the significance of fossil fuel power plant emissions in determining SO_2 levels in the Tampa Bay region. In actuality, it can be stated that most of the SO_2 load calculated for the proposed facility site can be traced to the Florida Power Bartow Plant and the Tampa Electric Big Bend Plant. This latter facility, situated on the eastern shore of Tampa Bay, emits the largest inventoried volume of SO_2 in the region. Another large SO_2 source, the Florida Power Anclote Plant, emits that pollutant at a rate of 1631.9 grams per second; however, the northwesterly orientation and considerable distance (over 35 km) from that power plant to the proposed facility, coupled with actual meteorologic conditions limit the impact of the Anclote emissions on the study area. Point sources contributing the most to TSP concentrations at the evaluated receptors are the Florida Power Higgens Unit #2, and the Florida Power Bartow Pipeline Heater.

THE PROPOSED RESOURCE RECOVERY PLANT

- General Specifications -

The design proposed for Pinellas County employs a two boiler, 1050 tons per day (2100 TPD combined) mass fire unit for the incineration of solid waste, the production of steam and the generation of electricity; a more detailed discussion of facility specifications is provided in Chapter 3 of the PPSC document. With regard to facility input parameters to the atmospheric dispersion models, Table 4 identifies the stack and emission characteristics utilized. It was determined that for the Prevention of Significant Deterioration (PSD) and Ambient Air Quality Standard (AAQS) analyses, selective emission rates should be applied for calculations of various averaging time pollutant concentrations. Specifically, as augmented by Table 4:

Increment Determination	Selected Facility Emission Rate (GM/SEC)
TSP - Annual[1]	7.50
TSP - 24 Hour[1]	16.51
TSP - Potential 24 Hour & Annual	499.71
SO_2 - Annual[1]	22.55
SO_2 - 3 Hour and 24 Hour[1]	31.12

The emissions of the proposed solid waste resource recovery facility will in no way impact air quality in a Class I maintenance area; the most proximal such area is the Chassahowitzka National Wildlife Refuge situated over fifty miles to the north of the study area.

° Results -

1. PTMAX - The fundamental guidance for selection of CRSTER model receptor ring distances was provided by PTMAX calculations; the results for the various emission characteristics listed above were subjectively evaluated with respect to local topographic and meteorologic factors. From this,

[1] Allowable

TABLE 4

EMISSION CHARACTERISTICS OF VARIOUS CRSTER MODEL RUNS	
	Emission Rate GM/Sec.
Maximum TSP, Controlled	16.51
Average TSP, Controlled	7.50
Maximum TSP, Uncontrolled	499.71
Maximum SO_2	31.120
Average SO_2	22.55
Stack Data	
Height (Meters)	49.07
Diameter (Meters)	2.74
Maximum Gas Exit Velocity (Meters/Sec.)	38.16
Average Gas Exit Velocity (Meters/Sec.)	27.72
Exit Gas Temperature (Degrees K)	521.89
Ring Distances (KM) for Selected CRSTER Runs	
TSP, Annual - 0.85, 1.60, 3.00 and 5.00 KM	
TSP, 24 Hour - 0.90, 1.80, 3.50 and 6.50 KM	
SO_2, 3 Hour - 0.90, 1.85, 3.00 and 5.00 KM	
SO_2, 24 Hour - 0.90, 1.85, 3.00 and 5.00 KM	
SO_2, Annual - 0.85, 1.60, 2.00 and 5.00 KM	

those receptor ring distances shown in Table 4 were input to the CRSTER model runs.

2. CRSTER - The maximum pollutant concentrations and affected receptor locations for each CRSTER run is featured in Table 5. With respect to these modeling results, the following conclusions relative to the emission dispersal characteristics of the proposed facility are offered:

- Maximum SO_2 and TSP concentrations occurred primarily from 1.0 to 6.5 kilometers out from the stack site; maximum concentrations at more distant receptors were infrequent (less than 11 days per 365 days, average; no receptor at such a distance recorded a maximum in the top 50 readings for any model run).
- Maximum concentrations were recorded primarily during unstable meteorologic conditions; that is, the highest concentrations for SO_2 and TSP were noted during the noon to evening period during the summer and fall months. This phenomenon is probably attributable to the high exit temperature of the facility emissions and their ability to penetrate such stable situations as a temperature inversion layer. The mixing of exit gases in a more unstable atmosphere is characterized by both upward and downward plume dispersal, hence the recording of maximum concentrations during these periods.

TABLE 5

SYNOPSIS OF CRSTER MODEL RUNS

	Max (UG/M^3)	Distance (KM)	Direction (°)	Allowable PSD Incr. UG/M^3
TSP, Max. Controlled 24 hour	1.69	2.0	90	37
TSP, Avg. Controlled Annual	0.09	3.0	90	19
TSP, Max. Uncontrolled 24 hour Annual	 51.03 4.32	 2.0 3.8	 90 90	 -- --
SO_2, Max. 3 hour 24 hour	 12.82 3.21	 1.9 3.0	 270 90	 512 91
SO_2, Avg. Annual	0.29	2.0	90	20

- The maximum values recorded for the resultant concentration from facility emissions are quite small and, by themselves, do not violate the allowable PSD increment for any situation with each pollutant.

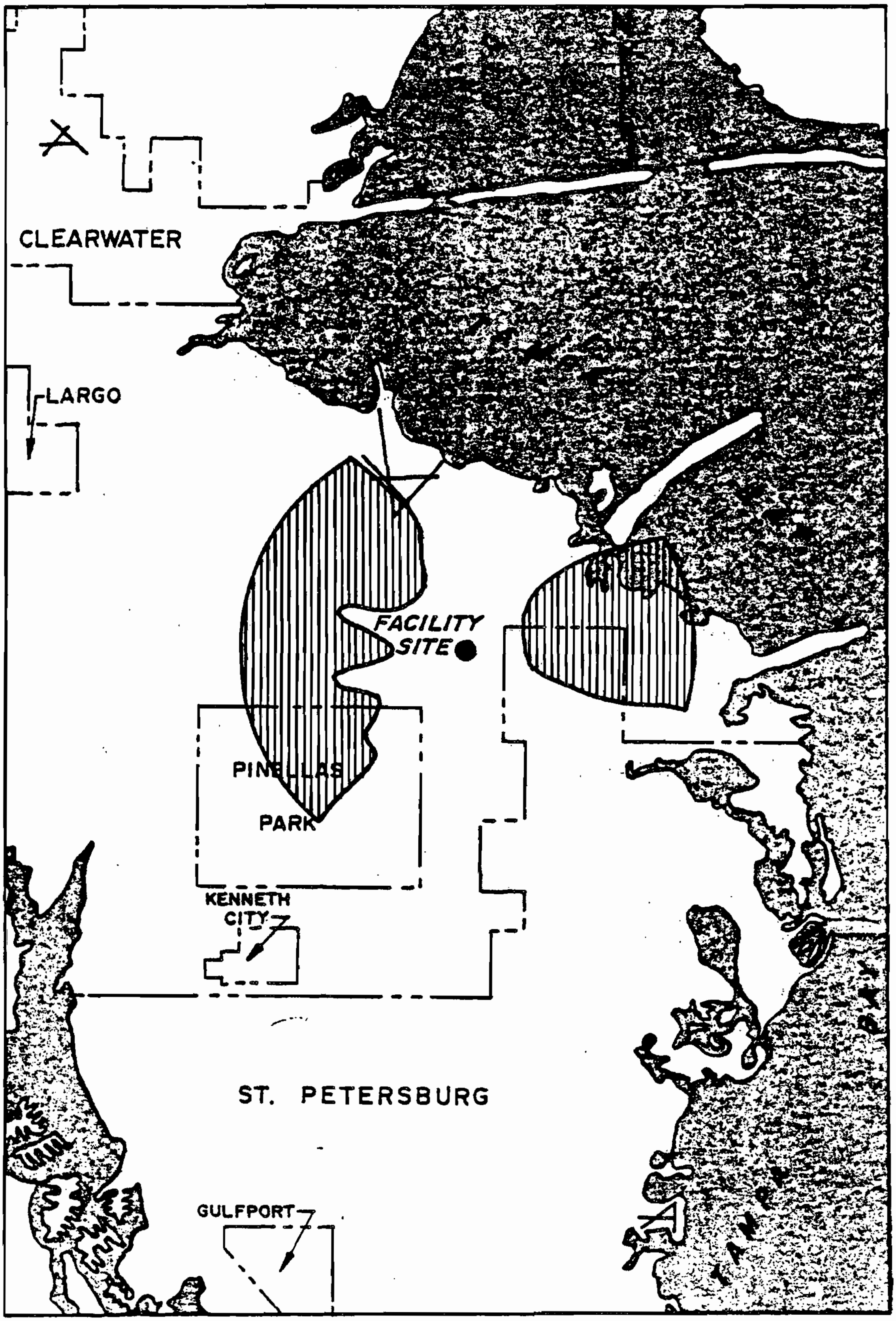
Figures 8 through 12 illustrate the isopleths of maximum concentration for each pollutant and averaging time.

1985 CONDITIONS - CDMQC

Predicated on the assumptions of emissions inventory for 1985 conditions a significant reduction in ambient SO_2 concentrations (ave. 3.31 ug/m^3 per receptor) was calculated for the Pinellas peninsular; likewise a decrease in TSP levels was also estimated although the magnitude of the reduction was less significant (ave. 0.39 ug/m^3 per receptor). Figures 13 and 14, respectively, feature isopleths of TSP and SO_2 concentrations for 1985 conditions. The overall trend in pollutant reduction is geared on the abatement of SO_2 emissions from fossil fuel power plants. Still, though, while the increment contribution by power plants is consistently lessened, the relative contribution (percent of total) of SO_2 by such facilities is somewhat elevated (see Tables 6 and 7). In addition, the importance of sources on the eastern shore of Tampa Bay is substantially enhanced. Figures 15 and 16 illustrate the orientation of pollutant magnitude towards those sources in Hillsborough County (compare these figures with those pollutant roses for 1976

FIGURE 8

CALCULATED MAXIMUM ANNUAL MEAN TSP CONCENTRATION (ug/m^3), TO 5.0 KILOMETERS



0.04 - 0.09 ug/m^3

FIGURE 9

CALCULATED MAXIMUM 24-HOUR TSP CONCENTRATION (ug/m^3)

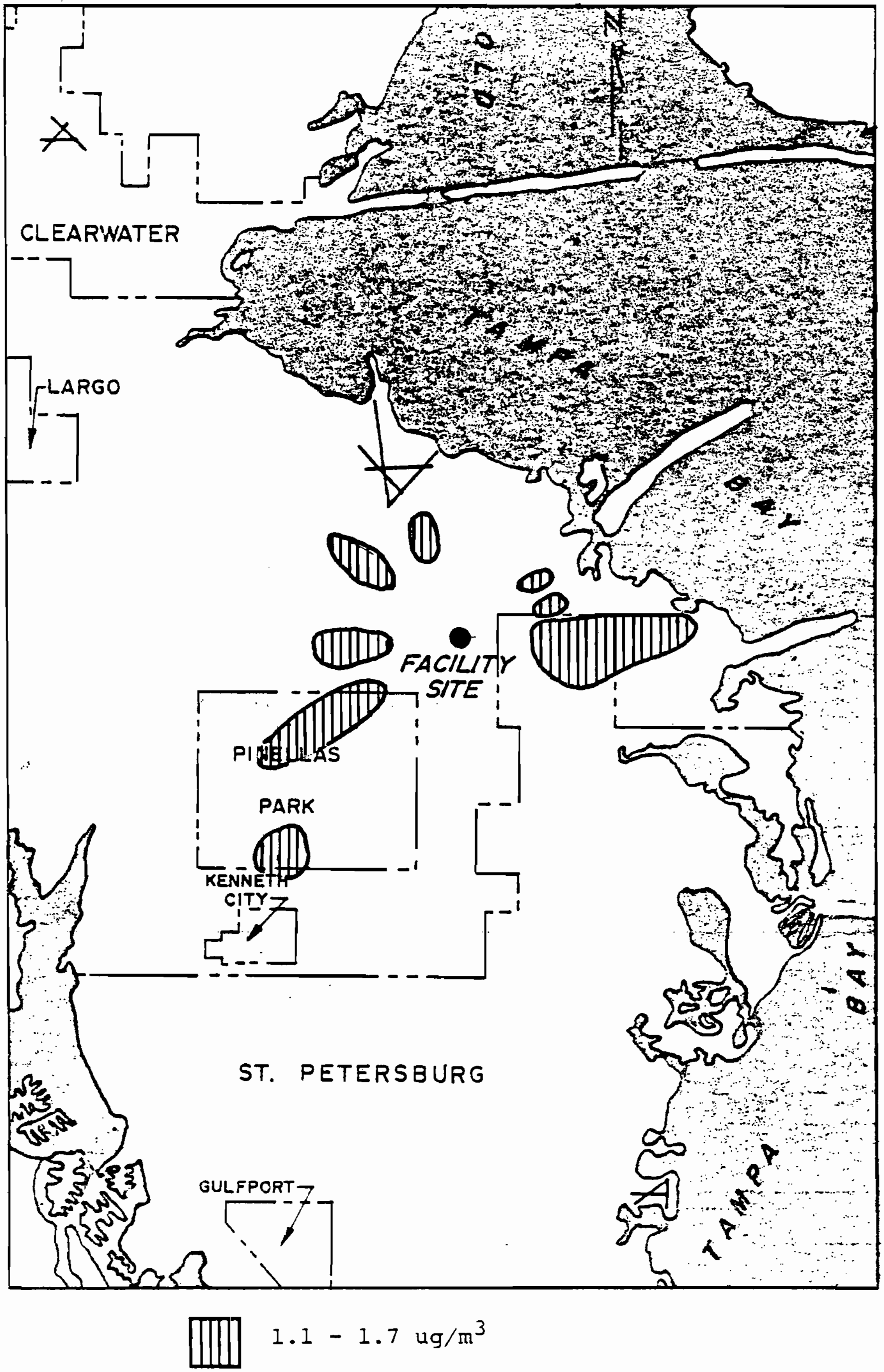


FIGURE 10
CALCULATED MAXIMUM 3-HOUR SO_2 CONCENTRATION (ug/m^3) TO 5.0 KILOMETERS

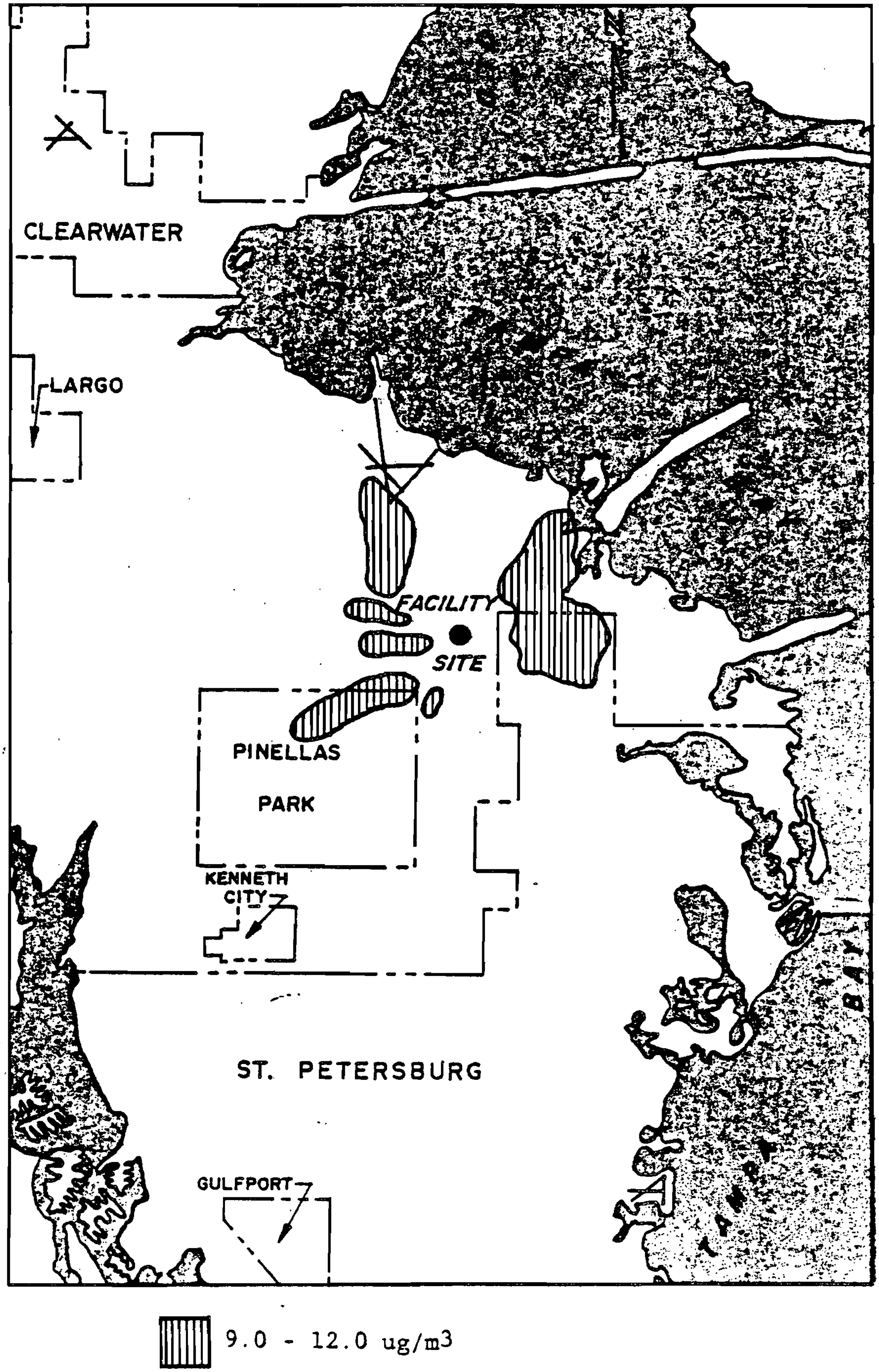


FIGURE 11

CALCULATED MAXIMUM 24 HOUR SO_2 CONCENTRATIONS, ug/m^3 TO 5.0 KILOMETERS

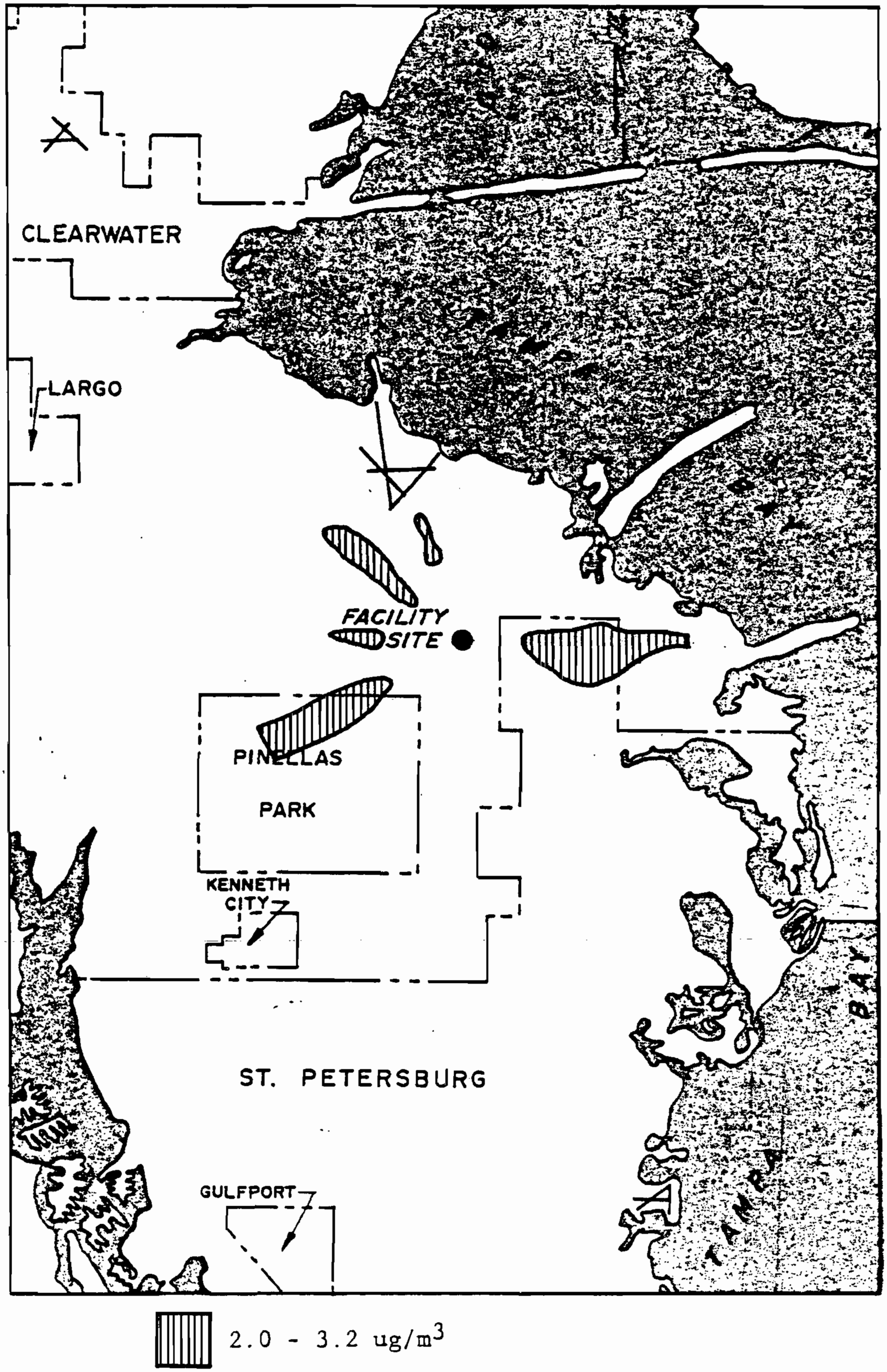
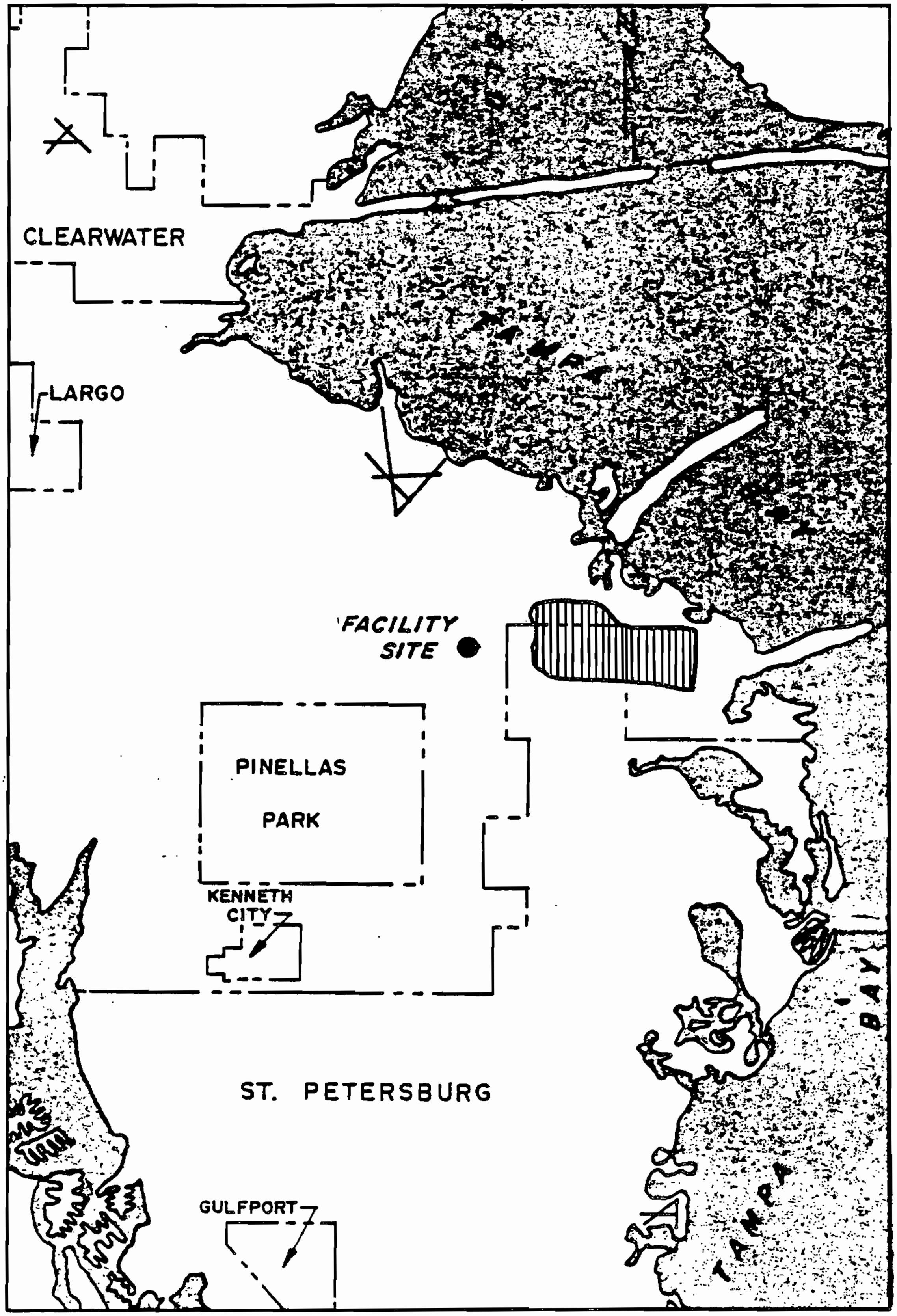


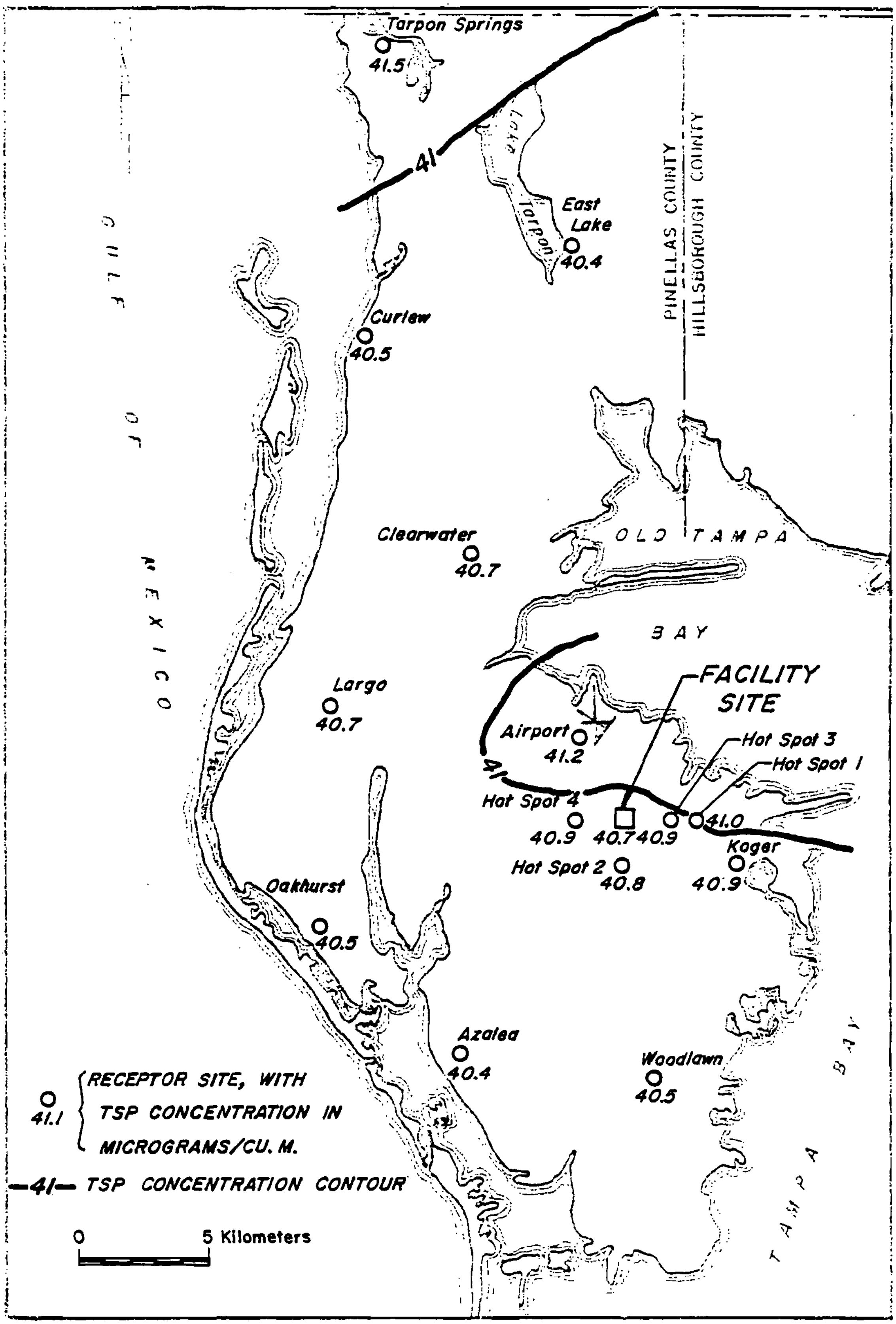
FIGURE 12

CALCULATED MAXIMUM ANNUAL MEAN SO_2 CONCENTRATION (ug/m^3), to 5.0 KILOMETERS



0.16 - 0.29 ug/m^3

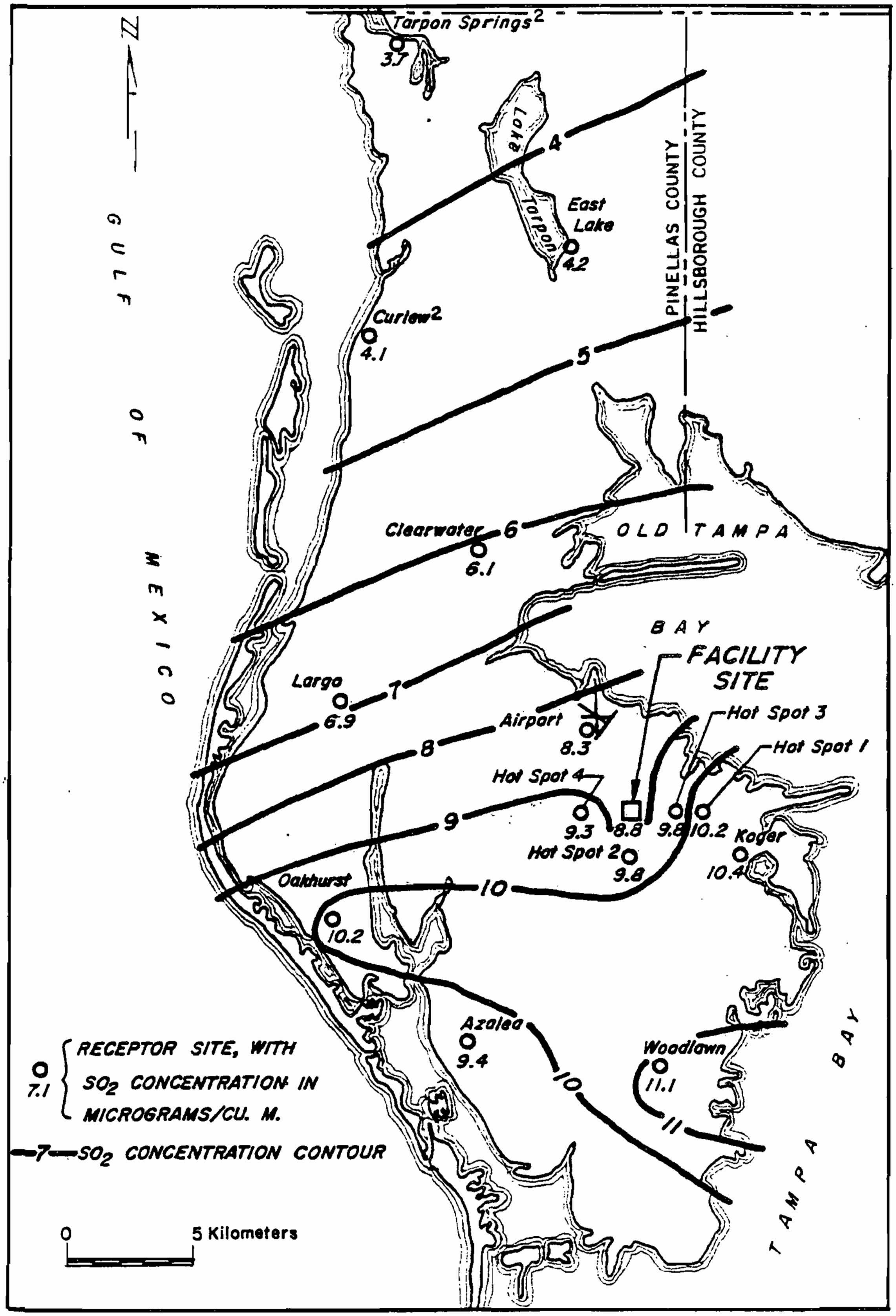
FIGURE 13



ESTIMATED AVERAGE ANNUAL[1] TSP CONCENTRATION – 1985

[1] ANNUAL ARITHMETIC MEAN

FIGURE 14



ESTIMATED AVERAGE ANNUAL[1] SO_2 CONCENTRATION–1985

[1] ANNUAL ARITHMETIC MEAN

TABLE 6

TSP AND SO_2 CONTRIBUTIONS OF
MAJOR SOURCES AT THE KOGER RECEPTOR, 1985

	Source	Contribution ug/m^3	Percent of Calculated Pollutant Concentration*
° TSP	-Florida Power Corp., Bartow Pipeline Heater	0.29	0.70
° SO_2	-TECO Big Bend Unit #2**	1.73	16.58
	-TECO Big Bend Unit #1**	1.72	16.52
	-TECO Big Bend Unit #3**	0.92	8.85
	-Florida Power Corp., Bartow #1	0.79	7.60
	-Florida Power Corp., Bartow Pipeline Heater	0.78	7.52
	-Florida Power Corp., Bartow #3	0.64	6.11
	-Florida Power Corp., Bartow	0.60	5.76
	-TECO, Gannon Unit #6**	0.53	5.06

* Including all area background, area and point sources.

** Distant sources; indiscriminant acceptance of respective contributions from these stacks may compromise model limitations.

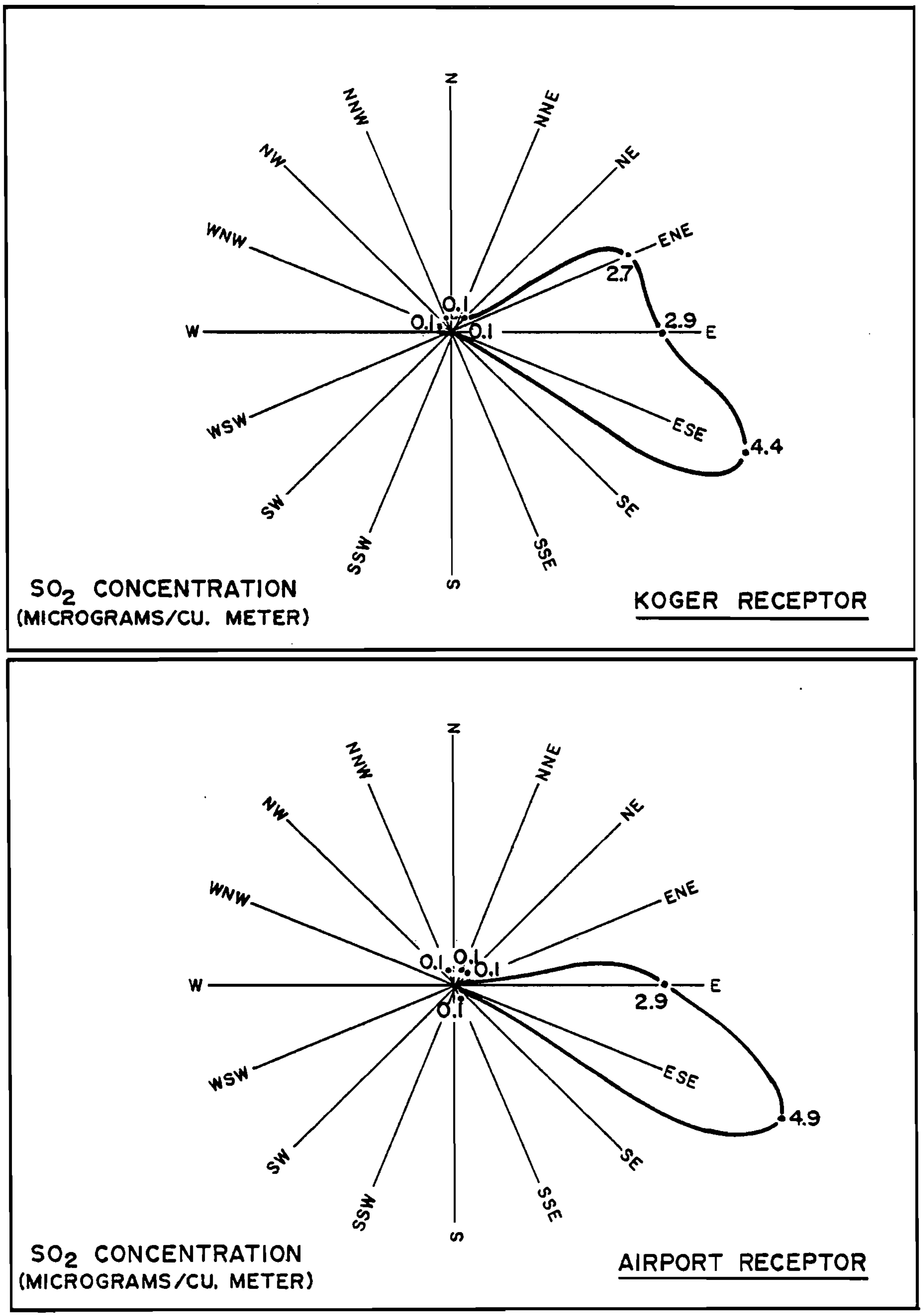
TABLE 7

TSP AND SO_2 CONTRIBUTIONS OF MAJOR SOURCES AT THE AIRPORT RECEPTOR, 1985			
	Source	Contribution (ug/m^3)	Percent of Total Calculated Concentration*
° TSP	-Florida Power Higgens	0.12	0.28
° SO_2	-TECO Big Bend Unit #2 **	1.54	18.58
	-TECO Big Bend Unit #1 **	1.53	18.54
	-TECO Big Bend Unit #3 **	0.83	9.72
	-TECO Gannon Unit #6 **	0.74	8.89
	-TECO Gannon **	0.43	5.23

* Including all background, area and point sources.

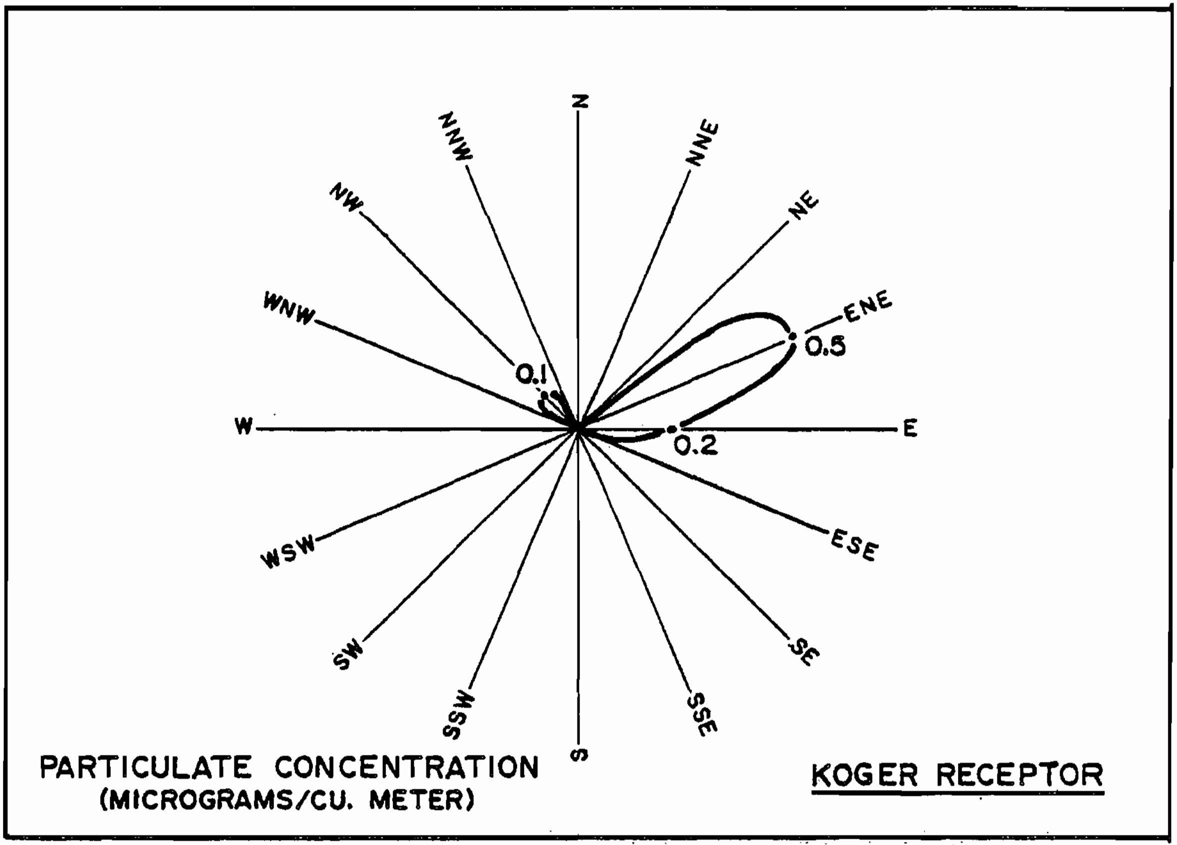
** Distant sources; indiscriminant acceptance of respective contributions may compromise model limitations.

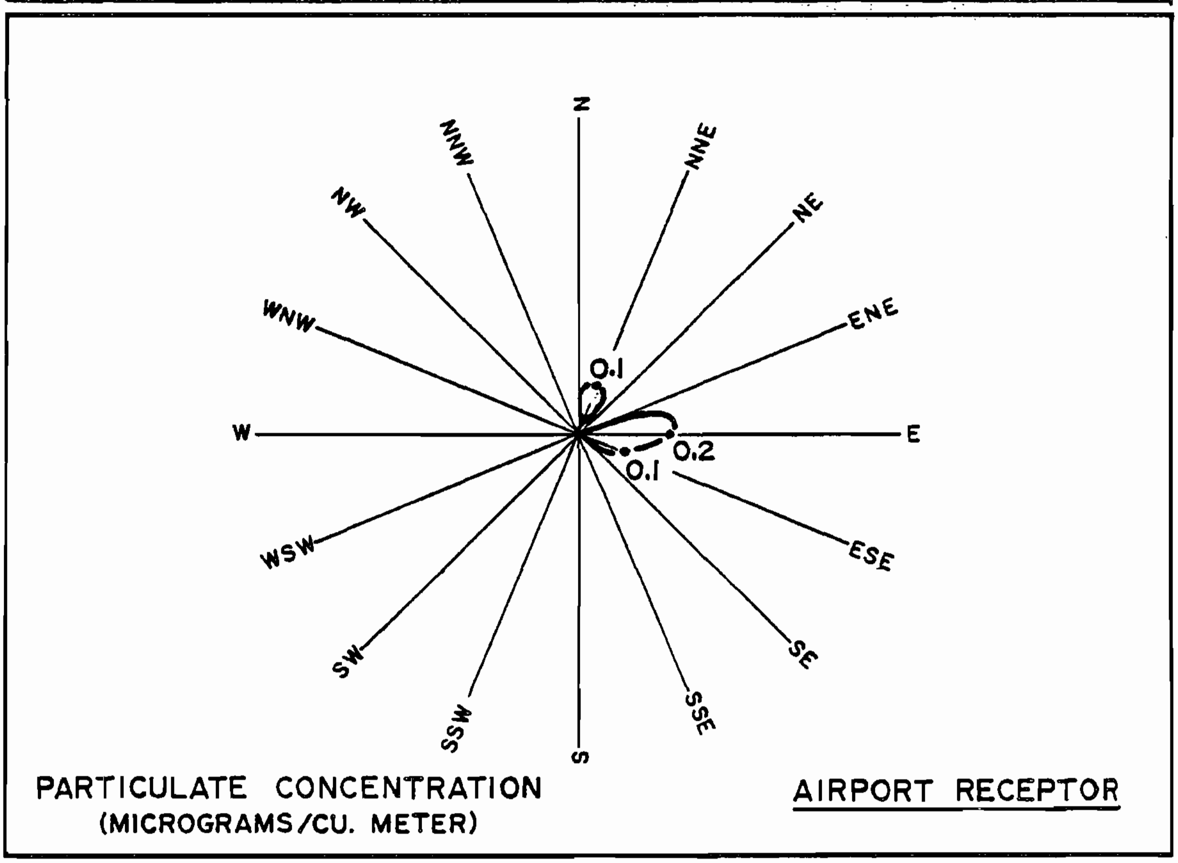
FIGURE 15



POINT ROSES FOR SO_2, 1985
(FROM CDMQC)

FIGURE 16





POINT ROSES FOR TSP, 1985

(FROM CDMQC)

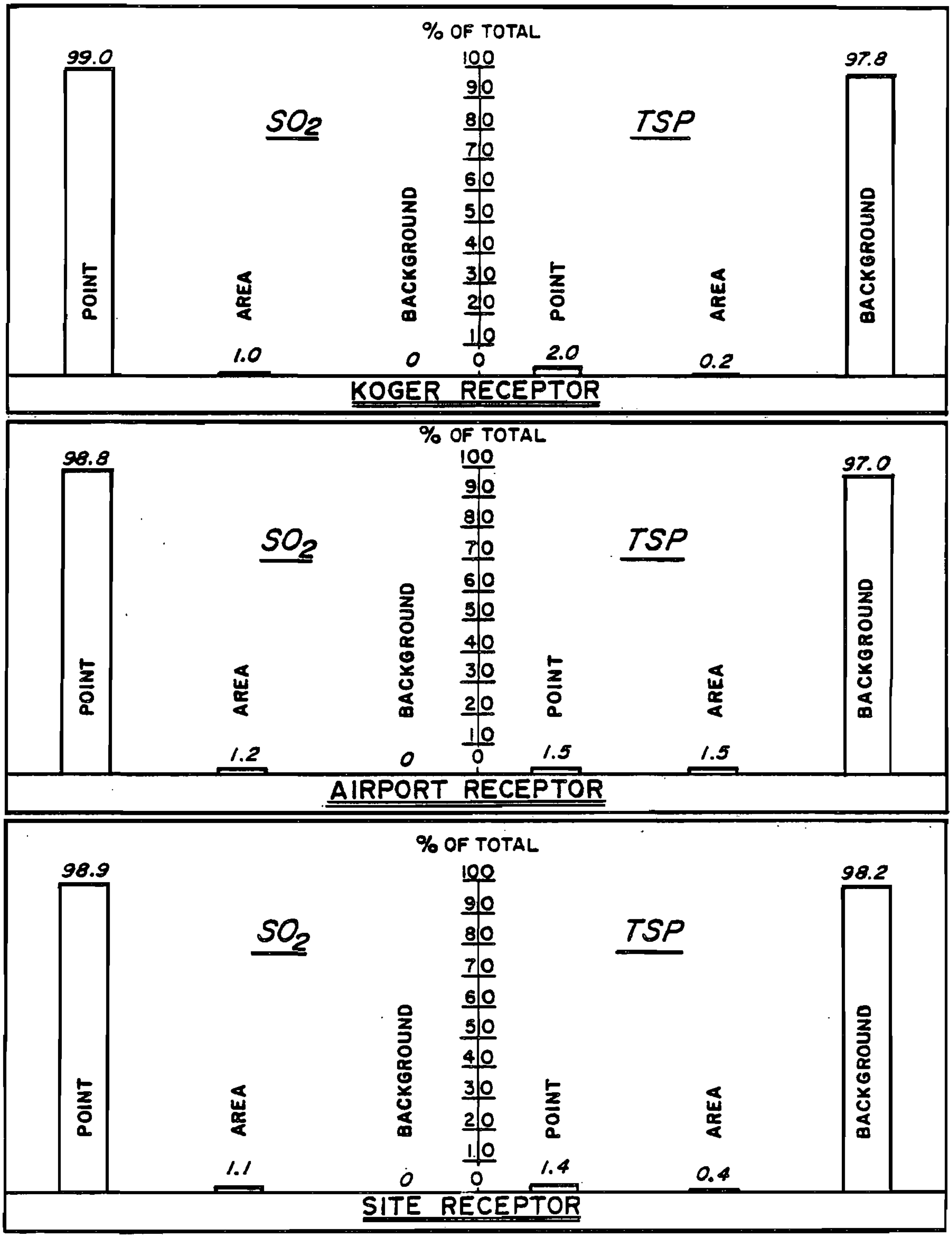
conditions, featured in Figures 5 and 6); a histograms illustrating area, background and point source contributions to the total TSP and SO_2 concentrations are presented in Figure 17.

PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

To satisfy the requirements of Part 52 of the 1977 Amendments to the Clean Air Act as promulgated on June 19, 1978, an assessment of PSD increment consumption by the proposed resource recovery and all major sources permitted since January 6, 1975 was completed. The area and point source emissions inventory (CDMINP file) utilized for the CDMQC model was submitted to the Florida Department of Environmental Regulation (Tampa), the Pinellas County Department of Environmental Management and the Hillsborough County Environmental Protection Commission so that their guidance concerning the selection of post-baseline permitted facilities would be received. Based on such input, the following sources as depicted in Figure 18 have been designated as being relevant sources:

- Florida Power, Anclote - 1 unit, SO_2 and TSP
- Florida Power and Light, 2 units at Willow Point - SO_2 and TSP
- Nord Southern Dolomite - 1 unit, SO_2 only
- Gardiniers - 1 unit, SO_2 only
- Chloride Metals - 1 unit, SO_2 only
- Tampa Electrical, Big Bend - 1 unit, SO_2 and TSP

FIGURE 17

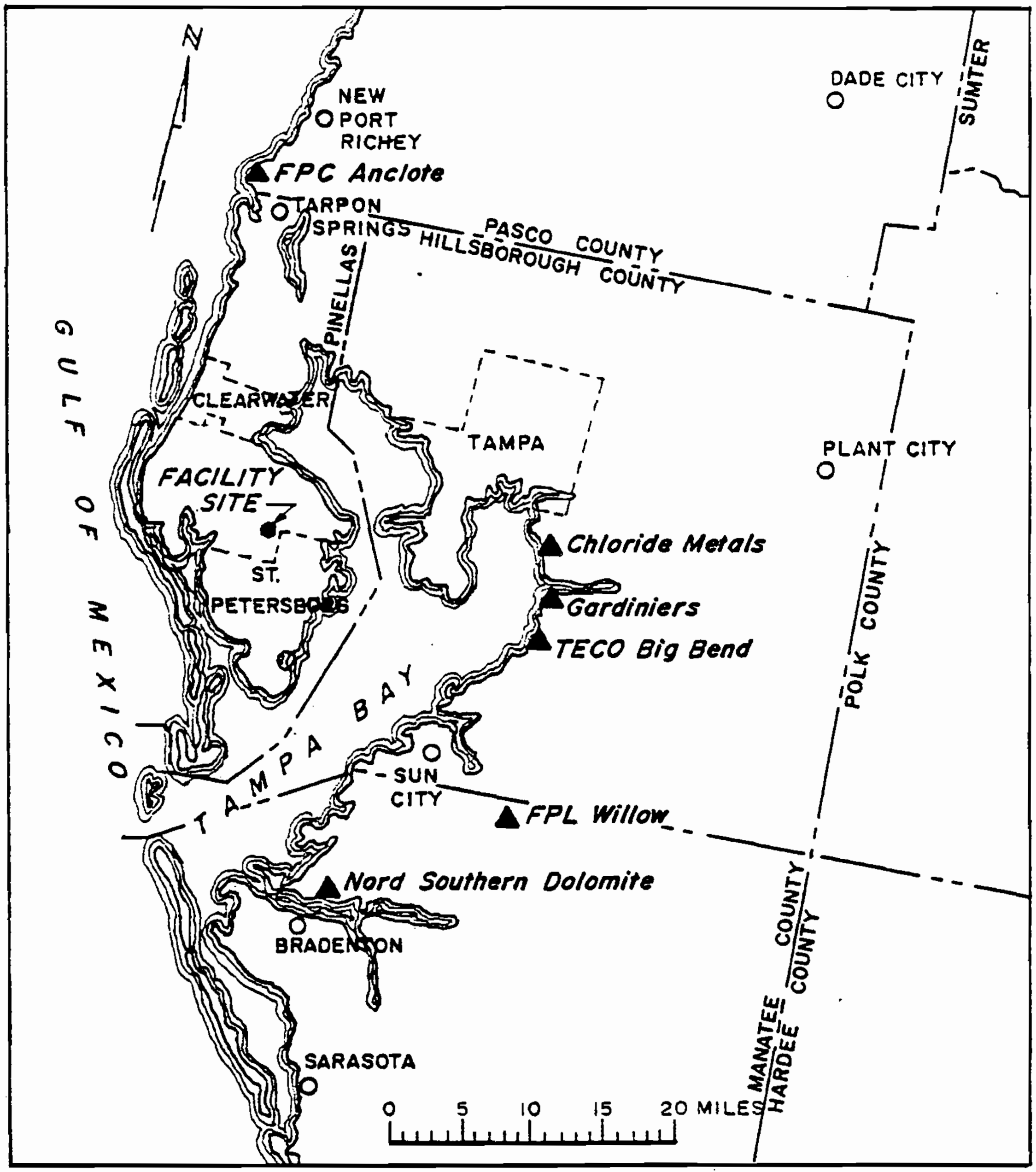


HISTOGRAMS OF RELATIVE CONTRIBUTION OF TSP AND SO_2

TO SELECTED RECEPTORS, 1985

(FROM CDMQC)

FIGURE 18



AIR EMISSION SOURCES PERMITTED SINCE JANUARY 6, 1975

To determine source interaction and increment consumption two distinct methodologies were applied. First, to demonstrate absolute worst case (although highly improbable) impacts, a CRSTER model was run with receptor ring distances coinciding with the "hot spots" from each pollutant generated by the proposed facility. Maximum readings recorded within these "hot spots" from both the post-baseline source and the proposed facility will be utilized to estimate increment consumption. As meteorologic data for plume dispersal are randomly generated by the CRSTER model, the values obtained should not be taken as real-case situations; rather, they represent a worst case condition at a particular receptor and point in time. Furthermore, it should be clearly understood that the accuracy of the CRSTER model at distances greater than 15.0 KM becomes highly suspect as the probability for identical meteorologic conditions over such distances (as the model assumes) is very unlikely.

Table 8 features the pertinent data input to CRSTER for each "new" major source.

The second method involved an analysis of source interaction via the PTMTP model. Through the results of the PTMAX and CRSTER model runs the impact of the proposed facility at distances greater than 6.0 KM was judged as negligent[1], thus it was assumed that any untoward pollutant

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[1] Part 52, 1977 Amendments to Clearn Air Act as promulgated on June 19, 1978 identifies the limits of source impact as follows: SO_2 24 hour, 5 ug/m^3; TSP 24 hour, 5 ug/m^3.

TABLE 8

MAJOR AIR EMISSION SOURCES PERMITTED SINCE JANUARY 6, 1975, AND RELEVANT CRSTER INPUT DATA

Source	Emissions		Stack Data			
	SO_2 (GM/Sec)	TSP (GM/Sec)	Height (M)	Diameter (M)	Flow (M/Sec)	Temp. (°C)
◦ Florida Power Corp., Anclote (Pasco County)	1631.9	58.08	152.1	3.66	49.95	143.3
◦ Florida Power & Light, Willow Point (Manatee Co.)	438.69	39.98	152.0	6.97	26.7	151.7
◦ Florida Power & Light, Willow Point (Manatee Co.)	666.2	37.71	152.0	8.05	20.7	151.7
◦ Nord Southern Dolomite (Manatee Co.)	3.22	0.22	16.76	1.22	12.9	76.7
◦ Gardiniers (Hillsborough County)	13.86	0.0	45.4	2.74	11.6	70.6
◦ Chloride Metals (Hillsborough County)	7.19	0.06	20.9	0.61	12.1	80.6
◦ Tampa Electric Co., Big Bend (Hillsborough County)	1153.0	10.32	149.4	4.57	33.0	137.0

interactions would occur downwind of the facility within the 6.0 KM limit. To demonstrate this, three wind direction ranges were input to PTMTP which encompassed those post-baseline source sites. Specifically:

Wind Direction	Source Interaction With:
NNW	FPC Anclote
E	TECO Big Bend, Gardiniers, Chloride Metals
SSE	FPC Willow (both units), Nord Southern Dolomite

The results of the PSD increment analysis via CRSTER are summarized in Table 9. As is obvious, only the FPC Anclote and TECO Big Bend exhibit significant affects and then only to SO_2 concentrations. To simply sum the increment consumption by each source to determine the remaining increment would be unsound. Since, as stated before, the post-baseline source modeling values obtained are construed as being worst case situations, they are, therefore, overestimates. However, it is quite obvious that even when utilizing these very high readings, the construction and operation of the proposed facility and resultant interactions will not violate the allowable PSD increment at any averaging time for either pollutant.

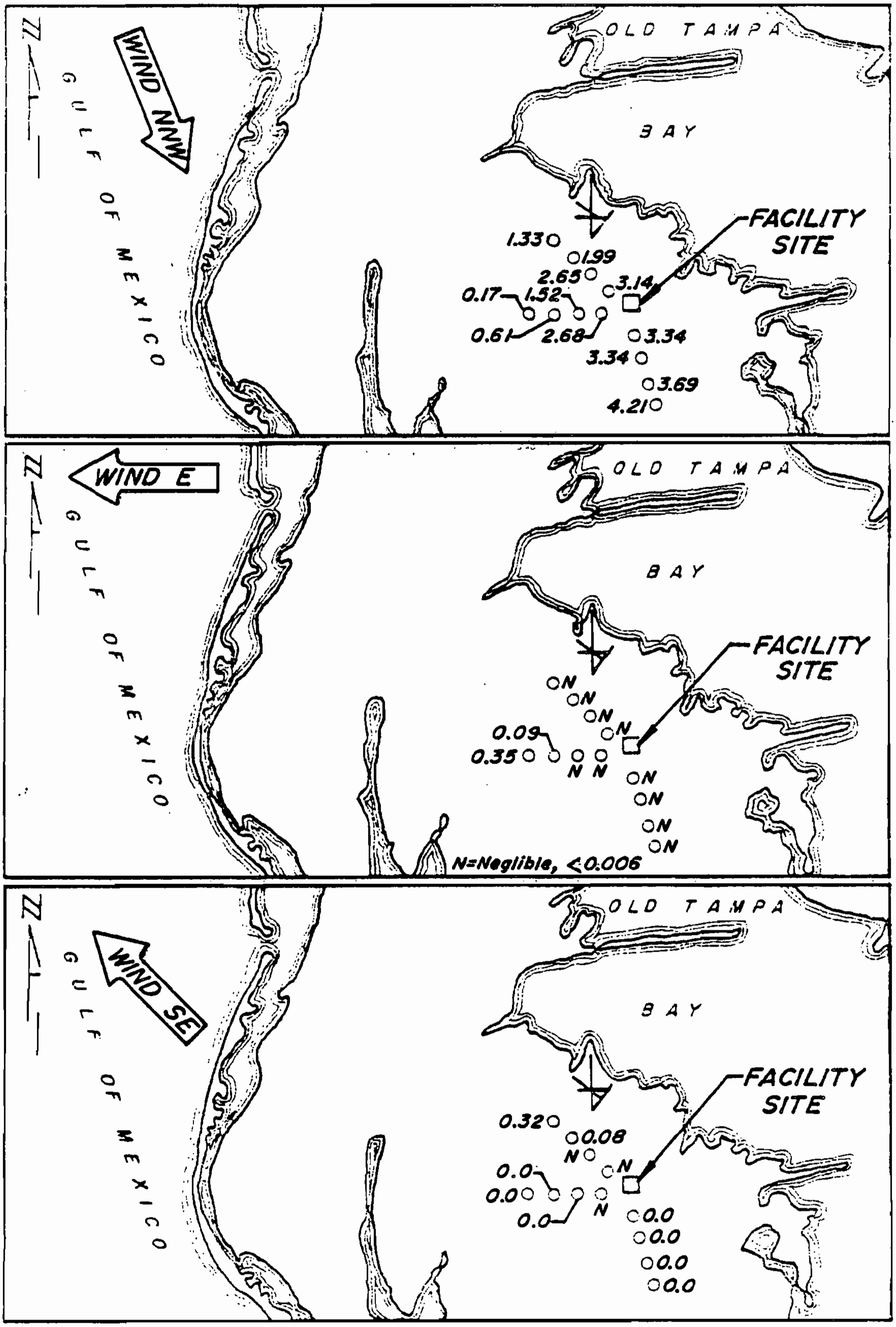
PTMTP model runs assumed static meteorologic conditions over the twenty-four hour period; that is mixing height = 400M, temperature = 295°K, and wind velocity corresponding to those for respective wind directions shown in Figure

TABLE 9

MAXIMUM CALCULATED CONCENTRATION (ug/m^3) FOR EACH 'NEW' SOURCE MAJOR EMISSION WHICH COINCIDES WITH PROPOSED FACILITY 'HOT SPOTS'					
Major Source Permitted Since 1/6/78	SO_2 3 Hour	SO_2 24 Hour	SO_2 Annual	TSP 24 Hour	TSP Annual
Anclote	36.7	10.4	0.63	0.40	0.023
FPC Willow (Both Units)	17.4	3.80	0.39	0.37	0.030
Nord	1.77	0.22	0.01	NA*	NA*
TECO Big Bend	47.23	13.48	1.02	0.12	0.009
Gardiniers	5.84	1.59	0.10	NA*	NA*
Chloride	5.81	1.63	0.09	NA*	NA*

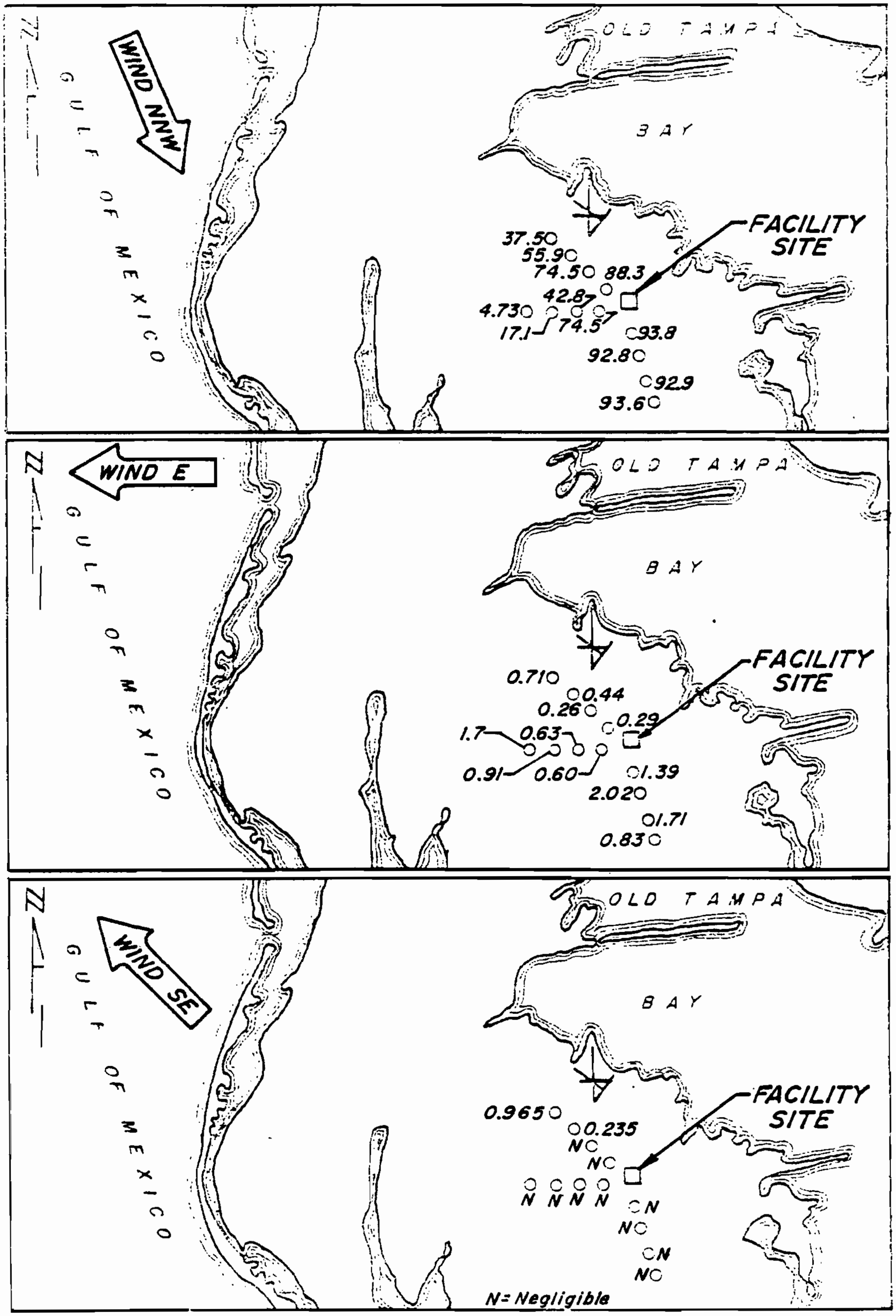
SYNOPSIS OF PSD INCREMENT CONSUMPTION, FROM CRSTER					
	SO_2 3 Hour	SO_2 24 Hour	SO_2 Annual	TSP 24 Hour	TSP Annual
Proposed Facility Increment	12.82	3.21	0.29	1.69	0.09
Other Source Increment	114.75	31.12	2.25	0.77	0.053
Total	127.57	34.33	2.54	2.46	0.14
Allowable	512	91	20	37	19

FIGURE 19



TSP 24-HOUR MAXIMUM CONCENTRATIONS FOR VARIOUS INPUT WIND DIRECTIONS

FIGURE 20



SO_2 24-HOUR MAXIMUM CONCENTRATIONS FOR VARIOUS INPUT WIND DIRECTIONS

2.6.a. For these constant atmospheric conditions and those wind directions previously specified (i.e., 343°, 90°, 134°) the calculated 24-hour maximum concentrations for TSP and SO_2, respecitvely, at the specified receptor array were rendered and are shown in Figures 19 and 20. From these data one untoward interaction is noted. In Figure 20, the model estimates that a NNW wind will convey a heavy load of SO_2 to receptors just downwind of the proposed facility site. Analysis of partial concentrations at each receptor yields the following results:

Receptor	Total Concentration ug/m^3	FPC Anclote Contribution ug/m^3	Proposed Facility Contribution
1	93.75	93.75	1.29×10^{-4}
2	92.78	92.66	0.124
3	92.90	91.61	1.29
4	93.55	90.57	2.98
5	75.35	75.35	0.0
6	42.78	42.78	0.0
7	17.09	17.09	0.0
8	4.73	4.73	0.0
9	88.27	88.27	0.0
10	74.53	74.53	0.0
11	55.93	55.93	0.0
12	37.54	37.54	0.0

The above analysis reveals that although a violation of the 91 ug/m^3 PSD increment is noted, the maximum contribution of the proposed facility to that level is similar to that calculated by CRSTER (3.2 ug/m^3) and is thus judged as insignificant.

Once again the reviewer of these results is cautioned about the reliability of utilized models at distances greater than 10 km. A run of the PTDIS model for ranges from about 32 to 40 km for various stability classes reveals that zero concentrations are predicted for stability classes 1 through 4 (unstable to neutral). For stability classes 5 and 6 concentrations from 10^{-5} to 10^{-6} gm/m^3 are calculated; however, the model cautions the user that for distances beyond 10 km under stable conditions, resultant concentrations should be reviewed with extreme caution since it is unlikely that the stability and mixing height will persist beyond this range. Indeed, the plume dispersion width at the 32 to 40 km range is computed between 1 and 1.4 km, an extremely unlikely condition. Therefore, it is highly doubtful that the calculated violation of 3 hours SO_2 increment would ever occur.

AMBIENT AIR QUALITY STANDARDS

To evaluate the impact of the proposed facility's air emissions on state ambient air quality standards the CDMQC model was employed as the primary assessment tool. Basically, CDMQC estimates annual arithmetic mean pollutant concentrations at a given set of receptors. For those receptors with input calibration data, the Larsen's statistical analysis further estimates short term (i.e., 3 and 24 hour) pollutant levels.

As the site and associated "hot spots" receptors did not include monitoring data, short term concentrations at those sites would not be rendered by CDMQC; thus it was determined to stipulate the airport receptor as being situated so as to perceive maximum facility emissions. An examination of areal dispersion of facility emissions, as rendered by CRSTER and illustrated in Figures 8 through 12, reveals that, with the exception of the SO_2 annual calculation, maximum facility emissions do proximate the airport receptor. Facility contributions to annual ambient air quality standards were extracted from the CDMQC source contribution listing for the airport receptor; short term contributions are the maximum respective concentrations as calculated by CRSTER. With regard to the conversion of annual arithmetic means to annual geometric means, review of comprehensive historical data and reports concerning air quality assessment in Florida identifies a general relationship of 92:100 for geometric to arithmetic means; therefore, all annual geometric mean figures will reflect this assumption.

The results of the AAQS evaluation are summarized in Table 10; from these data it is apparent that the standards should not be violated under specified 1985 conditions. Of cardinal importance to this assessment is the contribution of the proposed resource recovery plant to ambient pollutant concentrations; again, from Table 10, it is quite obvious that the initiation of recovery operations at the facility will not exacerbate air quality in the study area.

TABLE 10

SYNOPSIS OF CDMQC RUN, 1985,
INCLUDING PROPOSED FACILITY EMISSIONS

Pollutant	Concentration at Airport ug/m^3	Concentration at Koger ug/m^3	Maximum Contribution of Facility ug/m^3	AAQS ug/m^3 [3]	% of AAQS[4]
° TSP					
Annual	41.2[2]	40.9[2]	0.0[4]	60[1]	63%
	37.9[3]	37.9[3]			
24 Hour	96.8[6]	94.1[6]	1.7[7]	150[5]	65%
° SO_2					
Annual	8.3[2]	10.4[2]	0.1[3,4]	60[1]	13%
	7.6[3]	9.6[3]			
24 Hour	26.4[6]	69.0[6]	3.2[7]	260[5]	10%
3 Hour	31.5[6]	62.9[6]	12.0[7]	1300[5]	2%

1 Annual Geometric Mean

2 Annual Arithmetic Mean

3 Expected Annual Geometric Mean

4 From Airport Receptor Data

5 Not to be exceeded more than once per year

6 Expected maximum concentration from Larsens statistical analysis

7 From CRSTER

CONCLUSIONS

For both the Prevention of Significant Deterioration (PSD) and the Ambient Air Quality Standard (AAQS) evaluations it is concluded that the air quality impacts associated with emissions from the Pinellas Solid Waste Resource Recovery Facility will be minimal. It should be noted that, in accordance with Part 52, 1977 Amendments to the Clean Air Act (as promulgated on June 19, 1978) the area of significant impact of the proposed facility is virtually non-existent. Specifically, the limits of significant impact are stated as 50 KM or where the respective pollutant concentration falls below a critical level. Below are listed the critical levels for each pollutant and pertinent averaging time as compared to maximum pollutant concentrations generated by the proposed plant:

PSD CRITICAL LEVEL	FACILITY MAXIMUM
° TSP	
Annual - 1 ug/m^3	0.09 ug/m^3
24 Hour - 5 ug/m^3	1.7 ug/m^3
° SO_2	
Annual - 1 ug/m^3	0.29 ug/m^3
24 Hour - 5 ug/m^3	3.2 ug/m^3
3 Hour -25 ug/m^3	12.0 ug/m^3

APPENDIX B

COOLING TOWER - DISPERSION ANALYSIS

APPENDIX B

COOLING TOWER - DISPERSION ANALYSIS

In operating an evaporative cooling tower, the cooling media (water) is discharged from the system by three distinct processes. They are:

1. Evaporation - This is the means by which the hot water is cooled and the heat is released to the atmosphere as latent heat (heat of vaporization) in the evaporated portion of the cooling media.

2. Blowdown - Since the cooling fluid is continuously being evaporated from the system, contaminants in the system become concentrated unless the system is flushed or diluted. This is performed on a continuous basis by dumping a certain percentage of cooling media from the system.

3. Mechanical Drift - In order to provide air movement through the water (and thereby cause evaporation) mechanically driven fans are used on the towers. This forced air movement causes a small percentage of the cooling media to be mechanically carried from the cooling medial flow to the atmosphere.

For the proposed facility, 1.9 percent of the cooling waters will be evaporatively entrained into the air stream, another 0.8 percent will be discharged by blowdown and 0.1 percent will be lost as mechanical drift. The evaporative process results in pure water being released into the atmosphere. The flow from the blowdown will be discharged into the composite blowdown system and hence to the municipal waste treatment facility or to the residue quench system. Again, evaporation will cause the quench water to enter the ambient atmosphere as pure water.

Drift, on the other hand, contains the same proportion of chemical constituents as the cooling waters. The cooling water constituents are shown in Table 3.4.5.a. The deposition of these particles on the surrounding terrain thus may adversely affect the environment.

The behavior of drift in the atmosphere will depend on droplet size meteorological conditions and on effective release heights and velocity of the droplets into the atmosphere. The release heights are a function of plume rise and particle size fall velocities. Under conditions of downwash, the release height will be at ground level. Slight downwash may occur if the ratio of tower exit air velocity to wind velocity is less than 1.5. This situation occurs 38 percent of the time in Pinellas County. Substantial downwash may occur if this ratio is less than 1.0, which occurs approximately 1 percent of the time.

For a number of reasons, wet cooling tower plumes may behave differently than dry plumes. As water vapor condenses and releases latent heat, thus increasing the temperature, buoyancy may be increased. This effect was incorporated into Briggs' dry plume equations by using "virtual" temperatures in the equations. The virtual temperature is:

$$T_v = T(1 + 0.61q)$$

where "q" is the specific humidity. The virtual temperature was approximated as

$$T_v = T \div \frac{\text{mixing ratio (grams } H_2O\text{/kg dry air)}}{6}^{a,b}$$

Otherwise, the cooling tower plume rise was calculated as a dry plume. This should be accurate, according to Briggs.

For trajectory analysis, these plume rise considerations are important because they determine the upward momentum of the drift droplets, and, for those particles small enough to be dispersed as a gas, these considerations influence gaseous dispersion. The size range of drift from a mechanical draft cooling tower is typically such that a small number of very large droplets will dominate the total mass of drift. The expected size distribution at the proposed facility is shown in Table I. The larger droplets generally have terminal fall speeds of several meters per second. For particles with diameters larger than 200 micrometers, trajectory rather than dispersion equations need to be utilized to estimate drift deposition. Since 70 percent of the drift mass was in this range, the deposition calculations have all been made utilizing trajectory techniques.

TABLE I

SIZE AND MASS DISTRIBUTION OF DRIFT PARTICLES

Droplet Diameter (Micron)	% by Weight
less than 100 micron	10
100 - 200 micron	20
200 - 300 micron	22
300 - 400 micron	21
400 - 500 micron	16
500 - 600 micron	9
greater than 600 micron	2

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a Cheremisinoff, et.al.

b American Meteorological Society Lecture on Air Pollution and Environmental Impact Analysis

The exit velocity from the main stream of the plume is 1640 fpm (8.33 m/sec) at the top of the cooling tower. At this point it is assumed that all particles have the same velocity. The drift particle size distribution and terminal fall velocities are shown below.

TERMINAL FALL VELOCITIES BY DROPLET SIZE

Droplet Size um	Term. Vel. (m/sec)
100	.615
200	1.18
300	1.71
400	2.19
500	2.64
600	3.05

The effective rise of the droplets was estimated as:[a]

$$h_r = h_s + \Delta h_D$$

$$\Delta h_D = 1.3 \frac{F}{u V_D^2}$$

where

h_s = height of tower

F = plume buoyance factor = $\frac{g W_O D_T^2}{4} \times \frac{T_{vo} - T_{va}}{T_{vo}}$

g = gravitational constant

W_0 = tower exit velocity

D_T = tower effective diameter

T_{vo}, T_{va} = exit and ambient virtual temperature, respectively

u = wind speed, and

V_D = terminal velocity of the particle at its initial size.

---

a Cheremisinoff, et.al.

The travel time for the drop particle will be the total of the following three parts:

1. T_1 - Elapsed time related to the rise of the droplet to height h_s. Estimated to be $T_1 = \Delta h \div W_o$.

2. T_2 - Time for the particle to fall (at terminal velocity) from the stream release height to the elevation of the top of the tower.

3. T_3 - Time for the particle to fall (at terminal velocity) from the elevation of the top of the lower to the ground level (60 ft. = 18.29 m).

The horizontal distance travelled during the rise and fall of the drift particle is equal to the velocity of the wind times the duration of the flight of a given size particle.

EFFECTIVE HEIGHT AND TIME OF PARTICLE RISE

$T_1=\Delta h/W_o$ (sec)	Diameter	V_T m/sec	$h_r=h_s+\Delta h_D$
35	100 um	.615	288
11.0	200 um	1.18	92
6.4	300 um	1.71	53
4.7	400 um	2.19	39
4.0	500 um	2.65	33
3.5	600 um	3.05	29

The fall time is the sum of $T_2 + T_3$ which is the sum of the distances $H_T + H_d$ divided by the terminal fall velocities of the given particle size. This is shown in tabular form below.

H_d (m) = height of rise above top of tower

H_T (m) = height of top of tower = 18.3 m

Particle Size (um)	$H_d + H_T$ (m)	$T_2 + T_3$ (sec)	$T_1 + T_2 + T_3$ (sec)
100	306	498	533
200	110	93	104
300	71	42	48
400	57	26	31
500	51	19	23
600	47	15	19

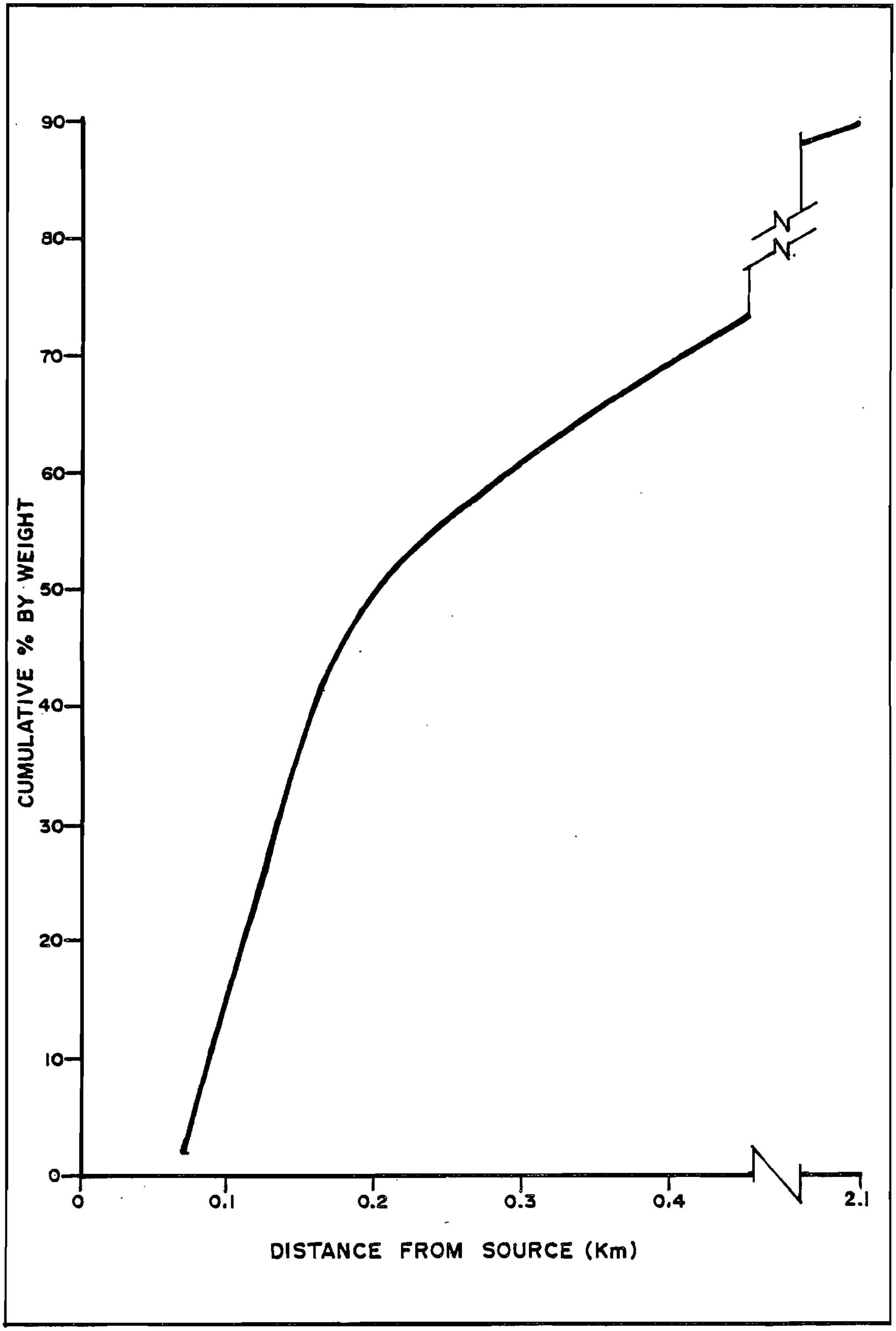
The travel distances prior to deposition on the terrain are shown in the following table.

Particle Size (um)	T_{tot} (sec)	Distance (km)
100	533	2.1
200	104	.413
300	48	.191
400	31	.123
500	23	.091
600	19	.075

Figure 1 shows the percentage of deposition of the total drift versus distance from the source.

Drop Size (um)	Cumulative % drift deposited (by wt.)	Distance to deposition (km)
600 & greater	2%	.075
500	11%	.091
400	27%	.123
300	48%	.191
200	70%	.413
100	90%	2.1

FIGURE I



DEPOSITION DISTANCES FOR DRIFT PARTICLES

APPENDIX C

APPLICATION FOR DETERMINATION OF BEST AVAILABLE TECHNOLOGY FOR AIR POLLUTION SOURCES

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION FOR DETERMINATION OF BEST AVAILABLE CONTROL TECHNOLOGY FOR AIR POLLUTION SOURCES

SOURCE STATUS: (X) New ( ) Modification

Company Name: Pinellas County County: Pinellas

Source Identification: Pinellas County Resource Recovery Facility

Source Location: Street: 28th Street and 110th Avenue City: County

UTM: East ______ North ______

Appl. Name and Title: D. F. Acenbrack, Director of Solid Waste Mgmt. Div., Pinellas County

Appl. Address: 315 Haven Street, Clearwater, Florida 33516

Appl. Phone: 813/448-2251

DEPARTMENT USE ONLY

Date Appl. Received: ______

Notice of Receipt:

Newspaper: ______ Date: ______

Florida Administrative Weekly Date: ______

BACT Determination: ______

Declared by Secretary: ______ Date: ______

BACT: ______

NOTICE OF DETERMINATION

Newspaper: ______ Date: ______

Florida Administrative Weekly Date: ______

I. DETAILED DESCRIPTION OF SOURCE

A. Describe the manufacturing process at the facility and the unit operation to be controlled. Discuss the source of emissions, existing control devices, the expected improvement in performance, and state whether the project will result in compliance with ambient air quality standards or applicable PSD increments. Attach additional sheet if necessary.

The primary function of the facility is to dispose of solid waste material generated within the county. The process involves the burning of the solid waste in two medium pressure boilers. The steam produced will be used to drive a turbine and generate electricity. The source of emission will be a single 161' stack fitted with a three field electrostatic precipitator. The project will result in compliance with both Ambient Air Quality and Prevention of Significant Deterioration Standards.

B. For this source indicate any previous DER permits, orders, and notices; including issuance dates and expiration dates.

None

C. Raw materials, fuels, and chemicals used:

DESCRIPTION	HOURLY USE	CONTAMINANTS TYPE	CONTAMINANTS % WT.	RELATION TO FLOW DIAGRAM
Solid Waste	83.33 ton/hr*	-- **	-- **	

* Capacity ** Not defineable

D. Process Rate

1. Total Process Input Rate: 83.33 ton/hr.
2. Product Output Rate: 41* megawatts, 5.25 ton/hr. ferrous scrap, 500 lb/hr. aluminum
   * Net output after 10% in-plant useage
3. Operating Time:

   a. Hrs./Day: 24 b. Days/Wk: 7 c. Wks./Yr.: 52 d. Seasons: All seasons

II. BEST AVAILABLE CONTROL TECHNOLOGY DATA

A. Emission limitations for any pollutants emitted from the source pursuant to 17-2 F.A.C.?

Yes (X) No ( )

CONTAMINANT	RATE OR CONCENTRATION
Particulate Matter	.08 G/SCFD, corrected 50% excess air
Odor	No objectionable odor

... standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

Yes (x) No ( )

?

CONTAMINANT	RATE OR CONCENTRATION
Particulate Matter	0.18 gr/dscm corrected to 12% CO_2

C. Has EPA declared the best available control technology for this class of sources? (If yes attach copy)

Yes ( ) No (X) EPA ruling is pending declaring electrostatic precipitation the BACT for particulate matter on large incinerator

CONTAMINANT	RATE OR CONCENTRATION

D. What emission levels do you propose as best available control technology?

CONTAMINANT	RATE OR CONCENTRATION
Particulate Matter	.08 g/dscf @ 50% excess air

E. Describe the existing control and treatment technology (If any) New Facility

1. Control Device: N/A

2. Operating Principles: N/A

3. Efficiency:* --

4. Capital Costs: --

5. Useful Life: --

6. Operating Costs: --

7. Energy: --

8. Maintenance Cost: --

9. Emissions --

*Explain method of determining E., 3. above.

CONTAMINANT	RATE OR CONCENTRATION Before Device	After Device

10. Stack Parameters

a. Height: 161 Ft. b. Diameter: 9 Ft.

c. Flow Rate: ~~ACFM~~ 202,960 SCFM (Avg.) d. Temperature: 480 °F

e. Velocity: 90.9 FPS

F. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary)

1.

a. Control Device: 3 field electrostatic precipitator

b. Operating Principles: A high voltage discharge source is applied to a series of relatively small diameter wires over which the exhaust gases flow. Opposite the wires are grounded electrodes which serve as the collecting elements and the terminus of the electric field. The basic steps in particle collection are: (1) charging the particles, (2) subjecting them to a precipitating force which moves them toward the collecting plates & (3) dislodging the particles from the plates & removing them from the system.

c. Efficiency: 98.35% d. Capital Cost: $2,250,000

e. Life: 20 yrs. f. Operating Cost: $66,600/yr.

g. *Energy: 388 KWH/hr. h. Maintenance Cost: $14,400/yr.

i. Availability of construction materials and process chemicals: good

j. Applicability to manufacturing processes: good

k. Ability to construct with control device, install in available space, and operate within proposed levels: good

2.

a. Control Device: 4 field electrostatic precipitator

b. Operating Principles: Same principle as above with additional field added to the cluster. Additional draft fan capacity required due to increase in pressure drop through system.

c. Efficiency: 99.01% d. Capital Cost: $3,182,000

e. Life: 20 yrs. f. Operating Cost: $81,000/yr.

g. Energy: 474 KWH/hr. h. Maintenance Costs: 22,000/yr.

i. Availability of construction materials and process chemicals: good

j. Applicability to manufacturing processes: good

k. Ability to construct with control device, install in available space, and operate within proposed levels: good

*Energy to be reported in units of electrical power - KWH design rate.

3.

a. Control Device: Fabric Filter Dust Collector (bag house)

b. Operating Principles: Dust laden air enters settling chamber at the bottom of the collector (below the bags) where the reduced velocity allows heavier particles to drop from stream. The gas stream then proceeds through the particles to drop from stream. The gas stream then proceeds through the filter media which is in the form of several bags into the clean air exhaust chamber. At periodic intervals the air flow is shut off and the bags are mechanically shaken to remove the collected dust from the fabric surfaces.

c. Efficiency: Unknown since this type device has not been used on a large incinerator.

d. Capital Cost: Moderate (less than FSP)

e. Life: 20 yr.

f. Operating Cost: Moderate

g. Energy: High, due to high pressure drop through filter media.

h. Maintenance Cost: High cost of bag replacement. Bags are susceptable to burn holes from glowing airborne embers.

i. Availability of construction materials and process chemicals: Good

j. Applicability to manufacturing processes: Not applicable at present state of the technology. Tests are presently being conducted in Saugus, Mass.

k. Ability to construct with control device, install in available space, and operate within proposed levels: The control device could be constructed within the available space, however problems with the filter materials presently available restrict this type equipment from practical application on large incinerators.

4.

a. Control Device High energy type wet scrubber dust collecting system.

b. Operating Principles: Gas enters the scrubber tangentially near the bottom of the scrubber through a dense shower of the scrubbing fluid (usually water for particulate removal). The water remains in the bottom of the scrubber and provides a dynamic seal against the system pressure. The gas is spun to remove the water droplets from the stream prior to discharge to the atmosphere. The scrubbing water is continuously withdrawn and treated prior to reuse. The sludge removed from the water stream is dried and disposed of by landfilling.

c. Efficiency: Low efficiency for particulate removal (90% est.)

d. Capital Cost: Moderate

e. Life: 20 years (est.)

f. Operating Cost: Moderate - high

g. Energy: High pressure drop

h. Maintenance Cost: Moderate - high

i. Availability of construction materials and process chemicals: good

j. Applicability to manufacturing processes: Little success to date with wet scrubbers on incinerator type operation. Major problems - heavy plume from high temperature saturated stream, complex sludge removal requirement & ineffective partic- removal.

k. Ability to construct with control device, install in available space, and operate within proposed levels: Requires large amount of space to accommodate liquid effluent treatment.

G. Describe the control technology selected:

1. Control Device: 3 field electrostatic precipitator

2. Efficiency: 98.35

3. Capital Cost: $2,250,000

4. Life: 20 years

5. Operating Cost: $74,000

6. Energy: 388 KWH/hr.

7. Maintenance Cost: $ 7,000

8. Manufacturer: UOP, Inc., Des Plaines, Illinois

9. Other locations where employed on similar processes:

a.

(1) Company: City of Harrisburg

(2) Mailing Address: 223 Walnut Street

(3) City: Harrisburg

(4) State: Pennsylvania 17101

(5) Environmental Manager: J. R. Karper, Deputy Director of Public Waste

(6) Telephone No.: 717/255-6495

(7) Emissions: Data are not available

CONTAMINANT	RATE OR CONCENTRATION

(8) Process Rate:

b.

(1) Company: City of Chicago

(2) Mailing Address: Room 300, 320 N. Clark Street

(3) City: Chicago (4) State: Illinois 60610

(5) Environmental Manager: William C. Ryder, Chief Environmental Design Engineer

(6) Telephone No.: 312/744-8030

(7) Emissions: Data not available

CONTAMINANT	RATE OR CONCENTRATION

(8) Process Rate:

c.

(1) Company: Town of Hempstead, New York

(2) Mailing Address: 1500 Merrick Road

(3) City: Merrick (4) State: New York 11566

(5) Environmental Manager: Joseph A. Oliviero, Deputy Commissioner of Sanitation

(6) Telephone No.: 516/378-4210

(7) Emissions: Data not available.

CONTAMINANT	RATE OR CONCENTRATION

(8) Process Rate:

d.

(1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:

CONTAMINANT	RATE OR CONCENTRATION

(8) Process Rate:

e.

(1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:

CONTAMINANT	RATE OR CONCENTRATION

(8) Process Rate:

10. Reason for selection and description of systems:

11. Emissions:

CONTAMINANT	RATE OR CONCENTRATION

12. Stack Parameters:

a. Height: 161 Ft.

b. Diameter: 9 Ft.

c. Flow Rate: 202,960 SCFM (Avg.)

d. Temperature: 480 °F

e. Velocity: 90.9 FPS (Avg.)

13. Fuels:

TYPE	HOURLY USE* X 10^3 lbs. AVG.	HOURLY USE* X 10^3 lbs. MAX.	HOURLY HEAT INPUT MILLION BTU/HR. AVG.	HOURLY HEAT INPUT MILLION BTU/HR. MAX.
Solid Waste	121	166.6	605	833

TYPE	DENSITY	%S	%N	%ASH
Solid Waste	18 - 26 lb/ft^3	.14	.21	18.5

*Gaseous: Cu. Ft./Hr.; Liquid & Solid: Lbs./Hr.

14. Wastes generated, disposal method, cost of disposal: 18.5% of the incoming waste (by weight - wet basi[s]) will be discharged from the boiler after the burning process. This portion will be disposed of as follows:

Material	%	Method of Disposal	Cost(Credit)/gross ton
Ferrous Metals	6.3	Sale to Metal Dealer	($.47)
Aluminum	.3	Sale to Metal Dealer	($1.04)
Heavy Non-Ferrous Metal	.12	Sale to Metal Dealer	($.35)
Aggregate	10.28	Used as clean fill material	(-0-)
Residue	1.5	Sanitary Landfill	($.36)
		TOTAL COST (CREDIT)/gross ton	($1.50)

H. Discuss the social 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. The County has seen the need to provide a more efficient method of solid waste disposal which is ecologically sound, will recover useable materials, will generate energy from waste material and will reduce the amount of land required for the final disposal of the waste. To this end, the County has committed itself to provide a modern resource recovery facility with the following benefits as incentive.

BENEFITS: Initially the facility will receive some 530,000 tons of solid waste per year (a capacity of 728,000 tons/year will be provided), of which less than 3% will ultimately have to be landfilled. This substantial reduction in the waste tonnage represents a corresponding volume reduction and therefore a similar savings in the amount of land annually consumed by landfilling operations.

In addition to reducing the amount of land required for solid waste disposal, conversion from landfilling of raw garbage to process residue landfilling will preclude further damage to the water table since the processed material is inert, consisting of the burned out material discharged from the grate and fly ash. Landfilling this material will have the added benefit of materially reducing the number of seagulls that are attracted to the site by the presence of raw garbage. The seagulls present a hazard to aircraft climbing from or descending to the nearby St. Petersburg-Clearwater International Airport.

The plant will generate 262 million kilowatt hours of electrical energy per year (based on 530,000 ton/year and 495 KWH/ton net output).

The recovery and recycling of marketable materials will help to abate the existing scarcity of these resources. Annually 33,000 tons of ferrous metals, 1,600 tons of aluminum and 636 tons of heavy nonferrous material will be recovered from the waste stream.

Since the resource recovery will be one of the first of its kind in the United States (unprocessed solid waste fuel to electricity), it can be expected that its operation will contribute significantly to the advancement of the solid waste processing activity in the country.

Operation of the plant will require a staff of 51 people (8 administrative, 32 operations and 11 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 $765,000 will put $15.3 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 $60 million construction project in the area. This will provide jobs for local construction labor, as well as an input to the local economy through the purchase of construction materials and services. Although the facility will be owned by the County, a private contractor will operate and maintain the plant. This private operation will generate an income for the contractor which will in turn provide corporate tax revenues as provided for in the Florida Administrative Code.

COSTS: The land on which the facility will be built (approximately 20 acres of industrial zoned land) will be utilized exclusively for the facility and will be restricted from other uses. It should be noted, however, that this land is presently within the permitted landfill area. If landfilling were to continue as is the existing practice, this area would be consumed in less than two years and its monetary value as industrial land would be severely reduced, since heavy construction on landfilled property is not generally practiced.

III. ADDITIONAL ATTACHED INFORMATION

A. Show derivation of total process input rate and product weight.

See Exhibit A, Figure A

B. Show derivation of efficiency estimation.

See Exhibit B

C. An 8½" 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 exist, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

See Figure C

D. An 8½" x 11" plot plan showing the exact location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

See Figure D

E. An 8½" x 11" plot plan showing the exact location of the establishment, and points of airborne emissions in relation to the surrounding area, residences and other permanent structures and roadways.

See Figure E

F. Attach all 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.

Environmentally, the facility will be much like any other well designed and operated facility. During the construction period there will be a disturbance and most likely a loss of individuals of various species of flora and fauna as well as increased emissions into the air and water. Conscientious efforts will be exercised in order to mitigate these environmental disturbances so that the construction activity will impose minimal long range effects on the environment.

Similarly, during the term of operation of the plant, the best available control technology will be utilized to protect the environment from the effects of discharges from the facility.

Detailed accounts of the proposed abatement efforts during construction and operation of the facility are presented in the Power Plant Site Certification Chapters 4 and 5, respectively.

Of primary significance, however, is the fact that without this facility, much larger scale negative environmental effects would be realized. A comparison of effects with and without the resource recovery facility is also detailed in the PPSC report.

EXHIBIT A

BASIS OF DESIGN
PINELLAS COUNTY RESOURCE RECOVERY FACILITY
MARCH 1978

I. EXISTING CONDITION

a. Solid Waste Quantities Disposed in 1977

Landfill	1977 Quantities Tons/Year	% Total	Source of Data
Toytown	334,840	58.7	City of St. Petersburg Weighed Data
Wells Bros.	146,761	25.7	Pinellas County Wells Bros., Weighed Data
Largo	48,000	8.4	City of Largo Estimated
Tarpon Springs	11,000	1.9	City of Tarpon Springs Estimated
Windish	30,000	5.3	Cities of Dunedin, Safety Harbor, Pinellas County, Wells Bros., Estimated
TOTAL	570,601	100.0	

b. Population Projections

Population projections were obtained from the Pinellas County Planning Department. Figure 1 depicts the 1975 and 1977 projections to the year 2000. The 1977 projections are lower than the previous projections and are based on the Pinellas County Comprehensive Land Use Plan adopted by Pinellas County in October 1977.

c. Per Capita Generation Rate

In 1977 approximately 570,600 tons of solid waste were disposed in Pinellas County by an estimated population of 770,000 people, which equals to an average per capita generation rate of 4.06 lb/cap/day (570,600 TPY x 2000 lbs/ton ÷ 770,000 capita ÷ 365 days/year = 4.06 lb/cap/day).

d. Seasonal Variation

Scale data was obtained from the Toytown and Wells Bros. sanitary landfills. The data reported daily, weekly and monthly quantities during 1977. These two landfills received 84.4 percent of the 1977 tonnage disposed in Pinellas County. Figure 2 depicts the 1977 monthly variation in waste quantities. Two maximum peaks occurred in 1977. In March 11.1 percent of the total waste was disposed while in August 9.2 percent was disposed. Further inspection indicates that during the month of January the minimum tonnage was received. During January 7.0 percent of the total annual solid waste was discarded.

Analysis of records from prior years indicated a similar seasonal variation. Therefore, the consultant proposes to use the 1977 seasonal variation as a typical condition to estimate the tonnage by month for the following years: 1980, 1990 and 2000.

II. SOLID WASTE PROJECTIONS

Listed below are the projected quantities for three project years:

Year	Quantity (Tons)
1980	592,690
1990	676,455
2000	776,400

The estimated quantities are based on the 1977 population projections for the three project years and a 4 lbs/capita/day waste generation rate.

PINELLAS COUNTY POPULATION PROJECTIONS

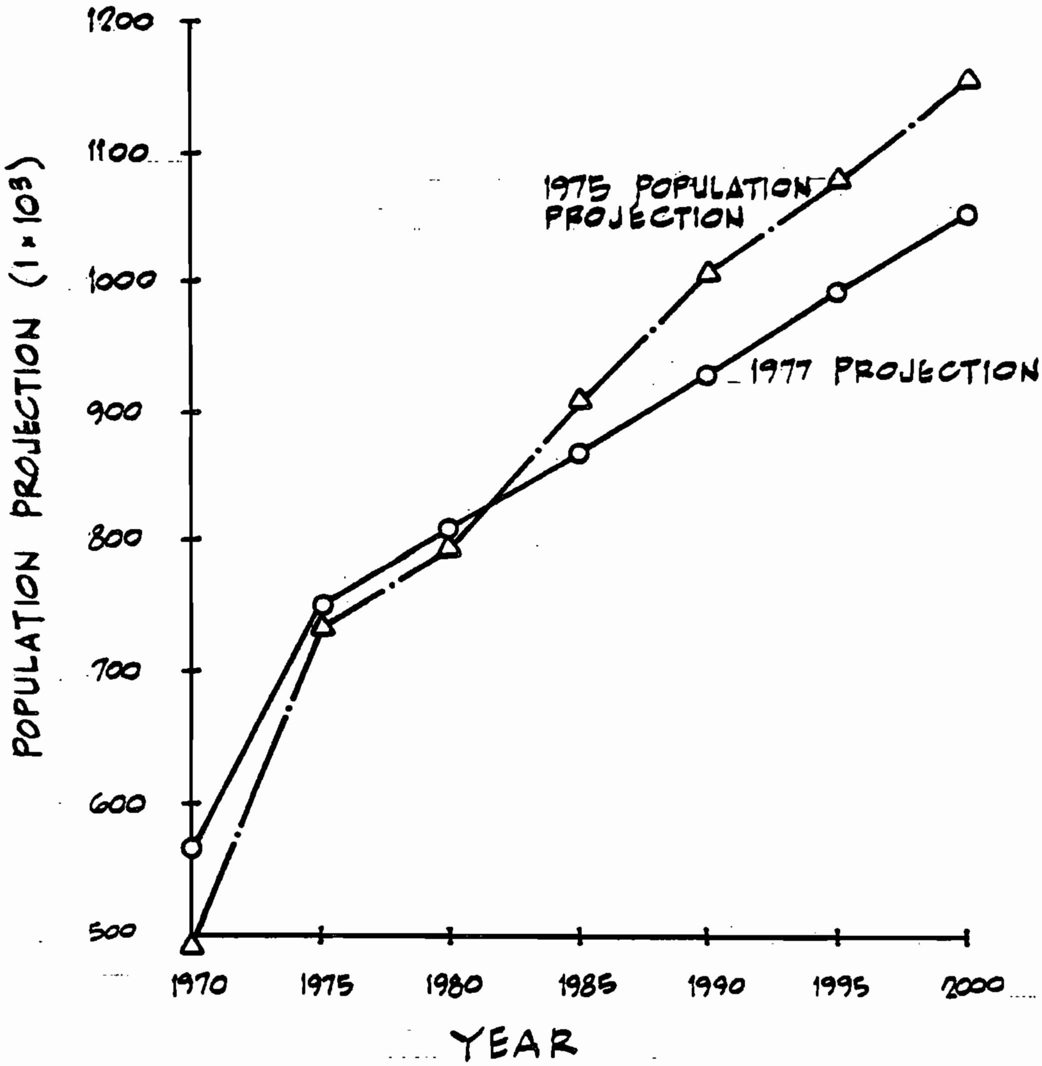


FIGURE A

EXHIBIT B

DERIVATION OF EFFICIENCY ESTIMATION

REVISED SEPTEMBER 19, 1978

CALCULATIONS FOR

EPA PSD PERMIT APPLICATION

(SUBSTITUTED FOR APPENDICES D AND E

OF JULY 12, 1978 SUBMITTAL)

FOR

PINELLAS COUNTY RESOURCE RECOVERY FACILITY

UOP 9/19/78

EMISSION CALCULATIONS

No Electrostatic Precipitator Control

Maximum Hourly Fuel Consumption

Annual Fuel Consumption	730,000 T/Year
Boiler Emission (Uncorrected)	1.654 gr/scf
Boiler Gas Flow	279,549 scfm
Excess Air at Boiler Outlet	90%
% Moisture by Volume in Flue Gas	13%

Boiler Emission Corrected to dscf @ 50% Excess Air:

$$1.654 \times \frac{190}{150} \times \frac{1}{.87} = 2.41 \text{ gr/dscf @ 50\% excess air}$$

Particulate Emission Rate:

$$279{,}549 \; \frac{\text{scf}}{\text{min}} \times .87 \; \frac{\text{dscf}}{\text{scf}} \times 60 \; \frac{\text{min}}{\text{hr}} \times \frac{1 \text{ lb}}{7000 \text{ gr}} \times \frac{150}{190} \times 2.41 \; \frac{\text{gr}}{\text{dscf}}$$

$$= 3966 \text{ lb/hr}$$

EMISSION CALCULATIONS

No Electrostatic Precipitator Control

Average Hourly Fuel Consumption

Annual Fuel Consumption	530,000 T/Year
Boiler Emission (Uncorrected)	1.447 gr/scf
Boiler Flue Gas Flow	202,960 scfm
Excess Air at Boiler Outlet	90%
% Moisture by Volume in Flue Gas	13%

Boiler Emission Corrected to dscf @ 50% Excess Air

$$1.447 \times \frac{190}{150} \times \frac{1}{.87} = 2.11 \text{ gr/dscf @ 50\% excess air}$$

Particulate Emission Rate:

$$202{,}960 \frac{\text{scf}}{\text{min}} \times .87 \frac{\text{dscf}}{\text{scf}} \times 60 \frac{\text{min}}{\text{hr}} \times \frac{1 \text{ lb}}{7000 \text{ gr}} \times \frac{150}{190} \times 2.11 \frac{\text{gr}}{\text{dscf}}$$

$$= 2521 \text{ lb/hr}$$

EMISSION CALCULATIONS

Three Field Electrostatic Precipitator

Maximum Hourly Fuel Consumption

Annual Fuel Consumption	730,000 T/Year
Boiler Emission (Uncorrected)	1.654 gr/scf
Boiler Gas Flow	279,549 scfm
Excess Air at Boiler Outlet	90%
% Moisture by Volume in Flue Gas	13%
ESP Outlet Dust Loading (Guaranteed)	.08 gr/dscf @ 50% excess air

Boiler Emission Corrected to dscf @ 50% Excess Air:

$$1.654 \times \frac{190}{150} \times \frac{1}{.87} = 2.41 \text{ gr/dscf @ 50\% Excess Air}$$

ESP Efficiency:

$$\text{\% Eff.} = \frac{2.41 - 0.08}{2.41} = 96.7\%$$

Particulate Emission Rate:

$$279{,}549 \frac{\text{scf}}{\text{min}} \times .87 \frac{\text{dscf}}{\text{scf}} \times 60 \frac{\text{min}}{\text{hr}} \times \frac{1 \text{ lb}}{7000 \text{ gr}} \times \frac{150}{190} \times 0.08 \frac{\text{gr}}{\text{dscf}}$$

$$= 132 \text{ lb/hr}$$

EMISSION CALCULATIONS

Three Field Electrostatic Precipitator

Average Hourly Fuel Consumption

Annual Fuel Consumption	530,000 T/Year
Boiler Emission (Uncorrected)	1.447 gr/scf
Boiler Gas Flow	202,960 scfm
Excess Air @ Boiler Outlet	90%
% Moisture by Volume in Flue Gas	13%
ESP Outlet Dust Loading	.05 gr/dscf @ 50% excess air

Boiler Emission Corrected to dscf @ 50% Excess Air:

$$1.447 \times \frac{190}{150} \times \frac{1}{.87} = 2.11 \text{ gr/dscf @ 50\% Excess Air}$$

ESP Efficiency:

$$\% \text{ EFF} = \frac{2.11 - .05}{2.11} = 97.6$$

Particulate Emission Rate:

$$202{,}960 \frac{\text{scf}}{\text{min}} \times .87 \frac{\text{dscf}}{\text{scf}} \times 60 \frac{\text{min}}{\text{hr}} \times \frac{1 \text{ lb}}{7000 \text{ gr}} \times \frac{150}{190} \times 0.05 \frac{\text{gr}}{\text{dscf}}$$

$$= 60 \text{ lb/hr}$$

EMISSION CALCULATIONS

Four Field Electrostatic Precipitator

Maximum Hourly Fuel Consumption

Annual Fuel Consumption	730,000 T/Year
Average Hourly Fuel Consumption	83 T/Hour
Boiler Emission (Uncorrected)	1.654 gr/scf
Boiler Gas Flow	279,549 scfm
Excess Air @ Boiler Outlet	90%
% Moisture by Volume in Flue Gas	13%
ESP Outlet Dust Loading (Guaranteed)	.04 gr/dscf @ 50% escess air

Boiler Emission Corrected to dscf @ 50% Excess Air:

$$1.654 \times \frac{190}{150} \times \frac{1}{.87} = 2.41 \text{ gr/dscf @ 50\% excess air}$$

ESP Efficiency:

$$\% \text{ EFF} = \frac{2.41 - 0.04}{2.41} = 98.3\%$$

Particulate Emission Rate:

$$279{,}549 \frac{\text{scf}}{\text{min}} \times .87 \frac{\text{dscf}}{\text{scf}} \times 60 \frac{\text{min}}{\text{hr}} \times \frac{1 \text{ lb}}{7000 \text{ gr}} \times \frac{150}{190} \times .04 \frac{\text{gr}}{\text{dscf}}$$

$$= 66 \text{ lb/hr}$$

EMISSION CALCULATIONS

Four Field Electrostatic Precipitator

Average Hourly Fuel Consumption

Annual Fuel Consumption	530,000 T/Year
Average Hourly Fuel Consumption	60 T/Hour
Boiler Emission (Uncorrected)	1.447 gr/scf
Boiler Gas Flow	202,960 scfm
Excess Air @ Boiler Outlet	90%
% Moisture by Volume in Flue Gas	13%
ESP Outlet Dust Loading	.025 gr/dscf @ 50% excess air

Boiler Emission Corrected to dscf @ 50% Excess Air:

$$1.447 \times \frac{190}{150} \times \frac{1}{.87} = 2.11 \text{ gr/dscf @ 50\% Excess Air}$$

ESP Efficiency:

$$\% \text{ Eff.} = \frac{2.11 - .025}{2.11} = 98.8\ \%$$

Particulate Emission Rate:

$$202{,}960 \ \frac{\text{scf}}{\text{min}} \times .87 \ \frac{\text{dscf}}{\text{scf}} \times 60 \ \frac{\text{min}}{\text{hr}} \times \frac{1 \text{ lb}}{7000 \text{ gr}} \times \frac{150}{190} \times .025 \ \frac{\text{gr}}{\text{dscf}}$$

$$= 30 \text{ lb/hr}$$

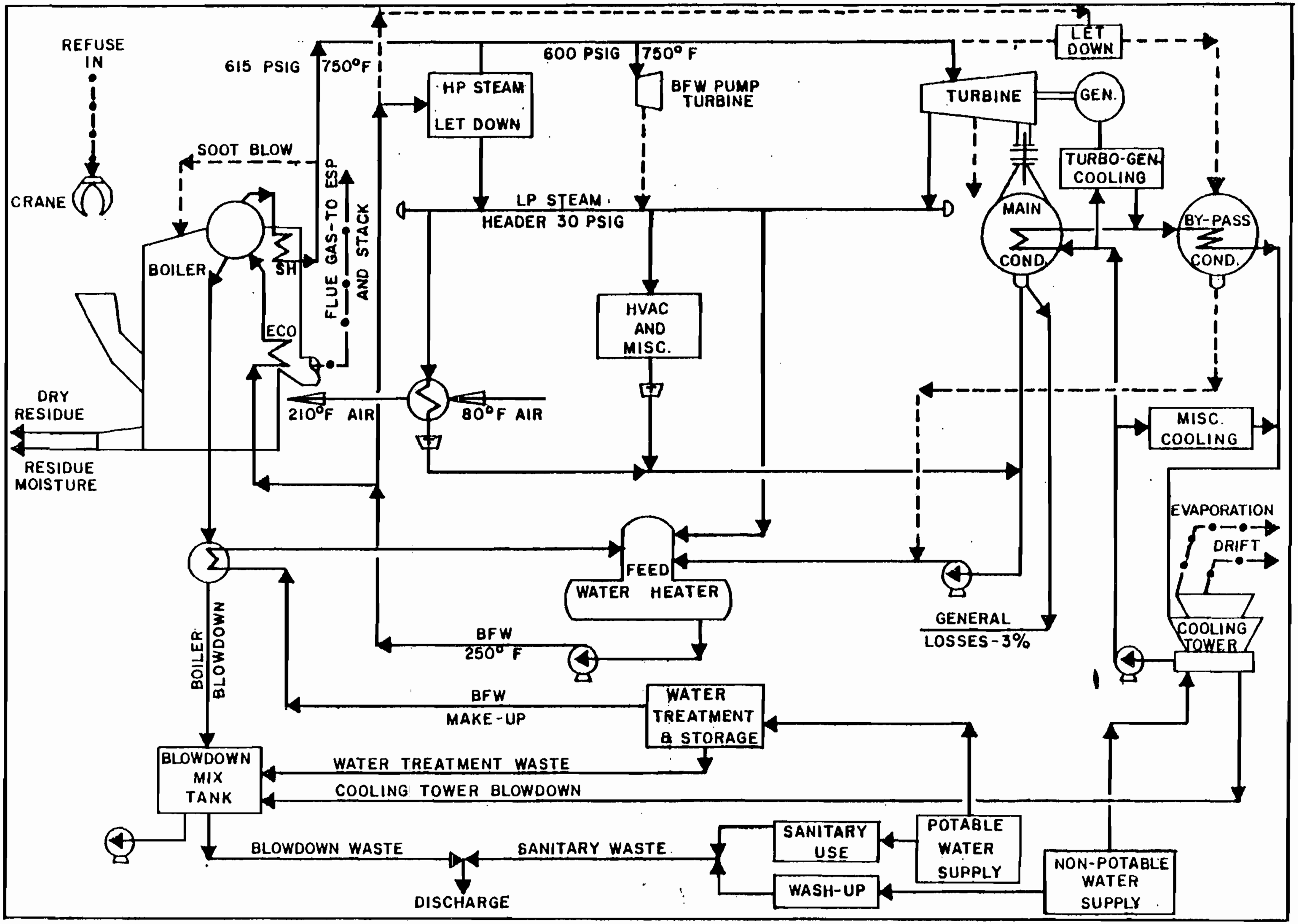
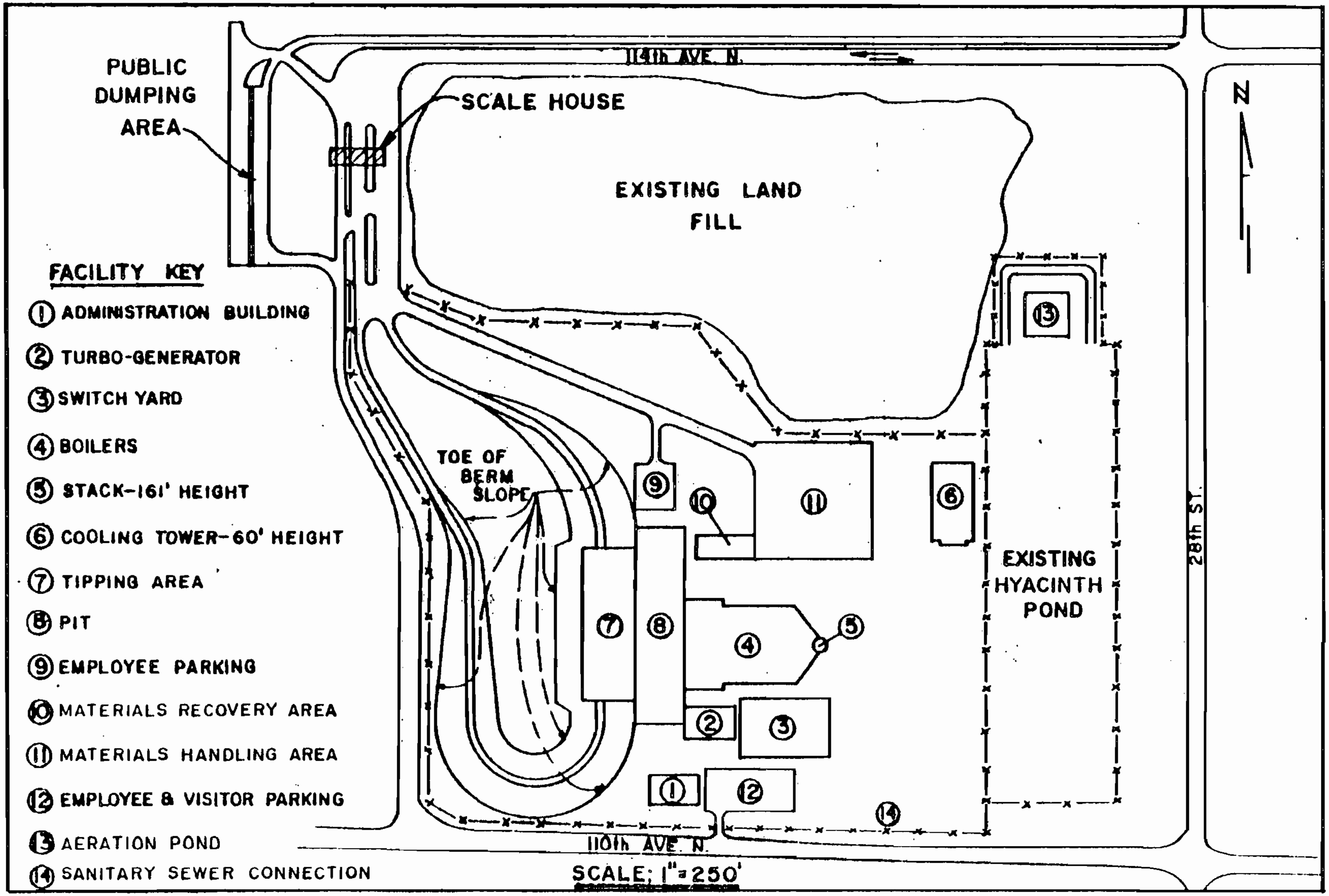


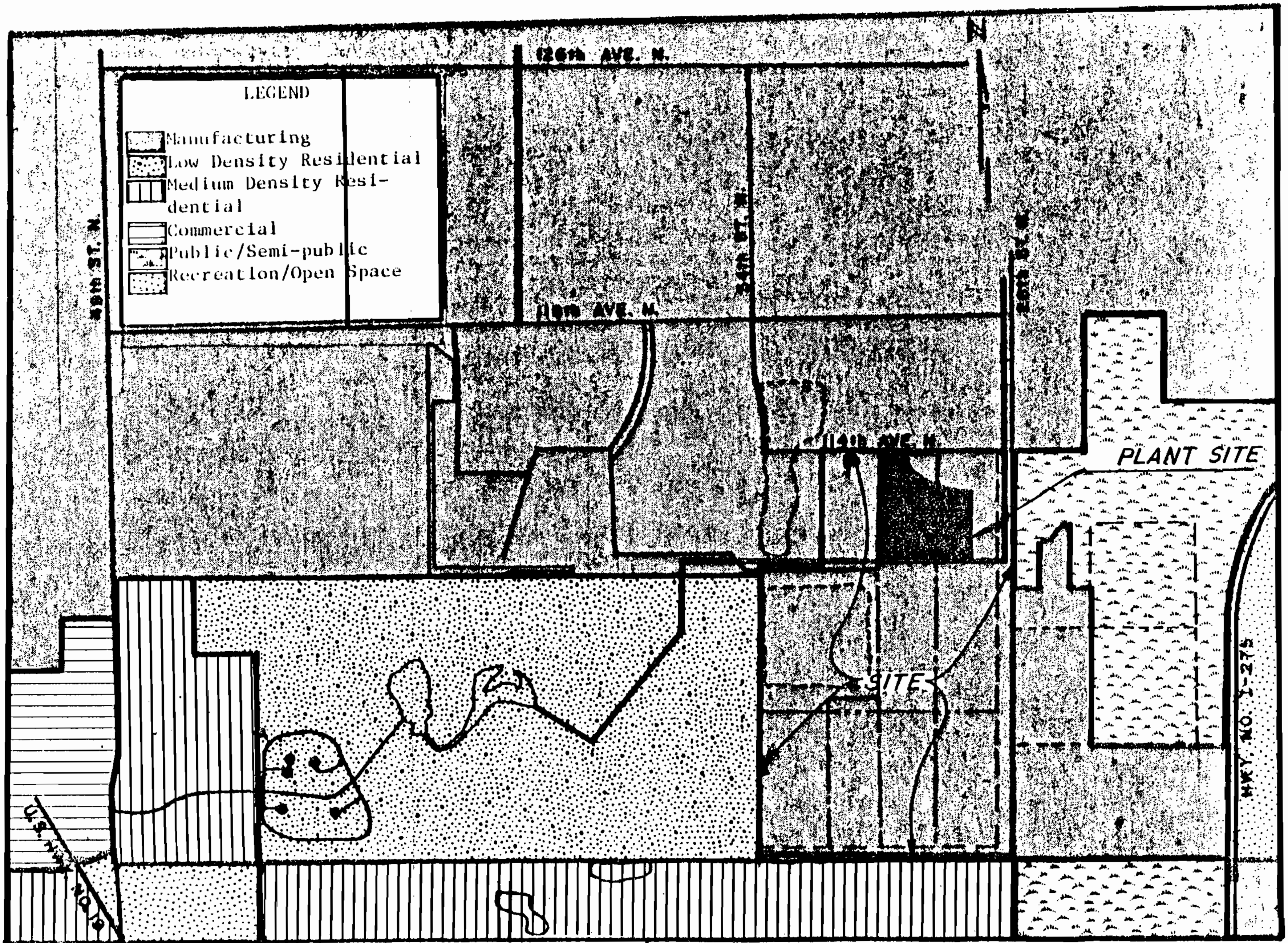
FIGURE C

PROCESS FLOW DIAGRAM



PLOT PLAN

FIGURE D



PINELLAS COMPRENSIVE LAND USE PLAN

FIGURE E

APPENDIX D

LANDFILL PERMIT INFORMATION

GENERAL

The following information is presented in order to clarify and further elaborate on the landfilling process which will be used as an adjunct activity to the Resource Recovery Plant. This landfill will be used primarily for the disposal of inert residue from the plant. Other short term uses of the landfill will be for the disposal of construction debris (during construction of the plant) and in the event of an emergency shut down, raw refuse will be disposed of until the plant is again operational.

The information presented herein is provided on the standard DER Resource Recovery and Management Facility format with Exhibits A through C included with this Appendix for additional clarification.

STATE OF FLORIDA

DEPARTMENT OF POLLUTION CONTROL

APPLICATION TO CONSTRUCT (x) / OPERATE ( ) A SOLID WASTE

RESOURCE RECOVERY AND MANAGEMENT FACILITY

Applicant: (owner or authorized agent): G. Jordan, Director of Public Works and Utilities

Street Address: County Courthouse
315 Haven Street
Clearwater, Florida 33516

Mailing Address: (If different from above) ______________________

______________ (City) ______________ (County)

Location of Site: Township 30, Range 16, Section 14

Lat. 27°52′18″N Long. 82°40′48″W

(Township, Range, Section, & Lat., Long.)

28th Street N. & 110th Avenue

(Name of Access Road and Crossroad)

Towns and Areas to be Served: All Portions of Pinellas County

Population to be Served: approx. 775,000 Area of Site: 240 AC Acres

Date Site Ready to Receive Refuse: ______________________

General Requirements

A permit for each Resource Recovery and Management Facility is required. Separate applications for each permit, four copies each, should be submitted to the Regional Office of the Department of Pollution Control. Complete appropriate sections of the application for the type of facility proposed: sanitary landfill, incinerator, volume reduction plant, etc.

Each application shall be accompanied by an application fee of $20.00 payable by check drawn in favor of "State of Florida, Department of Pollution Control".

Applicant has the responsibility to provide copies of the application to appropriate city, county and/or regional pollution control agencies, established pursuant to Section 403.182 Florida Statutes. Applicant shall also clear the application through appropriate local planning agencies. Comments from any of these agencies shall be forwarded with the application to the Department.

Information contained in the application shall conform to requirements of Chapter 17-7 F.A.C. All entries should be typed or printed in ink. If additional space is needed, separate, properly identified sheets of paper may be attached.

All documents submitted to support the application should be on 8.5" x 11" paper.

Processing of the application will begin when the foregoing requirements have been met.

Permit Number ______________ Issue Date ______________

Review Date ______________ Expiration Date ______________

STATEMENTS BY APPLICANT AND ENGINEER

A. Applicant

The undersigned owner, or authorized representative*, of Pinellas County, is aware that statements made in this form and attached exhibits are an application for a Sanitary Landfill Permit from the Florida Department of Pollution Control and certifies that the information in this application is true, correct and complete to the best of his knowledge and belief. Further, the undersigned agrees to comply with the provisions of Chapter 403 Florida Statutes and all rules and regulations of the Department. It is understood that the Permit is not transferable, and, if granted a permit, the Department will be notified prior to the sale or legal transfer of the permitted establishment.

[signature]

Signature of owner or agent

Director of Public Works & Utilities

Name and Title

Date: Oct. 23, 1978

*Attach letter of authorization

B. Professional Engineer Registered in Florida

This is to certify that the engineering features of this resource recovery and management facility have been designed/examined by me and found to conform to engineering principles applicable to such facilities. In my professional judgement, this facility, when properly maintained and operated, will comply with all applicable statutes of the State of Florida and rules of the Department. It is agreed that the undersigned will provide the applicant with a set of instructions for proper maintenance and operation of the facility.

Signature R. Lee Torrens Mailing Address: P. O. Box 12744
Pensacola, Fla. 32575

Name: R. Lee Torrens Telephone No.: 904/432-2481
(please type)

Florida Registration Number 21274 Date: 10/22/78
(please affix seal)

Sanitary landfill including milled refuse disposal sites requirements
Required Attachments
(Submit in the order listed)

1. Maps

   A. A location map drawn to a scale of one inch equals one half mile showing the contours and elevation of the area surrounding the site.

   B. A topographic map of the site drawn to a scale not to exceed one inch equals two hundred feet showing existing and final grades.

2. Drawings which shall include:

   A. Property lines

   B. Land use including existing habitations; other structures; public roads and highways; shallow and deep wells; trees; etc.

   C. Area and depth of the proposed fill

   D. All borrow areas

   E. Location and elevation of surface and highest ground waters

   F. A wind rose to show prevailing winds

   G. Special provisions for surface and subsurface drainage and erosion control

   H. Leachate treatment and control provisions

   I. Necessary provisions for gas control

   J. Method of operation and completion

   K. Cross sections showing typical lifts not to exceed ten feet compacted depth of refuse

   L. The necessary grade for proper drainage of each lift and the final grade of the completed operation

   M. Locations of stockpiled cover material

   N. Access routes, approach roads and on-site roads

   O. Fencing, direction and information signs.

   P. Weighing facilities, locker room; toilet and shower facilities; equipment shelter, and wash-out facilities

   Q. Locations of existing and proposed utilities

   R. Fire Control and potable water supply locations

3. Hydrogeological Report which shall include:

   A. Thickness and character of the overburden (soil)

   B. Character of bedrock

   C. Depth of the water table and potentiometric surfaces

   D. Depth to the shallow ground water aquifer and artesian aquifier

   E. Local and regional ground water flow systems

   F. Chemical quality of surface and ground water. (See Page 24 - A Handbook for Sanitary Landfills in Florida for list of substances to be tested for.)

   G. Frequency and extent of flooding of the area.

   H. Nature and volume of the waste materials to be buried

4. Soils Survey which shall include

   A. Depth to seasonal high watertable

   B. Soil Series

   C. Soil Drainage Class

   D. Flooding

   E. Permeability

   F. Slope

   G. Soil Texture (dominant to depth of 60")

   H. Depth to bedrock

   I. Stoniness Class

   J. Rockiness Class

5. Equipment -- Discuss

   A. Present - types, sizes, numbers

   B. Proposed - types, sizes, numbers

6. Discuss projected amount of waste to be handled including basis for projection.

7. Operating procedures - explain methods of

   A. Controlling the length and width of the working face

   B. Disposing of large items, special industrial, and hazardous wastes

   C. Confining papers to the site

   D. Waste handling in the wake of a natural disaster

   E. Emergency provisions for insect and rodent control

   F. Providing adequate site supervision

   G. Controlling unauthorized fires

   H. Maintaining an all weather access road

   I. Posting operating hours, fee schedule, waste restrictions, the name, address and phone number of the operating agent

   J. Locating signs to direct traffic

8. Land Disposal Data Form

NOTE: Additional information may be required as determined by the Department.

DESCRIPTION OF SITE

The landfill site (approximately 40 acres) will be used as an auxiliary to the proposed resource recovery plant. The specific landfill site is located as shown on Figure LP1 (following page) and is part of the 240 acre site included as the resource recovery site. The legal description of the entire 240 acres is as follows:

> Lots 41 through 56, 73 through 86 and 105 through 120, inclusive Bridgeway Acres Subdivision and as recorded in Plat Book 6, page 64, Public Records of Pinellas County, Florida, and Lots 1 through 28, Block A, and Lots 1 through 28, Block B, Beladona Heights Subdivision as recorded in Plat Book 10, page 63, public records of Pinellas County, Florida.

The northernmost 80 acres was included in Phase I of the Bridgewater Acres sanitary landfill permit (application made March 1, 1977). The remaining 160 acres was described as Phase II in that Phase I application. This landfill site will predominantly be used to dispose of residues from the Resource Recovery Facility; however, during emergency conditions of a system failure, raw refuse will be disposed of in this site. In addition, debris generated during the construction of the Resource Recovery Facility will also be disposed of at this site.

RESOURCE RECOVERY FACILITY

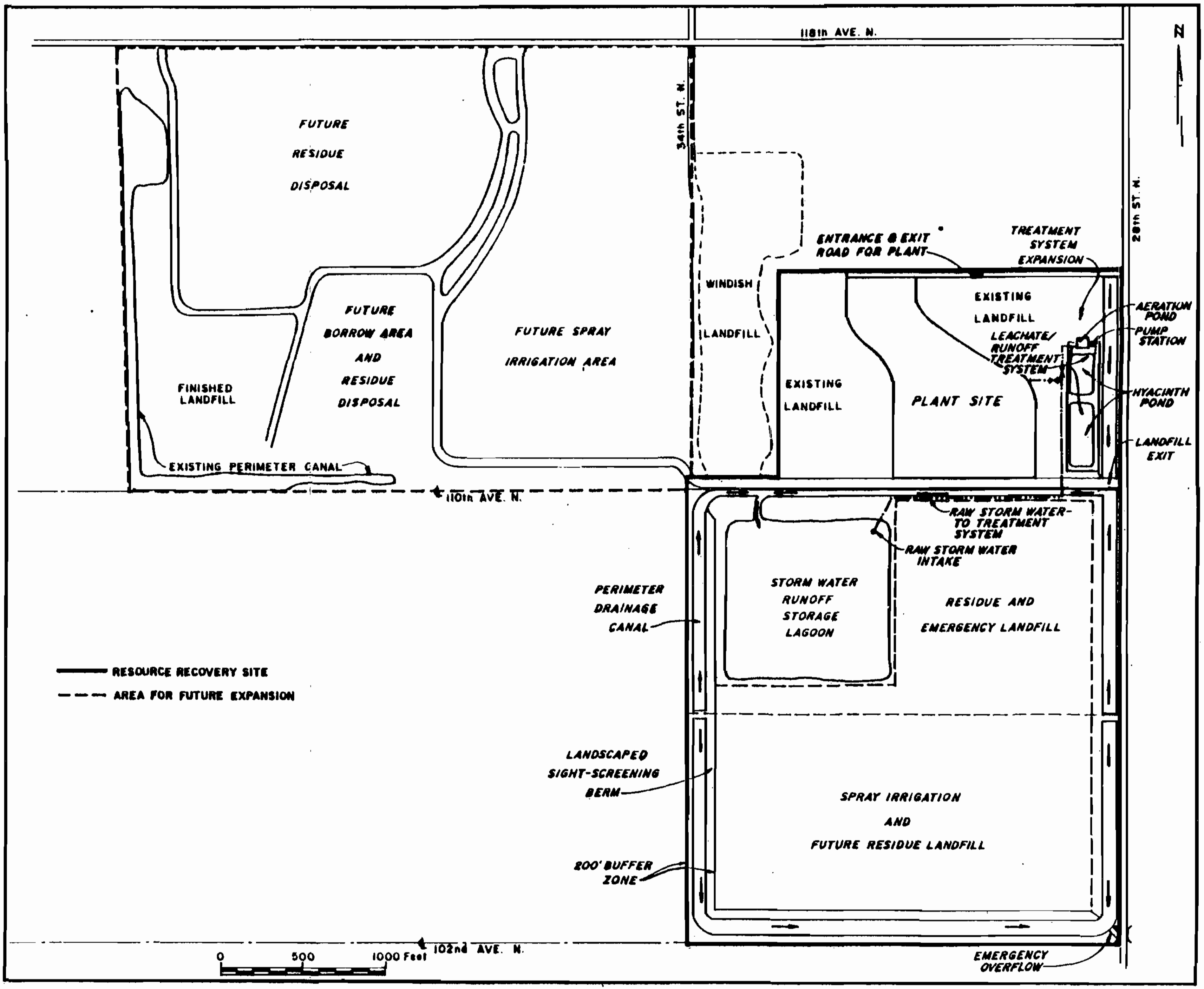


FIGURE LP-1

COMMENTS ON REQUIRED ATTACHMENTS

1. Maps - Drawings from other portions of the PPSC text provide the same required information. Figure LP-1 is included herein for added clarification.

2. Drawings - Drawings provided as attachments hereto augment the material presented in the PPSC text.

   A. Property lines - PPSC text.

   B. Land Use, etc. - PPSC text.

   C. Area and depth of proposed fill - The effective fill area as shown on Figure LP-1 is approximately 40 acres. The final equivalent depth of material to be landfilled in this fill is approximately 20 to 30 feet, to be constructed using 10 to 12 foot cell lifts.

   D. Borrow areas - Borrow material, when needed, will be obtained either on site or from the adjacent county owned property. Material from excavation of the perimeter canals will be used for construction of a levee screen. This is shown on Figure LP-1. Potential areas for borrow in the contiguous county land are shown on Figure LP-1.

   E. Location and elevation of surface and ground waters - Refer to PPSC text in addition to U.S. Geological Survey Hydrogeological Report (Exhibit A).

   F. Wind rose indicating prevailing winds - Refer to PPSC text.

   G. Special provision for drainage and erosion control - The drainage system proposed for the entire resource recovery site consists of the following items shown on Figure LP-2:

      (1) Interceptor Canals - These canals will be served by intermediate drainage swales which direct drainage from the areas to be drained. The interceptor canals will flow to the stormwater holding lagoon.

      (2) Stormwater Holding Lagoon - This lagoon will serve as a main holding area for drainage. If water levels become too high due to major storms water from this lagoon will be pumped to the stormwater/leachate treatment system.

(3) Stormwater/Leachate Treatment System - This system consists of an aeration basin, two contiguous ponds containing water hyacinth, a chlorine contact basin and a high head pump station. Additional design parameter information is contained in the PPSC text. Effluent from this system will be pumped to the spray irrigation area, shown on LP-1, or it will be used at the Resource Recovery Facility as cooling water make-up (reference PPSC text). Final top and side slopes of completed fill areas will be graded in such a manner that proper drainage will be provided by directing flow away from active landfill areas. All slopes of covers, canals, and completed fill areas will be seeded to retard erosion.

H. Leachate treatment/control provisions - Drainage of completed fills will be employed to minimize leachate formation by allowing water to run off the fill rather than being allowed to percolate through the filled material. Leachate which does form by percolation through an active fill through seepage will be accumulated at the low point of the active cell. This accumulation will be pumped, via portable pumps, directly to the aeration pond. At no time will residue or raw refuse be deposited in standing water.

As described in "G" above, all leachate and stormwater will be treated and contained on site by spray irrigation. Drainage of treated wastewaters from the spray irrigation field into the perimeter canals will be discharged only during emergency conditions from an emergency overflow structure located at the extreme southeast corner of the site (see LP-1).

Existing monitoring wells (refer to PPSC text), plus any additionally required, will be used to monitor the effectiveness of the system. The need for special treatment will depend on the final analysis of the system's effectiveness during full operations. If required, they will be implemented appropriately.

I. Gas control provisions - This site will primarily be used for plant residues containing less than 0.2% putrescible matter. Odors and gas production of any consequence are not expected. Since putrescible matter will be landfilled during emergencies, this condition will be monitored, and provisions evaluated at that time. Objectionable odors, if any, originating from this site will be effectively controlled during all phases of operation as circumstances dictate.

J. Method of operation and completion - The incremental landfill area is approximately 40 acres. The acreage will be used sequentially from north to south through this 40 acre parcel. Primarily residues from the Resource Recovery Facility will be disposed of in this area. There will, however, be a need to dispose of raw refuse during periods of emergencies if a plant outage occurs. It is anticipated that such outages would be quite rare. At all times, normal residue will be segregated from the emergency landfill refuse. Putrescible wastes will receive daily cover while residues will only receive cover when necessary or at cell completion.

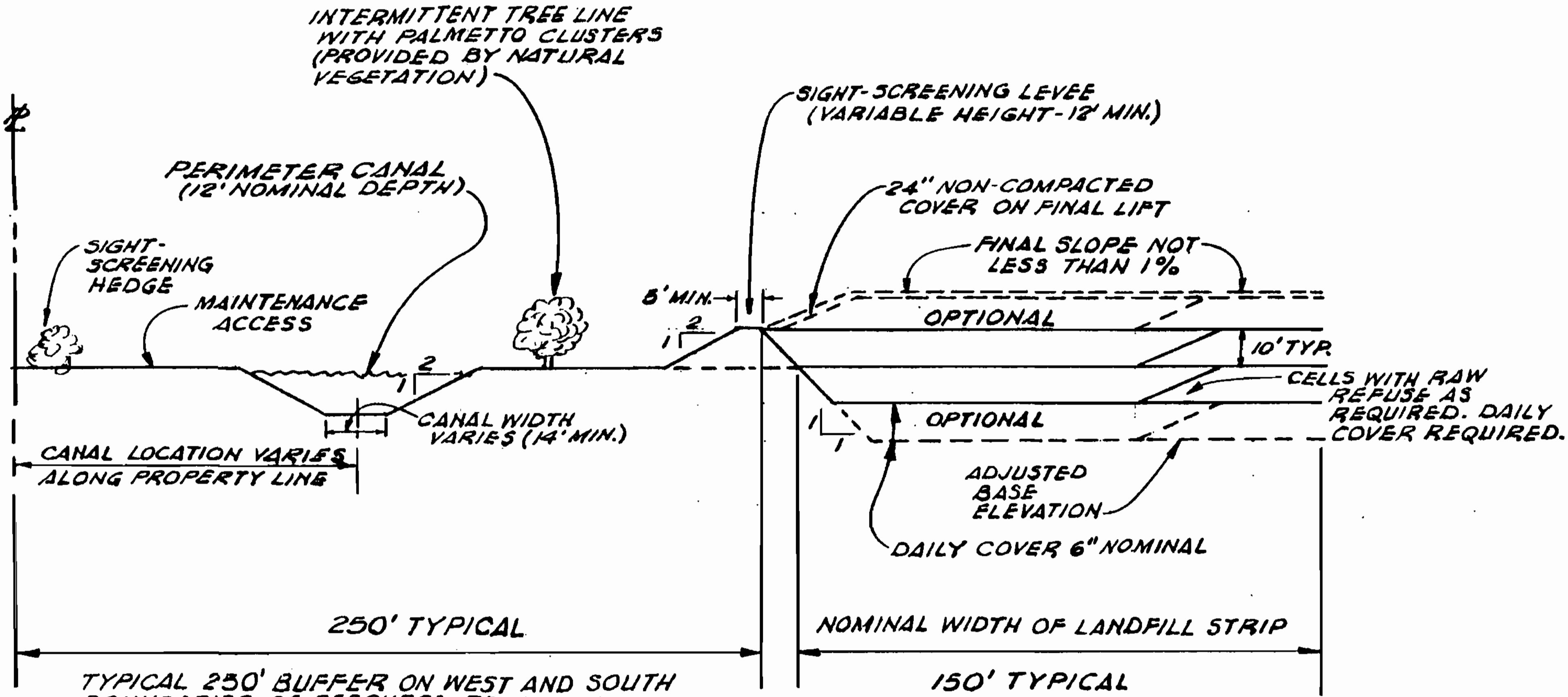
One standby putrescible cell will be available at all times. A typical cross-section of a finalized standby putrescible cell is shown on Figure LP-2. Following is an explanation of the sequence of operation of a putrescible cell when it is being utilized.

Site preparation prior to unloading and compacting of refuse, consists of excavating with dragline a portion of the north half of each strip, beginning at the end nearest to the on-site haul road. The nominal size of each portion (mini-cell) is 75 by 80-100 feet, one dimension being half the width of a full cell. Spoil is temporarily deposited at the outer edge of the excavation for later use as cover. Once this portion has been dug, the dragline begins excavating the other half of the cell width, depositing spoil beyond the outer edge of that portion.

Meanwhile, the first portion is prepared to receive refuse. Once this mini-cell has been filled and compacted to the desired elevation, the spoil deposited nearby is spread over the completed portion, as cover.

When required, the dragline is moved back (in direction away from on-site road) to begin excavation of the third portion located behind the initial mini-cell. Soon thereafter, the second portion is prepared to receive refuse from collection trucks. This procedure is repeated until the entire strip has been excavated, landfilled with refuse, compacted and covered.

This entire sequence is repeated if and when additional raw refuse fill is required.



TYPICAL 250' BUFFER ON WEST AND SOUTH BOUNDARIES OF RESOURCE RECOVERY SITE. MUCH OF LANDFILL AREA ABUTS STORM WATER HOLDING POND.

NOTE: CONTOUR ADJUSTED BASE ELEVATION AND SUBSEQUENT LIFT CONTOURS TO PROMOTE SURFACE AND SUB-SURFACE DRAINAGE AWAY FROM RAW REFUSE - FOR DIVERSION TO TREATMENT SYSTEM.

NO SCALE

FIGURE LP-2

TYPICAL CROSS SECTION RAW REFUSE CELL WITH PERIMETER CANAL AND BERM

Shown on Figure LP-3 is a typical life configuration for use in residue disposal. The sequence for excavation is basically the same as for the raw refuse cell described above, however, there will only be minimum compaction exercised. In addition, this material will receive cover only as circumstances dictate plus final cover.

This sequence of operation will continue until all of the designated area has been completely filled.

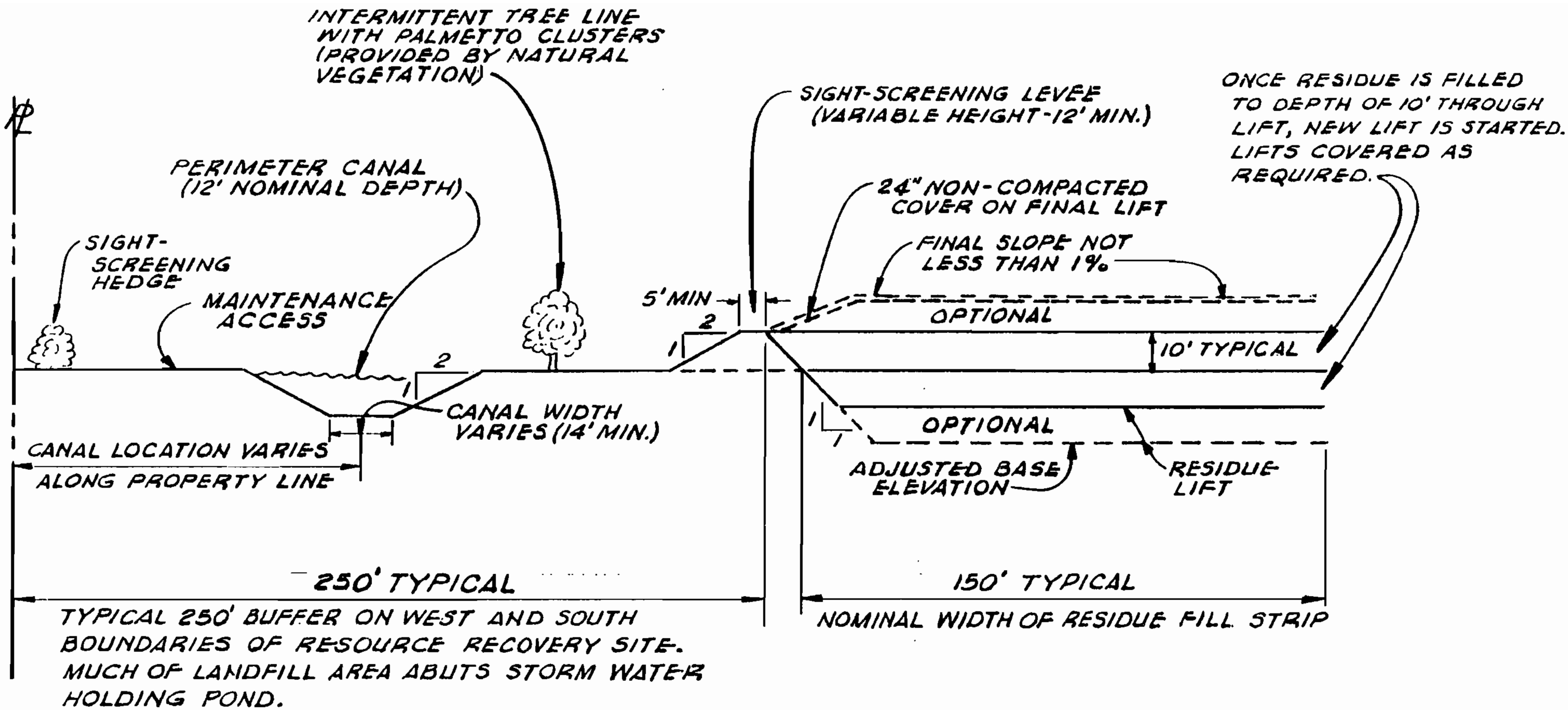
K. Sections of typical lifts - These are shown for both putrescible and residue cells on Figures LP-3 and LP-4, respectively.

L. Necessary grade for proper drainage - Figures LP-2 and LP-3 illustrate the requirements for contouring the adjusted base elevation and subsequent lift elevations, as well as final grade of completed operation to promote surface and sub-surface (leachate) drainage away from completed cells and on-site haul roads. A final top slope of not less than one percent will be provided to promote proper drainage.

M. Locations of stockpiled cover material - The cover material is normally stockpiled alongside the mini-cells, from excavation of the next cell area in the operation sequence (refer to Item J). Significant portions of fill material (consisting of: loose to medium dense fine sands, becoming clayey with depth; very loose to loose thinly stratified clayey-sands; and very loose calcareous, silty sands with shell fragments) will be excavated on-site with development of the disposal strips, as well as drainage swales/canals.

N. Access roads, approach roads, and on-site roads - Shown on LP-1 and in the PPSC text. Illegal entrance to the landfill site will be prevented through the presence of canals and fencing.

O. Fencing, direction and information signs - Only under emergency conditions will refuse collection and transfer vehicles be allowed access to the landfill area. Primarily dump trucks hauling residue within the site will be using this area. At no times will the general public have access to the landfill area. A public dumping area is provided at the entrance to the Resource Recovery Plant site (reference PPSC text). A variety of directional signs are provided at the entrance to the plant site and during emergency outages of the facility, the bypassed refuse vehicles will be directed by the scale operator at the Resource Recovery Plant to the landfill area. Fencing will be provided where necessary.



NOTE: CONTOUR ADJUSTED BASE ELEVATION AND SUBSEQUENT LIFT CONTOURS TO PROMOTE SURFACE AND SUBSURFACE DRAINAGE AWAY FROM FILLED RESIDUE FOR DIVERSION TO TREATMENT SYSTEM.

NO SCALE

FIGURE LP-3

TYPICAL CROSS SECTION

RESIDUE CELL WITH PERIMETER

CANAL AND BERM

P. Weighing facilities and other additional facilities - All weighing and adjunct facilities will be located at the plant site (reference PPSC text).

Q. Locations of existing and proposed utilities - No utilities are contemplated at this time for the landfill area. A three phase 12 KV service is located along 28th Street to serve the treatment system. Additional electrical as well as water and sewerage utilities requirements for the plant itself are outlined in the PPSC text.

R. Fire control and portable water supply locations - Fire control at the landfill will be handled with portable pumps utilizing perimeter canals and the holding pond as sources of water.

In the case of fire occurring in the active putrescible cell area, the area Volunteer Fire Department will be called. Fires are to be extinguished with water and cover dirt as necessary.

3. Sections A through G have been addressed by the U.S. Geological Survey (Tampa, Florida office). This report is included as Exhibit A of this document. A more thorough discussion of this information is contained in the PPSC text.

H. Nature and volume of wastes to be buried - As discussed previously, the primary function of this landfill is to dispose of non-marketable residues from the Resource Recovery Plant.

In addition, this landfill will be used in emergency situations to landfill raw refuse.

It is impossible to estimate the volume of bypassed materials which will be landfilled until the plant is operational, however, it is estimated that this will be rare due to the economic penalties and/or incentives for the contractor to keep the plant operational.

As specified in the text of the PPSC, the annual volume of residue estimated in 1982 is 11,130 tons per year. This residue material has a density of approximately 30 lbs/ft^3. This is approximately 27,481 c.y. per year. The full refuse flow volume delivered at the plant will be in the range of 1450 to 1700 tons per day initially.

Hazardous materials, such as poisons, herbicides, pesticides, flammable liquids, and other hazardous wastes will not be disposed of at this landfill. Certain approved chemicals will be disposed of subject to prior arrangements with the Pinellas County Public Works Department.

Sewage sludges and septic tank pumpings will not be accepted at the site.

4. This section has been discussed in the text of the PPSC report. Correspondence from the U.S. Geological Survey and the Soil Conservation Service (Exhibits A and B of this document) summarize this data in the format required in the Sanitary Landfill Application.

5. Equipment discussion - At present the county landfill activities are handled by a contract with Wells Brothers, Inc. who operate the Phase I Bridgewater Areas Landfill. The following is a list of equipment presently used in this operation.

Description	Size	Quantity
Steel-wheeled compactor with trash blade	N/A	1
Crawler dozer	D7 (Caterpillar)	1
Crawler dozer	D6 (Caterpillar)	1
Dragline with 6 cubic yard bucket	88B (Bucyrus-Erie)	1
Dragline with 1 cubic yard bucket	22B (Bucyrus-Erie)	1
Rubber tired loader	950 (Caterpillar)	1
Dump Truck	15 cubic yard	2
Pick-up Truck	1/2 ton	1
Miscellaneous Equipment pumps, generator, etc.	N/A	3

During the changeover of operation from the conventional landfill to the resource recovery operation, it is most likely the same equipment and staffing requirements will prevail as for the Phase I operation.

Once the resource recovery operation is begun, the equipment and staffing requirements will be minimal due to the nature of the residues being landfilled. Since the landfill activities will be adjunct to the resource recovery operation, some of the County personnel assigned to the plant will be utilized periodically at the landfill. Below is an estimate of the complement of personnel that will be assigned to the landfill operation:

Landfill Superintendent & Equipment Operator	1
Residue Truck Operators	1
Equipment Mechanic	1
	3

This staffing is considered to be the minimum required, however, if increased equipment and staffing are required, adjustments will be made.

In the advent of an emergency shutdown of the plant necessitating the landfilling of raw refuse, additional equipment will be procured on an interim basis (leased, rentals, or County equipment). Since the plant has storage capabilities (i.e. refuse pit) and two operating boiler units, there will be sufficient lead time available to make the necessary preparations for the landfilling of raw refuse.

6. Refuse quantities - The life of a sanitary landfill is a function of the rate at which material is landfilled. Anticipated quantities of solid waste are discussed in the PPSC report text. The materials which are intended to be landfilled are estimated to be 2.1 percent by weight of the incoming wastes with a density of approximately 30 lbs/ft^3. Assuming multiple cell construction and an uncompacted depth of this material of 20 feet, the annual land requirement will be 0.85 to 1 acre per year. It is anticipated non-combustible demolition material and debris will bypass the plant and increase land consumption. However, the volumes involved must await operational experience.

7. Operating procedures - The operation of the landfill will be directed by the County staff at the Resource Recovery Plant. All wastes directed to the landfill will be weighed at the facilities located at the plant. The quantity of residue to be landfilled is very important to the calculation of the payment due the plant operators (UOP), therefore, good record keeping and inventories are incumbent upon the County. Least of all this includes a complete inventory of the materials directed to the landfill.

   As mentioned previously, only those vehicles directed to the landfill by the scale operators located at the plant will be allowed access to the landfill.

   During residue disposal, the landfill superintendent will direct the residue trucks to the dump area to be used. Since there will be County personnel hauling the residue on a routine basis, traffic and vehicle management on the site are not anticipated problems.

   In the event of an emergency landfill condition, the operating procedures would be essentially the same as for the Phase I Bridgeway Acres Landfill.

   No scavenging of any kind will be permitted anywhere on the solid waste site.

A. Controlling the length and width of working face - During the disposal of residue, the landfill superintendent will direct the residue trucks to the dump area as required by existing conditions at that time. This residue material will be covered only when a maximum lift depth of 12 feet is reached or when extraneous conditions dictate (e.g. high rainfall, wind conditions, etc.).

On the rare occasions that raw refuse must be landfilled the basic trench and combined area method will be used. At the end of each working day, it is to be covered completely with a minimum six inch continuous layer of soil. The compacted waste and soil cover constitute a cell. A series of adjoining cells make up a lift.

Cell dimensions are determined by the volume occupied by the compacted refuse which in turn depends on the in-place density. Obtaining maximum in-place density is the major objective of the County landfill operation. To accomplish this, refuse is to be spread in layers of not more than two feet on the working face and the compacting vehicle is required to run up and down the slope compacting the refuse and eliminating voids.

The working face is to be no wider than required for dumping operations without causing a serious backlog of trucks waiting to dump. The slope of the face is to be as steep as the compaction vehicle can efficiently handle. The depth of the cell for each lift will only significantly vary on the side slopes of the exterior waste strips.

The typical height of each lift will average three to four yards. To conserve cover material, the cells are to be constructed with minimum surface area or approximately square. This cell construction will be accomplished by development of mini-cells initially emplaced in each minimum 150' wide disposal strip excavated to accommodate the required face dimension for each of two mini-cells, having typical individual widths of 75' nominal. Allowing a five-yard width for safety and truck dumping, this dimension will provide six to seven dumping positions per mini-cell width.

B. Disposing of large items, special industrial, and hazardous wastes - Pinellas County is not really faced with the problems of any special industrial or hazardous wastes as the County consists primarily of tourist-oriented communities and does not support any type of heavy manufacturing.

The proposed landfill operation will not accept hazardous materials such as indicated in Item 3-H.

Any bulky items received at the plant which will be diverted to the landfill will be heavy demolition debris and concrete.

C. Confining papers to the site - The only paper which will be landfilled will be during emergency operations. During these time temporary fences will be used (if required) to prevent blowing litter.

D. Waste handling in the wake of a natural disaster - These wastes will be handled at the plant, as much as possible. In the event that these wastes exceed the capabilities of the plant, special cells will be constructed for these materials as required.

E. Emergency provision for insect and rodent control - Since the residue is essentially non-putrescible in nature insect and rodent infestation is not anticipated. Nevertheless the County Mosquito Control Unit will cycle the proposed landfill site on a regular basis. Effective measures for rodent control will also be employed at the landfill site as required.

F. Providing adequate site supervisions - Site supervision will be provided by a contractor or the Public Works Department. A supervisor is to be on duty at all times that the site is being used.

G. Controlling unauthorized fires - All operating personnel will have been instructed in the proper control of unauthorized fires.

H. Maintaining all-weather access roads - All weather haul roads are to be maintained as required from the plant to the landfill.

I. Posting operating hours, fee schedules, waste restrictions, the name, address, and phone number of operating agent - All of the above is to be posted at the entrance gate to the Resource Recovery Plant since the landfill is adjunct to this facility.

J. Locating signs to direct traffic - Refer to Section 2 "O".

8. Land Disposal Data Form - The DER Land Disposal Data Form is provided as Exhibit C.

EXHIBIT A

Items 3A-G

U. S. GEOLOGICAL SURVEY
HYDROGEOLOGICAL REPORT

United States Department of the Interior

GEOLOGICAL SURVEY

Water Resources Division
4710 Eisenhower Boulevard, Suite B-5
Tampa, Florida 33614

February 4, 1977

(FL-152)

Mr. D. Acenbrack
Director of Solid Waste Management
315 Haven Street
Clearwater, Florida 33516

Dear Mr. Acenbrack:

This letter is in response to your request dated January 20, 1977 for information on the hydrogeology of the Pinellas County landfill vicinity. The data requested is enclosed and we hope it will satisfy most of Sections 3 and 4 of Chapter 17-7, F.A.C., Resource Recovery and Management, Part I: Solid Waste Facilities. The information is listed below in the order of appearance on the permit application. The data presented is part of a report entitled, "Hydrogeology of a landfill operation, Pinellas County, Florida" that is now being prepared.

Section 3. Hydrogeological Report

A. <u>Thickness and character of the overburden (soil)</u>: Soil samples from 8 test holes indicate the presence of 2 hydrologic units that comprise the overburden (1) a sand layer comprised of fine to very fine sand and shell, light gray to dark brown, which grades down to very fine sands with traces of clay to (2) marl and clay. The clay, soft, sandy gray-green becomes, with depth, stiff, cherty, with phosphate pebbles and limestone fragments. The thickness of the sand unit ranges from 13 to 23 feet, and the thickness of the marl/clay unit is about 32 to 42 feet.

B. <u>Character of bedrock</u>: The hard chert and limestone which forms the upper part of the Miocene-aged Tampa formation was never penetrated. The bed rock, based on drilling logs, appears to begin from 33 to 55 feet below land surface.

C. <u>Depth of the Water-table and potentiometric surfaces</u>: The depth to the water-table surface is about 1 to 5 feet for the wet and dry season, respectively. The potentiometric surface of the artesian aquifer is about 5 feet above mean sea level, figure 1.

D. Depth to the shallow ground-water surface and artesian aquifer: The shallow ground-water aquifer is the sand unit mentioned in 3A. This aquifer extends from essentially land surface to depths ranging from 13 to 23 feet as determined by test drilling. A marl and clay unit separates the shallow ground-water aquifer from the artesian aquifer. The artesian aquifer has not been reached by drilling in the immediate area of the landfill. From material encountered in shallow test holes, the top of the artesian aquifer probably is 33 to 55 feet below land surface.

E. Local and Regional Ground-water flow system: The local ground-water flow system is presented in figures 2 and 3. These figures are preliminary configurations and are subject to revision. Since the general direction of ground-water flow follows the topography of the land, it can be assumed that the overall ground-water flow is to the east and northeast. A local configuration of potentiometric ground-water flow system has not been developed, however the regional system has been developed and is presented in figure 1.

F. Chemical quality of surface and ground water: Water samples from surface water and ground-water sites are being collected periodically for analysis of the following parameters; biochemical oxygen demand, chemical oxygen demand, coliforms, nitrogen, phosphorus, sodium, potassium, magnesium, calcium, chlorides, pH, specific conductance, toxic heavy metals, pesticides and herbicides. The results of analysis for all the sites sampled are presented in Tables 1-6. The locations of the sampling sites are presented in figure 4.

G. Frequency and extent of flooding of the area: The Pinellas County landfill site lies at the boundary of a flood-prone area (figure 5). Flood prone areas shown on this map have a 1 in 100 chance on the average of being inundated during any year. Figure 5 was taken from "Map of flood-prone areas" prepared by the U. S. Department of Interior, Geological Survey, in cooperation with the U. S. Department of Housing and Urban Development, Federal Insurance Administration, 1973.

H. Nature and volume of the waste materials to be buried: This topic is not part of the Survey's geohydrological investigations.

Section 4.Soil Survey

A. Depth to seasonal high water table: The depth to the water-table surface is about 1 to 5 feet for the wet and dry season, respectively.

D. Flooding: The Pinellas County landfill site lies at the boundary of a flood-prone area (figure 5). Flood prone areas shown on this map have a 1 in 100 chance on the average of being inundated during any years.

H. <u>Depth to bedrock</u>: The hard chert and limestone which forms the upper part of he Miocene-aged Tampa formation was never penetrated. The bed rock, based on drilling logs, appears to begin from 33 to 55 feet below land surface.

Sections 4B, C, E, F, G, I and J can be obtained from the U. S. Department of Agriculture's Soil Conservation Service in Largo, Florida.

If you have any further questions, please contact us.

Sincerely,

John E. Moore
Chief
Southwest Florida Subdistrict

JEM:MF:dlc
Enclosures

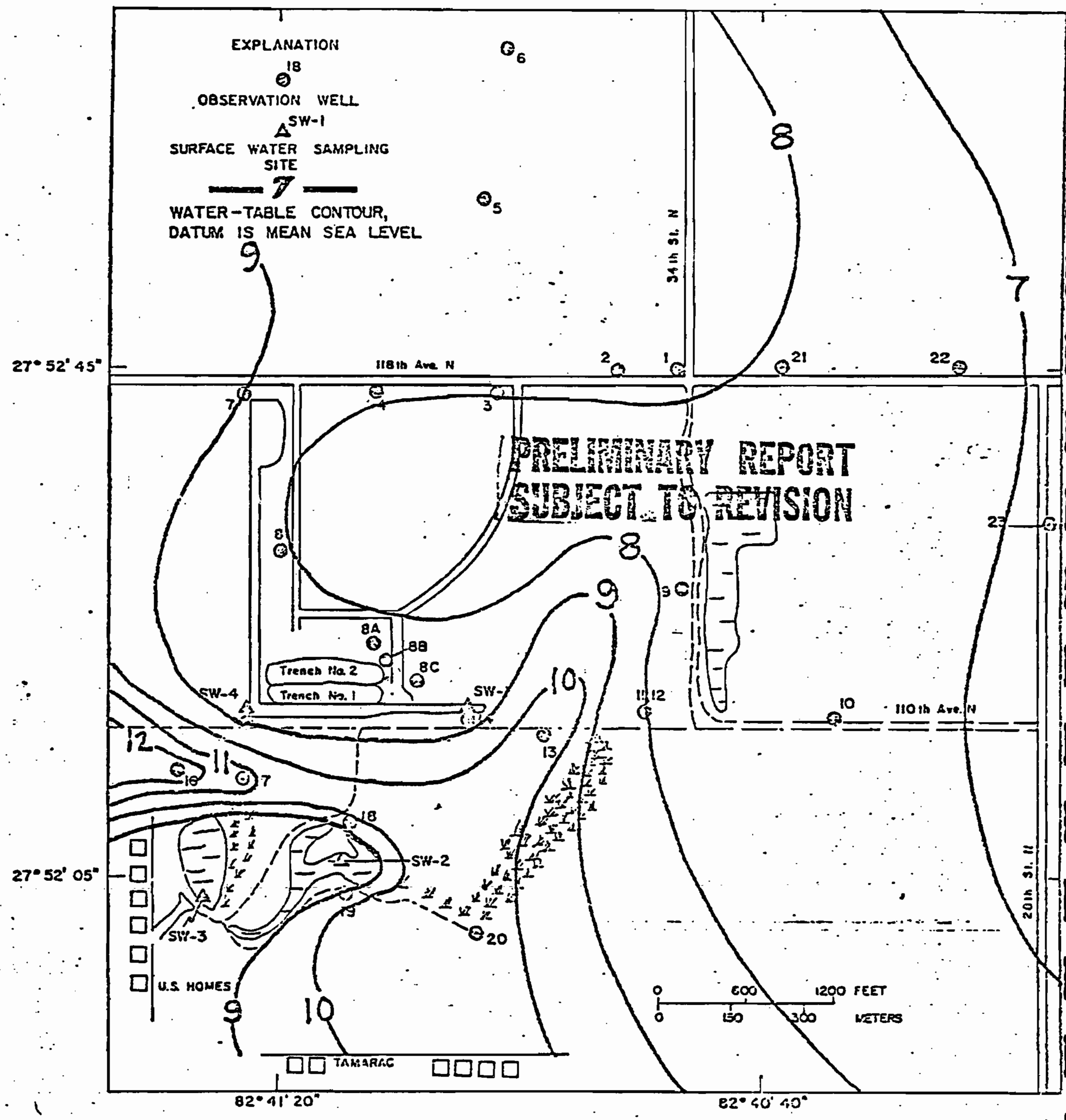


Figure 2. Water-table contours in Pinellas County Landfill
October 1975

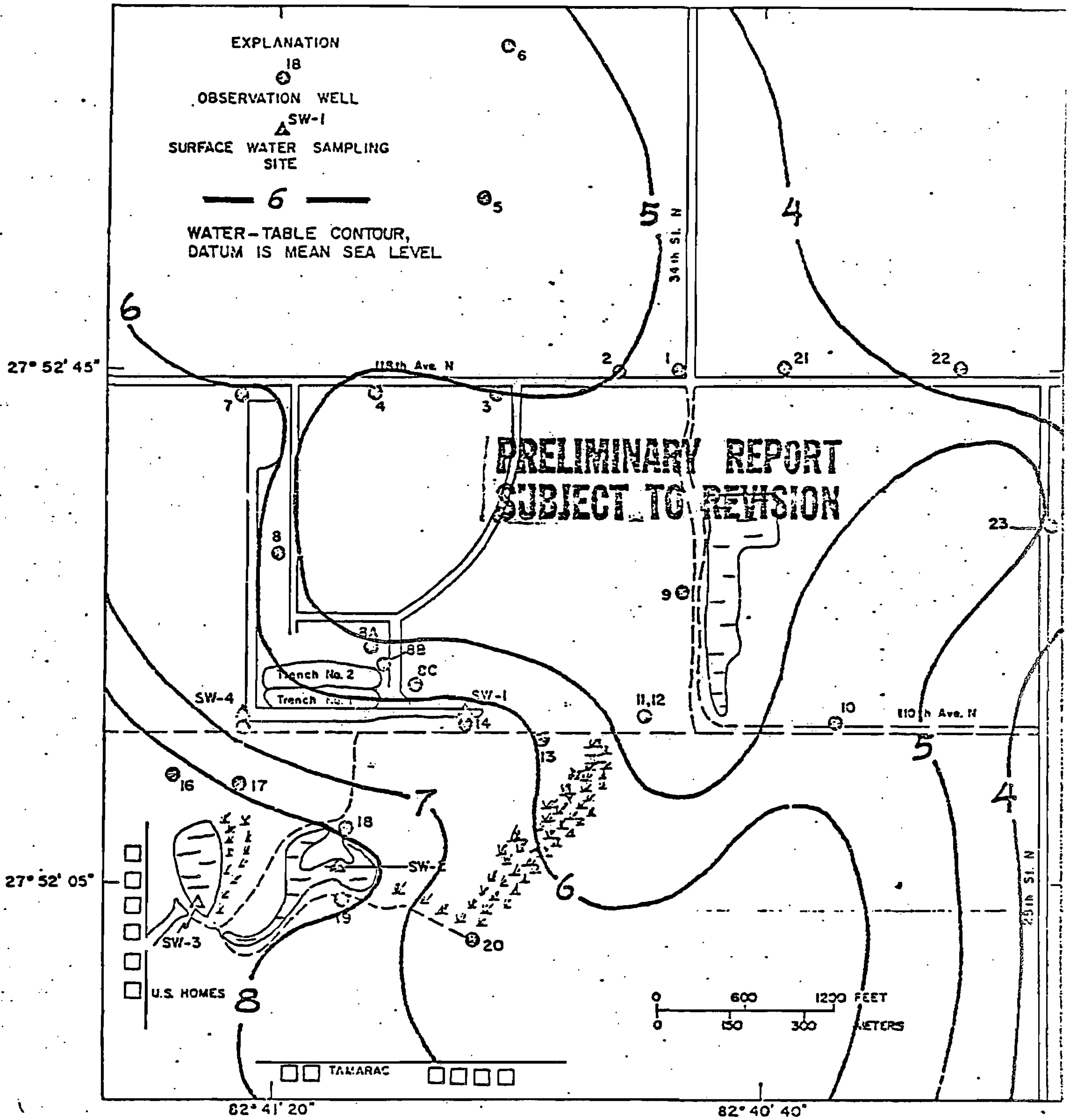


Figure 3. Water-table contours in Pinellas County Landfill May 1975

EXHIBIT B

Item 4 - A
B
D
E
G

SOIL CONSERVATION SERVICE

SOILS SURVEY

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

SUBJECT: Fea sibility of Sanitary La ndfill

DATE: 2/16/77

TO: Henningson, Durha m, & Richardson, Inc.

SOILS: Elred series- these are nearly level, poorly drained soils on broad low ridges in the flatwoods. The water table is at a depth of 10 - 30 inches for 2 to 6 months in most years and within a depth of 10 inches for 1 to 2 months during wet seasons.

Texture	Permeability
0 - 30" Fine sand	6.3 - 20.0 in/hr
30 - 35" Fine sandy loam	0.63 - 2.0 "
35 - 62" Sand, Shell	6.3 - 20.0 "

Flood hazard* once in 5 to 20 years for 7 to 30 days

SOILS: Felda series 20%- this is a nearly level poorly drained soil that occupies slightly elevated areas bordering sloughs and ponds. The water table is at a depth of about 10 inches.

Texture	Permeability
0 - 30 Fine sand	6.3 -20.0 in/hr
30 - 41 Fine sandy loam, loamy fine sand	0.63 -2.0 "
41 - 60 Shell, sand	6.3 -20.0 in/hr

Flood hazard - Once in 5 to 20 years for 7 to 30 days

EXHIBIT C
Item 8

LAND DISPOSAL SITE DATA FORM
(Fill in and check blocks as appropriate.)

DELETE
ADD
CHANGE
INACTIVE

CONTROL NO.____________________

1. COUNTY Pinellas | 2. SITE Bridgeway Acres | 3. DATE Oct. 20, 1978

4. STREET ADDRESS 34th Street N. & 110th Avenue

5. LOCATION UTM X 280,352.45 Y 1,286,607.29 Lat. 27°52'18"N Long. 82°40'48"W TOWNSHIP 30 RANGE 16 SECTION 14

6. RESPONSIBLE OPERATING AUTHORITY P/C Dept. of Public Works

7. OWNERSHIP Pinellas County | 8. ADDRESS 315 Haven St., Clearwater, Fla.

9. PHONE NO. 813/448-2251 | 10. POPULATION SERVED approx. 775,000

11. NO. OF ACRES 40 | 12. METHOD OF OPERATION (a) TRENCH ☒ (b) AREA ☒ (c) WETLAND ☐ (d) HIGH-RISE ☐ (e) DUMP ☐ (f) OTHER ☐

13. TOPOGRAPHY (a) QUARRY ☐ (b) BORROW PIT ☐ (c) STRIPMINE ☐ (d) HILLSIDE ☐ (e) GULLY ☐ (f) LEVEL AREA ☒ (g) MARSH ☐ | 14. SCALES YES ☒ NO ☐

15. SURROUNDING LAND-USE (a) RESIDENTIAL ☐ (b) COMMERCIAL ☐ (c) AGRICULTURAL ☐ (d) INDUSTRIAL ☒ (e) VACANT ☒

16. ZONING (a) RESIDENTIAL ☐ (b) COMMERCIAL ☐ (c) AGRICULTURAL ☐ (d) INDUSTRIAL ☒ (e) VACANT ☐ | 17. YEAR BEGUN 1979

18. PLANNED FINAL USE (a) PARK ☒ (b) PARKING LOT ☐ (c) BUILDING CONSTRUCTION ☐ (d) AIRPORT ☐ (e) NONE ☐ (f) OTHER ☐

19. TYPES OF WASTE RECEIVED (a) RESIDENTIAL ☒ (b) COMMERCIAL ☒ (c) INDUSTRIAL ☒ (d) AGRICULTURAL ☐ (e) SEPTIC TANK PUMPINGS ☐ (f) SEWAGE SLUDGE ☐ (g) INCINERATOR RESIDUE ☒ (h) DEAD ANIMALS ☐ (i) HAZARDOUS, CLINICAL, HOSPITAL ☐ (j) WATER TREATMENT, SLUDGE ☐ | 20. BURNING YES ☐ NO ☒

21. DAYS OPEN FOR DISPOSAL S (M T W T F) S | 22. FREQUENCY OF COVER NONE ☒ ~~S M T W T F S~~

23. DEPTH OF WATER TABLE 1-5' for wet & dry seasons | 24. SOIL PERMEABILITY 6-20"/hr. for top 30 in. of soil

25. NO. OF WELLS WITHIN ONE MILE SWFWMD data: 19 wells in contiguous 8 sections 3 w/ 34'+ case; 16 deep | 26. FLOODING (a) NONE ☐ (b) RARE ☒ (c) OCCASIONAL ☐ (d) FREQUENT ☐

27. NO. OF ROADWAYS ADJACENT TO SITE 28th St. N. & 110th Ave. (existing & unpaved) | 28. SLOPE OF SITE 0-1%

29. NO. OF RESIDENCES ~~OR BUSINESSES~~ WITHIN 1000 FEET 30 | 30. SOIL SERIES Eldred, Felda

31. SOIL TEXTURE (a) SAND ☐ (b) SANDY-LOAM ☒ (c) LOAMY-SAND ☐ (d) SANDY CLAY ☐ (e) SANDY CLAY LOAM ☐ (f) CLAY ☐ | 32. FENCED YES ☐ NO ☒ *

33. MONITORING WELLS NO ☐ YES ☒ | 34. POTENTIAL WATER POLLUTION (a) IMMEDIATE ☐ (b) HIGH ☐ (c) LOW ☒

35. DUMPING IN WATER YES ☐ NO ☒ | 36. PERIMETER DITCH YES ☒ NO ☐ | 37. LINER YES ☐ NO ☒

38. LINER TYPE (a) PLASTIC ☐ (b) ASPHALT ☐ (c) BENTONITE ☐ (d) CLAY ☐ (e) OTHER ☐ (f) NONE ☒ | 39. WELL POINT SYSTEM YES ☐ NO ☒

40. OXIDATION POND YES ☒ NO ☐ | 41. POND AREA 5 acres | 42. DEPTH OF SOILS TO BEDROCK 33 to 55'

43. EVIDENCE OF LEACHING YES ☐ NO ☒ | 44. FINAL LEACHATE TREATMENT NEEDED YES ☐ NO ☒

45. FINAL TREATMENT (a) CHLORINATION ☒ (b) AERATION ☒ (c) OZONATION ☐ (d) ADVANCED ☐ (e) OTHER ☒ hyacinth (f) NONE ☐ | 46. RODENT PROBLEM NO ☒ YES ☐

47. DISCHARGE (a) CANAL ☐ (b) DITCH ☐ (c) STREAM ☐ (d) LAKE ☐ (e) OTHER ☒ on-site spray irrigation** (f) MARSH ☐ | 48. RODENT CONTROL NO ☐ YES ☒

49. CELL DEPTH OF REFUSE 3-4 yards | 50. INSECT PROBLEM YES ☐ NO ☒ | 51. INSECT CONTROL YES ☒ NO ☐

52. BLOWING PAPER CONTROL YES ☒ NO ☐ | 53. FULL TIME ATTENDANT YES ☒ NO ☐

54. ALL WEATHER ACCESS ROAD YES ☒ NO ☐ | 55. GAS CONTROL YES ☐ NO ☒

56. SPREADING OF REFUSE IN 2 FT. LAYERS YES ☐ NO ☒

57. ONE (1) FT. INTERMEDIATE COVER APPLIED WITHIN ONE (1) WEEK CELL COMPLETION YES ☐ NO ☒

58. TWO (2) FT. FINAL COVER APPLIED WITHIN ONE (1) YEAR CELL COMPLETION YES ☒ NO ☐

59. EQUIPMENT AVAILABLE DAILY (a) CRAWLER TRACTOR ☒ (b) RUBBER TIRED TRACTOR ☐ (c) HYDRAULIC BACK HOE ☐ (d) LANDFILL COMPACTOR ☒ (e) PAN SCRAPER ☐ (f) DRAGLINE ☒ (g) BRUSH HOG ☐ (h) TRASH PUMPS ☒

60. PROPOSED COST OF OPERATION $/CU. YD. $/TON included in Resource Recovery Plant fee

61. NAME OF PERSON COMPLETING FORM D.F. Acenbrack P/C Director Solid Waste Mgt.

62. REVIEW DATE__________ 63. PERMIT NO.__________ 64. ISSUE DATE__________ 65. EXPIRATION DATE__________

H11 4-74

* Fencing perimeter canal & sight screening/retaining levee.
** Discharge only in emergency.

APPENDIX E

LETTER OF RESPONSE FROM STATE OF FLORIDA, DIVISION OF ARCHIVES, HISTORY AND RECORDS MANAGEMENT

STATE OF FLORIDA

Department of State

THE CAPITOL
TALLAHASSEE 32304

[redacted]
SECRETARY OF STATE
JESSE J. McCRARY, JR.

October 16, 1978

L. ROSS MORRELL, ACTING DIRECTOR
DIVISION OF ARCHIVES, HISTORY, AND RECORDS MANAGEMENT
(904) 488-1480

IN REPLY REFER TO:

Mr. Louis D. Tesar
Historic Sites Specialist
(904) 487-2333

Mr. James C. Andrews
Environmental Biologist
Henningson, Durham and Richardson
528 West Garden Street
Post Office Box 12744
Pensacola, Florida 32575

Re: Cultural Resource Assessment
Solid Waste Resource Recovery Facility
240 Acres in South 3/4 of West ½ of S14,
T30S-R16E, and Proposed Transmission Line
Pinellas County, Florida

Dear Mr. Andrews:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Procedures for the Protection of Historic and Cultural Properties"), we have reviewed the above referenced project for possible impact to archaeological and historical sites or properties listed, or eligible for listing, in the National Register of Historic Places. The authorities for these procedures are the National Historic Preservation Act of 1966 (Public Law 89-665) as amended by P.L. 91-243, P.L. 93-54, P.L. 94-422, and P.L. 94-458, and Presidential Executive Order 11593 ("Protection and Enhancement of the Cultural Environment").

A review of the Florida Master Site File indicates that no archaeological or historical sites are recorded for the project area. Furthermore, because of the location of the project, it is considered highly unlikely that any significant unrecorded sites exist in the vicinity. Therefore, it is the opinion of this office that the proposed project will not adversely impact any sites listed, or eligible for listing, in the National Register of Historic Places, or otherwise of national, state, or local significance.

Your interest and cooperation in protecting Florida's irreplaceable historic resources are appreciated.

Sincerely,

L. Ross Morrell,
Deputy State Historic
Preservation Officer

LRM:Teh