



Department of Environmental Protection

Lawton Chiles
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Virginia B. Wetherell
Secretary

September 27, 1994

Dr Marc C. Bruner
Solid Waste Authority
7501 North Jog Road
West Palm Beach, Florida 33412

Re: Palm Beach County Resource Recovery Facility
PA 84-20, Ash Management Amendment

Dear Dr. Bruner:

The drawing attached to your letter of September 20, 1994, is too general to demonstrate where the exhaust from the dry chemical silo baghouse will be located. It would be helpful if you would amend one of the drawings from the original application to show the location of the chemical silo and where it will interact with the flyash conveyor. You might consider changing figures contained in Volume IV of the application, such as Attachment 3 or Attachment 5/Sheet 1 of 3. In the alternative, you could modify the second drawing attached to Lee Rosenthal's letter of August 29, 1994 as prepared by Forrester Environmental Services, Inc. to reflect where the silo baghouse will be ducted.

Sincerely,

Hamilton S. Oven

Hamilton S. Oven, P.E.
Administrator, Siting
Coordination Office

cc: Bruce Mitchell ✓
Izzy Goldman
Joe Kahn
Raisa Neginsky
Richard Donelan

September 20, 1994



YOUR PARTNER FOR
SOLID WASTE SOLUTIONS

DEPARTMENT OF
ENVIRONMENTAL PROTECTION

SEP 22 1994

Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

SITING COORDINATION

Attn: Hamilton S. Oven

Subject: Additional Information
Amendment to PPSC PA 84-20
Ash Management System

Dear Buck:

Pursuant to our telephone conversation, attached is supplemental information concerning our request for an amendment to the Power Plant Siting Certification for the Authority's North County Resource Recovery Facility.

As you may recall the Amendment requests authorization to construct and operate a Dry Chemical Feed System for the treatment/fixation of fly ash (dry scrubber and ESP residue).

The attached schematic identifies the change from the earlier submittal. Note that the outlet from the dry chemical silo baghouse is now hard piped to the enclosed fly ash conveyor system. This will capture any emissions and contain them in the existing ash management system. With this change the proposed system should not create any additional sources, emissions, or points of release at the facility.

Copies of this request have been sent to FDEP legal counsel and technical staff in West Palm Beach to assist in starting the review process.

Your attention in this matter is most appreciated. If you have any questions or I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

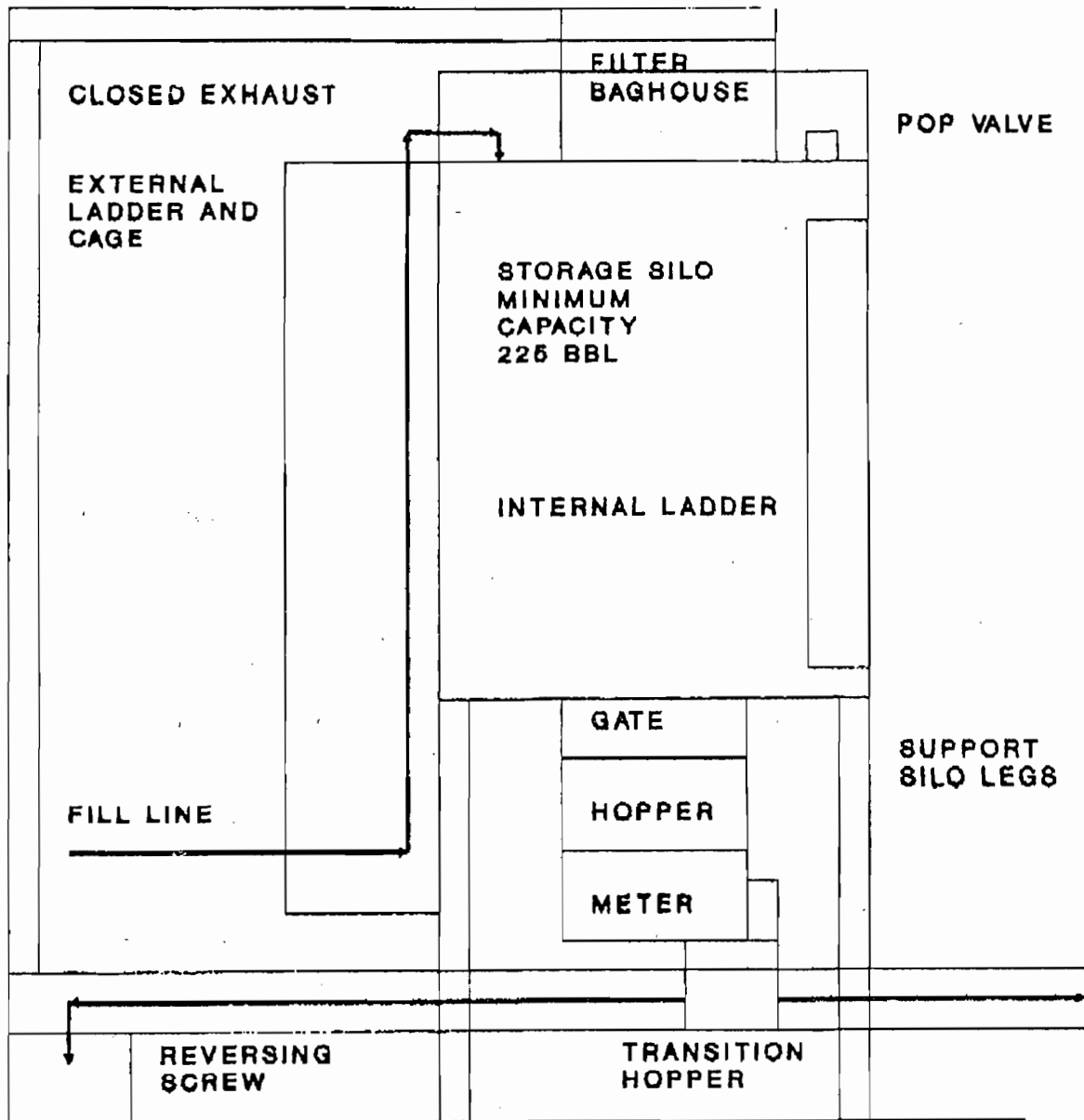
Marc C. Bruner, Ph.D.

Director of Planning and Environmental Programs

cc: Don Lockhart, SWA
Mark Hammond, SWA
Lee Rosenthal, SWA

John Booth, SWA
Richard Donelan, FDEP
Joe Kahn, FDEP

FESI/DRY STORAGE AND METERING DETAILS WEST PALM BEACH COUNTY AUTHORITY

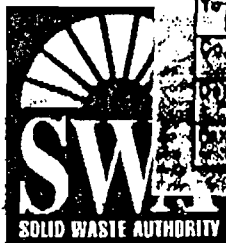


EXISTING FLYASH REINFORCED CONCRETE FOUNDATION
DRAGS

DESIGN NOTES:

- o REVERSING SCREW LOADS TO SOUTH AND NORTH FASR CONVEYORS
- o ACRISON 101-K FEEDER WITH VARIABLE DC DRIVE
- o 8" KNIFE GATE WITH TIGHT FACE TOLERANCE
- o BULK CHEMICAL DENSITY AT 80 TO 100 PCF

Post-It™ brand fax transmittal memo 7671		# of pages • 6
To: Buck Over	From: Lee Rosenthal	
FDEP	Co. SWA	
	Phone #	
904-922-5380	Fax # 407-683-4067	



YOUR PARTNER FOR
SOLID WASTE SOLUTIONS

August 29, 1994

Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Attn: Richard Donelan

Subject: Amendment to PPSC PA 84-20
Ash Management System

Dear Sir:

The Solid Waste Authority hereby requests that the Power Plant Siting Certification for the Authority's North County Resource Recovery Facility be amended.

This Amendment is requested to authorize the construction and operation of a Dry Chemical Feed System for the treatment/fixation of fly ash (dry scrubber and ESP residue).

The attached letter and schematic identify the basic components of the system. This system can use a variety of chemicals, alone or in combination, to achieve the desired results. At this point in time, it is anticipated that Type II Portland cement will be the dry chemical feedstock. The proposed system should not create any additional sources, emissions, or points of release at the facility.

Copies of this request have been sent to FDEP technical staff in Tallahassee and West Palm Beach, to assist in starting the review process.

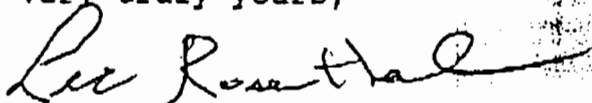
The Solid Waste Authority also requests authorization to install temporary facilities to enable us to evaluate and fine tune the effectiveness of this technology while the amendment process is underway.

BEST AVAILABLE COPY

Richard Donelan
Florida Department of Environmental Protection
August 26, 1994
Page Two

Your attention in this matter is most appreciated. If you have any questions or I can be of further assistance, please do not hesitate to contact me.

Very truly yours,



Lee Rosenthal
General Counsel
Solid Waste Authority
of Palm Beach County

cc: Don Lockhart, SWA
Mark Hammond, SWA
Marc Bruner, SWA
John Booth, SWA
Buck Oven, FDEP
Joe Kahn, FDEP



FORRESTER ENVIRONMENTAL SERVICES, INC.

FESI CONFIDENTIAL AND PROPRIETARY INFORMATION

TELECOPY 407/697-8635

August 20, 1994

Mr. Robert F. Worobel
Plant Engineer
Solid Waste Authority of Palm Beach County
7501 North Jog Road
West Palm Beach, Florida 33412

Re: FESI/DRY Permanent System Bid Information

Dear Rob:

The following bid information has been submitted to several vendors for engineering, procurement, construction and delivery of two (2) identical FESI/DRY chemical feed systems for your facility. Please review the specifications, and submit any changes or comments as soon as possible:

FESI/DRY SYSTEM COMPONENTS

The two (2) FESI/DRY systems will include the following process components:

- (1) 225 Brri Steel Silo with support legs, external ladder with cage, internal ladder, 360-degree top railing, 4" pneumatic loading pipe with aluminum cam lock male fitting, 150 Sq. Ft. Dust baghouse with air vibrator and pop-off valve, vibrator air line, top manhole and sealed lid, 8 external air pads for cone turbulence with dry 60 psi air feed, internal inverted cone, cone bottom 8" flanged fitting and sandblast, prime, and paint;
- (2) Silo base flange-to-flange 8" slide gate with limited open-face tolerance;
- (3) Flange-to-8" diameter spool transition with 8" rubber sock connector and two (2) steel tie bands;
- (4) 8" diameter spool to Acrison 101-K inlet transition hopper;
- (5) Model 101-K Acrison Feeder with DC drive and variable feed controller for loading range 400 to 100 lbs/hr. of FESI/DRY-D at a bulk feed density of 90 pcf upon relay signal from existing facility Bailey flyash drag motor conveyor controls;

Page 2
FESI Report - WPBC

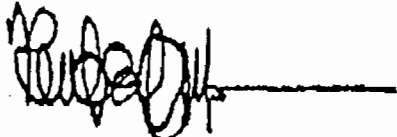
- (6) Acrison screw to 20' length horizontal reversing screw transition hopper;
- (7) 20' 6" diameter reversing screw, screw housing and drive motor for loading from Acrison feeder to either North or South FASR drag conveyors;
- (8) Equipment priming and painting - tan or gray finish.

PROCESS SCHEMATICS

The attached process schematics have been prepared for this project with a design objective of FESI/DRY chemical feed directly to the existing facility flyash drag conveyors.

Please call if you have any questions.

Sincerely,

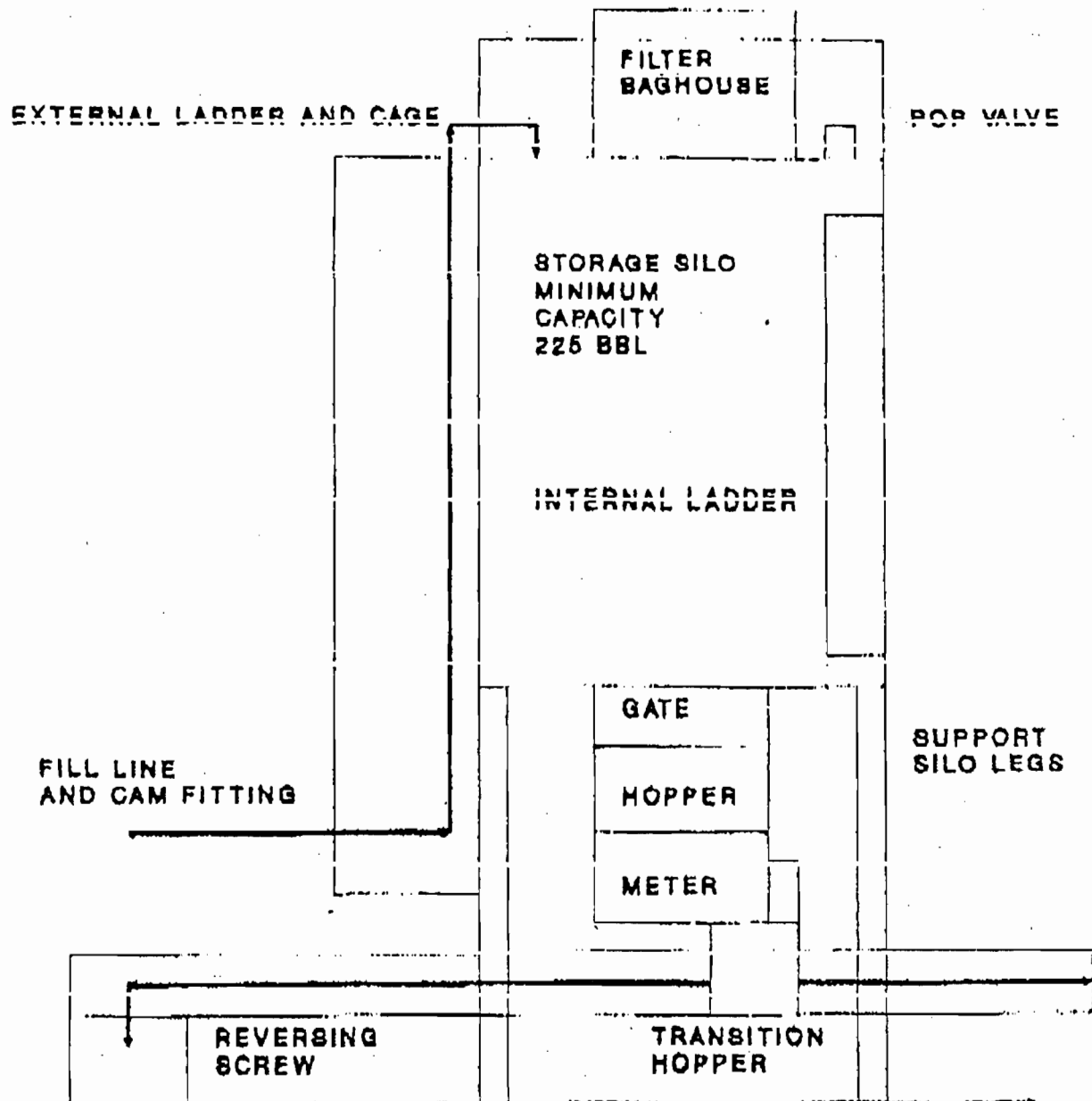


Keith E. Forrester, P.E., M.S.Env.Eng.
President

c: Ms. J. L. Forrester, MBA, CFO/Vice President

Atts: FESI/DRY Pre-FASR Mixer Process Schematics
File: m/woru-3

BEST AVAILABLE COPY

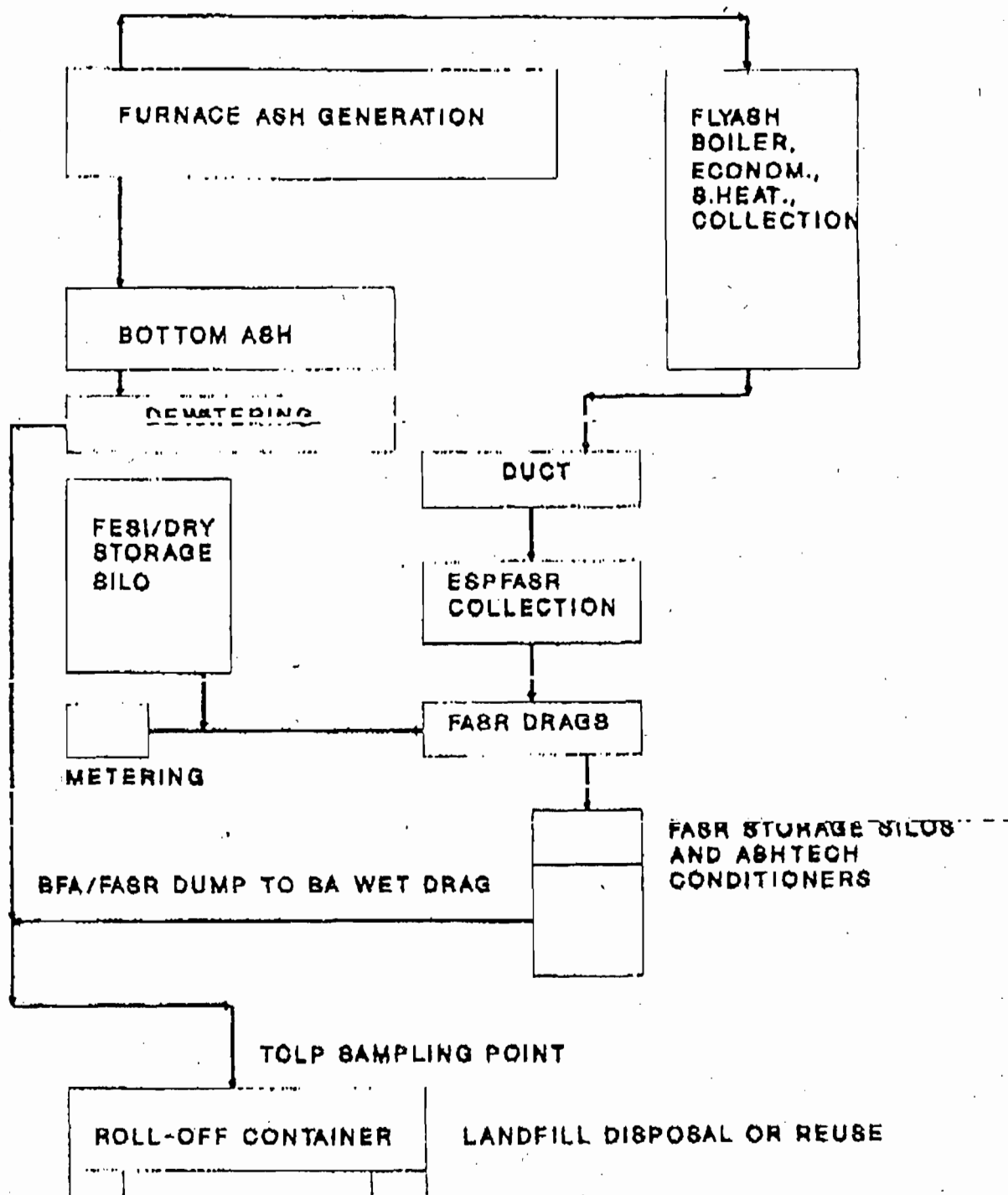
FESI/DRY STORAGE AND METERING DETAILS
WEST PALM BEACH COUNTY AUTHORITY

EXISTING FLYASH REINFORCED CONCRETE FOUNDATION
DRAGS

DESIGN NOTES:

- o REVERSING SCREW LOADS TO SOUTH AND NORTH FASR CONVEYORS
- o ADRISON 101-K FEEDER WITH VARIABLE DC DRIVE
- o 8' KNIFE GATE WITH TIGHT FACE TOLERANCE
- o BULK CHEMICAL DENSITY AT 90 TO 100 PCF

WASTE TREATMENT PROCESS SCHEMATIC WEST PALM BEACH SOLID WASTE AUTHORITY



SOLID WASTE AUTHORITY

OF PALM BEACH COUNTY

5114 Okeechobee Boulevard, Suite 2C
West Palm Beach, Florida 33417
Telephone: 407/471-5770

September 18, 1989



Mr. Buck Oven, Program Coordinator
Power Plant Site Certification Program
Florida Department of Environmental Regulation
2600 Blainstone Road
Tallahassee, FL 32301

Re: Solid Waste Authority of Palm Beach County
North County Regional Resource Recovery Project
Understanding of Regulatory Agency Expectations

RECEIVED
OCT 4 1989
DER-BAQM

Dear Mr. Oven:

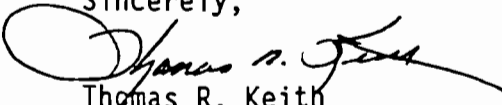
On September 15, 1989, representatives of the Solid Waste Authority of Palm Beach County met with representatives of Region IV, United States Environmental Protection Agency, and your Department (Mr. Pradeep Ravel) for the purposes of clarifying our understanding of the regulatory agencies' expectations relative to initial operations of the Authority's North County Regional Resource Recovery Facility. Pursuant to that meeting, and in accordance with direction provided by your representative, the Authority seeks your written concurrence with the following statements.

It is the Authority's understanding that as the Permittee, under both the State Conditions of Certification and the Federal PSD permits, that it maintains sole responsibility to the regulatory agencies for compliance with permit limitations. Consequently the Authority, as permittee, would be the party subject to any State or Federal action which might be instituted pursuant to the referenced permits and not the Authority's Contract Operator.

It is the Authority's further understanding that the 180-day initial start-up period provided by the Conditions of Certification and the PSD Permit is a shake-down period during which excursions, with respect to actual facility emissions, are not unexpected and do not constitute permit violations nor grounds for enforcement actions as long as the Facility is operated in accordance with generally accepted good operating and combustion practices.

I trust that Mr. Raval has relayed the urgent nature of the Authority's need to have the foregoing understandings confirmed by the Department. Your efforts to expedite your review and comment to this office would be most appreciated.

Sincerely,


Thomas R. Keith
Deputy Executive Director

TRK/ja.

cc: Bernie Conko
Craig Potter

SOLID WASTE AUTHORITY

PALM BEACH COUNTY

VOLATILE ORGANIC COMPOUNDS (VOC'S)

B&W	DRAFT PERMIT
0.045 LB/MMBtu $\approx 70 \text{ ppm}$	0.016 LB/MMBtu
- Agrees with CARB Report - Consistent with Operating Data	

POSSIBLE CAUSES OF DIFFERENCE:

- Combustion System Design
- Test Method
- Data Base
- Definition of VOC
- Interpretation of Test Data

SOLID WASTE AUTHORITY

PALM BEACH COUNTY

BEST AVAILABLE CONTROL TECHNOLOGY

- Dry Scrubber
- High Efficiency Precipitator (~ 99.75% Removal)
(State of the Art for a Dry Scrubber)
- Low Gas Temperature (Less than 300°F)
- Aluminum and Ferrous Recovery

SOLID WASTE AUTHORITY

PALM BEACH COUNTY

PARTICULATE AND OPACITY

	<u>B&W</u>	<u>Draft Permit</u>
TSP	Changing to Meet - 0.015 GR/DSCF @ 12% CO ₂	0.015 GR/DSCF @ 12% CO ₂
Opacity	15% 20% (3 Minutes/1 Hour)	15% 20% (3 Minutes/1 Hour)

SOLID WASTE AUTHORITY

PALM BEACH COUNTY

NOx AND CO

	<u>B&W</u>	<u>Draft Permit</u>
NOx	0.50 LB/MMBtu	0.32 LB/MMBtu
CO	0.22 LB/MMBtu	0.44 LB/MMBtu (400 PPMV)

- Consistent with Modern Operating Units of Good Design
- Represents Optimum Combustion
- Fuel Nitrogen Variability
- Consistent with NSPS for Solid Fossil Fuels
- NOx vs. CO Tradeoffs
- Consideration of Trace Organics

SOLID WASTE AUTHORITY

PALM BEACH COUNTY

LEAD, MERCURY, BERYLLIUM

-----B&W Prediction-----

	<u>Uncontrolled</u>	<u>W/Precip Only</u>	<u>Plus Dry Scrubber</u>	<u>Draft Permit</u>	<u>Add'l Removal Required</u>
Lead	0.03710	0.00075	BACT	0.0004	47%
Mercury	0.000912	0.000912	BACT	0.00024	74%
				3200 GM/Day	
Beryllium	9.8E-6	1.2E-7	BACT	7.3E-7	None

NOTE: Numbers are in Lbs/Million BTU Fuel Input (LB/MMBtu)

SOLID WASTE AUTHORITY

PALM BEACH COUNTY

ACID GASES (HCl, SO₂, HF, H₂SO₄)

	Uncontrolled	---Dry Scrubber---		Draft Permit	Requested
	Emission	Design	Outlet		Change
	<u>LB/MMBtu</u>	<u>Removal</u>	<u>LB/MMBtu</u>	<u> </u>	<u>To Permit</u>
		<u>%</u>			
HCl	1.20	90	0.12	90% Removal	24 Hr Avg; Need Floor, 0.05 LB/MMBtu
SO ₂	0.73	65	0.26	0.32 LB/MMBtu; 0.62 LB/MMBtu, 1 Hr Max	24 Hr Avg
HF	0.00325	BACT	BACT	0.0032 LB/MMBtu 90% Removal	BACT
H ₂ SO ₄	0.018	BACT	BACT	3.2E-5 LB/MMBtu (?) 90% Removal	BACT

SOLID WASTE AUTHORITY

PALM BEACH COUNTY

SUMMARY

HCl	90% Removal or 0.05 LB/MMBtu, Whichever First Achieved; 24 Hour Average
SO ₂	0.32 LB/MMBtu, 24 Hour Average
HF	BACT
H ₂ SO ₄	BACT
TSP	0.015 GR/DSCF @ 12% CO ₂
Opacity	15%; 20% Maximum, 3 Minutes/1 Hour
Pb	BACT
Hg	BACT
Be	BACT
NOx	0.50 LB/MMBtu
CO	0.22 LB/MMBtu (200 PPMV @ 12% CO ₂)
VOC	0.045 LB/MMBtu

SOLID WASTE AUTHORITY

PALM BEACH COUNTY

BOILER CAPACITY
PER BOILER

	-----B&W-----		Draft
	<u>Normal</u>	<u>Peak</u>	<u>Permit</u>
Fuel Input (MMBtu/Hr)	380.4	412.5	360.0
RDF Flow (Lb/Hr)			
a 6164 Btu/Lb			58333
a 5500 Btu/Lb (Design)	69164	75000	

NOTE: Permit is for Three Boilers.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

RECEIVED
JUL 31 1989
DER-BAQM

4APT/APB-aes

JUL 28 1989

Mr. Douglas E. Burnham
Babcock and Wilcox Company
Power Generation Group
20 S. Van Buren Avenue
Post Office Box 351
Barberton, Ohio 44203-0351

Re: Palm Beach County Solid Waste Resource Recovery Facility
PSD-FL-108

Dear Mr. Burnham:

This is to acknowledge the receipt of your letter dated July 7, 1989, transmitting the protocol procedure for measuring emissions of multiple metals from stationary sources and a write-up on the proposed method 13B procedure for determining HF and HCl emissions.

The documents have been reviewed by our staff and it is our opinion that these methods are acceptable for use in the compliance of the above referenced source.

Thank you for transmitting these documents and for your cooperation in this matter. If you have any further questions, please contact Gregg Worley of my staff at (404) 347-2864.

Sincerely yours,

Wayne J. Arnsperger

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

cc: Marc Broner - Solid Waste Authority
C. H. Fancy - Florida DER

CHF/BT/PA

Barry Andrews

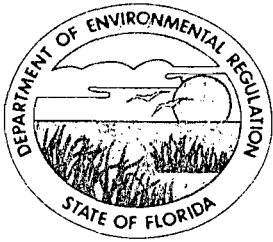
Pradeep Raval

Tom Rogers

Gene Sacco - PBC

Isidore Goldman

8-1-89 PAM



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

June 30, 1989

Marc C. Bruner, Ph.D
Section Chief
Environmental Programs
Solid Waste Authority
of Palm Beach County
5114 Okeechobee Blvd, Suite 2C
West Palm Beach, Florida 33417

Dear Dr. Bruner:

This letter is in response to your call of June 29, 1989 asking for clarification of the Department's position on the proper stack sampling methods for your facility's initial performance tests and which method(s), if any, may require an Alternate Standard or Procedure (ASP) request.

After review of the Conditions of Certification and the PSD permit, and in light of the recent adoption of test methods in the Corrective Amendment II rule package, all of the EPA promulgated methods are acceptable. However, an ASP request will be needed for the metals method (MMTL) as this method has not been promulgated and it will need technical review by the State and the EPA, and the approval of the Secretary for use.

Please send your request for an ASP, if you still desire to use the MMTL, to Secretary Twachtmann at the letter head address.

Please call me at (904) 488-1344 if you have any questions on the above.

Sincerely,

James K. Pennington, P.E.
Administrator
Compliance Monitoring Section
Bureau of Air Quality
Management

JKP/hk

cc: Isidore Goldman
Clair Fancy



8/12/87
Atlanta, GA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

AUG 12 1987

4APT-APB/eaw

DER

AUG 14 1987

BAQM

Mr. Clair Fancy, Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Fancy:

This is to confirm an August 5, 1987, telephone conversation between you and Mr. Wayne J. Aronson of my staff regarding his upcoming inspections of resource recovery facilities in the Tampa and Miami, Florida areas. The following schedule and list of facilities to be visited have been discussed with the appropriate local agency contacts:

August 24, 1987 - Pinellas County Resource Recovery Facility (RRF)
- McKay Bay RRF
- Hillsborough County RRF

August 25, 1987 - City of Lakeland
- Dade County RRF

August 26, 1987 - Palm Beach County RRF

If you have any questions regarding these upcoming inspections, please feel free to contact me or Wayne J. Aronson at (404) 347-2864.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

cc: Mr. Iwan Choronenko
Hillsborough County Environmental
Protection Commission

Mr. Patrick Wong
Dade County Environmental
Planning Division

Mr. Peter Hessling
Pinellas County Department of
Environmental Management

Mr. E. J. Sacco
Palm Beach County Health Department

Copied. CH#1BT
Barry Andrews } 8/17/87



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

26 JUN 1987

MEMORANDUM

SUBJECT: Operational Guidance on Control Technology for New and Modified Municipal Waste Combustors (MWCs)

FROM: Gerald A. Emison, Director *Gerald A. Emison*
Office of Air Quality Planning and Standards (MD-10)

TO: Air Management Division Directors
Regions I, III, V and IX

Air and Waste Management Division Director
Region II

Air, Pesticides, and Toxics Management Division Directors
Regions IV and VI

Air and Toxics Division Directors
Regions VII, VIII and X

As you know, numerous questions regarding the selection of appropriate pollution control requirements for MWCs have arisen during recent years in major source permitting proceedings under the prevention of significant deterioration (PSD) provisions of Part C of the Clean Air Act and the nonattainment new source review (NSR) provisions of Part D of the Act. Accordingly, the attached operational guidance is being issued to promote consistency in making best available control technology (BACT) determinations under PSD and lowest achievable emission rate (LAER) determinations under nonattainment NSR, and to reduce delay and confusion in the permitting process. This guidance requires reviewing authorities, in considering the range of potential control options during the BACT determination process for MWCs, to consider a dry scrubber and a fabric filter or electrostatic precipitator as BACT for sulfur dioxide (SO₂) and particulate matter (PM), and combustion controls as BACT for carbon monoxide (CO).

The Administrator remanded to Region IX on June 22, 1987, their previous concurrence on a PSD permit for the H-Power MWC to be constructed in Honolulu, Hawaii. Petitioners had argued that, (a) BACT for this facility did not adequately justify the failure to require the use of an acid gas scrubber, and (b) the permitting authority did not evaluate the effectiveness of acid gas scrubbers in reducing emissions of unregulated pollutants, as required

by the June 1986 North County Resource Recovery Associates PSD Appeal decision (or North County remand). In remanding the H-Power permit application to Region IX for further proceedings, the Administrator made it clear that the Agency considers acid gas scrubbers to be an available technology for excess air MWCs that fire refuse-derived fuel (RDF) such as the H-power facility. The attached operational guidance states that this type of post-combustion control is one component of available technology for modular, starved air MWCs and massburn, excess air MWCs, in addition to RDF-fired, excess air MWCs.

As stated above, the operational guidance includes a second component of available technology, which is combustion control for the criteria pollutant CO. Since the effectiveness of the two components of available technology in controlling unregulated pollutants is an important consideration in individual BACT determinations (per the North County remand), the attached guidance states that (a) acid gas scrubbers followed by fabric filters or electrostatic precipitators are effective in controlling potentially toxic organic and metal pollutants, as well as acid gases other than sulfur dioxide, and (b) combustion controls are effective in controlling potentially toxic organic pollutants.

The technical basis for the operational guidance is documented in five reports which are a part of the Agency's comprehensive study of MWC. These volumes are listed in the References section of the guidance. You will note that the guidance indicates "specified values" should be selected on a site specific basis for several design and operating parameters of the facility and for emissions of criteria pollutants. A thorough discussion of the factors to be considered in choosing the "selected values" is included in the five reports from the comprehensive MWC study.

As noted under Section V, this guidance should be transmitted to all State and local agencies to which PSD permitting authority has been delegated under 40 CFR Section 52.21(u). The transmittal letter should specify that the delegation agreement is amended to include this guidance. States which have received SIP approval of a PSD program under 40 CFR Section 51.166 (formerly Section 51.24) should also be informed of this guidance and of EPA's expectation that it be followed.

Attachment

cc: James DeMocker (ANR-443)
Gregory Foote (LE-132A)
Steve Greene (WH-565)
Joseph E. Lees (ANR-443)
J. Craig Potter (ANR-443)
John C. Ulfelder (A-101)
Marcia Williams (WH-562)

6/26/87

OPERATIONAL GUIDANCE ON CONTROL
TECHNOLOGY FOR NEW AND MODIFIED
MUNICIPAL WASTE COMBUSTORS

I. The Need for Guidance.

The combustion of municipal waste represents an increasingly important element of the solid waste disposal problem in the U.S. However, the operation of municipal waste combustors (MWCs) releases potentially harmful pollutants to the air. Human exposure can occur directly or indirectly, and there is also concern that the environment could be vulnerable to long-term accumulation of emitted pollutants. EPA is addressing these issues in a comprehensive, integrated Municipal Waste Combustion Study and with this operational guidance.

Numerous questions regarding the selection of appropriate pollution control requirements have arisen during recent years in major source permitting proceedings under the prevention of significant deterioration (PSD) provisions of Part C of the Act and the nonattainment new source review (NSR) provisions of Part D of the Act. Uncertainty over these questions has led to conflict over minimum legal requirements and consequent delay in the permitting and construction of MWCs. Hence, there is a need for guidance to resolve controversies which may arise as to facilities seeking permits. Accordingly, EPA is issuing this operational guidance for use in making best available control technology (BACT) determinations under PSD and lowest achievable emission rate (LAER) determinations under nonattainment NSR. EPA believes that this guidance will promote consistency in control requirements, and reduce delay and confusion in the permitting

process. At the same time it will allow permitting authorities to give appropriate consideration to local factors in making case-by-case BACT determinations as required under law.

II. Administrative History.

Section 169(3) of the Act provides that BACT determinations in PSD permits must be "based on the maximum degree of reduction of each pollutant subject to regulation under this [Act] . . . which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable." EPA's regulations track this language. See 40 C.F.R. 52.21(b)(12), 40 C.F.R. 51.166(b)(12). In addition, in two administrative appeals involving resource recovery facilities, EPA has further refined the analysis which permitting authorities must conduct in making BACT determinations.

In North County Resource Recovery Associates, PSD Appeal No. 85-2 (June 3, 1986), the Administrator issued a Remand Order which held that, in making BACT determinations for a regulated air pollutant, the permitting authority must consider the effect of that decision on emissions of pollutants not regulated under the Clean Air Act. North County provided that the final BACT decision should address these environmental impacts, and that the permitting authority may ultimately choose more stringent emissions limitations for the regulated pollutant than it would otherwise have chosen if it would have the collateral benefit of restricting emissions of the unregulated pollutant. In the North County case, the permitting authority had required the use of a dry scrubber and fabric filter as BACT for sulfur dioxide, but had failed to consider the effect of that decision on emissions

of certain unregulated pollutants -- dioxins and furans, heavy metals, and acid gases -- on the grounds that it lacked authority to do so. Various persons petitioned the Administrator under 40 C.F.R. Part 124. In response to the Administrator's subsequent remand order, the permitting authority analyzed the effect of various control options on these three classes of pollutants, and found that no other controls on regulated pollutants would be more effective in reducing emissions of the unregulated pollutants. The Administrator then ruled that the permitting authority had satisfied the requirements of the remand order, and denied the petitions. See North County Resource Recovery Associates, PSD Appeal No. 85-2, Order Denying Review (September 4, 1986).

The Administrator ruled in Honolulu Resource Recovery Facility ("H-Power"), PSD Appeal No. 86-6, Remand Order (June 22, 1987), that a PSD permitting authority has the burden of demonstrating that adverse economic impacts justify the failure to require as BACT the most effective control technology which is available. He also found that acid gas scrubbers are an available control technology for sulfur dioxide (SO_2). The H-Power decision also provided that the economic impacts must be specific to the source in question and substantial. Thus, because the Administrator agreed with EPA Region IX that Hawaii had not adequately demonstrated the basis for its conclusion that economic factors justified the absence of flue gas treatment as BACT for SO_2 , he remanded the matter for further proceedings.

EPA today also draws upon the technical data referenced below, and its experience in issuing, reviewing, and enforcing PSD permits for MWCs. Recent emission test data have demonstrated that particulate matter (PM), SO₂, and other air pollutants (including organics, heavy metals, and acid gases) can be controlled effectively by acid gas scrubbing devices (dry scrubbers) equipped with efficient particulate collectors. Over 20 MWC facilities in Europe are known to be operating with dry scrubbers and particulate collectors, and at least 37 such facilities are known to exist in Japan. In the United States, three facilities currently are in operation and at least 15 have been permitted to construct with dry scrubbing and particulate control devices as the specified technology. Thirteen of these facilities are expected to be operating by December 1988.

Based on this information, it is clear that a dry scrubber followed by either a fabric filter or electrostatic precipitator are "available" technologies for effective control of the SO₂ and PM emitted by MWCs, and that these technologies also are effective in controlling emissions of potentially toxic organic and heavy metal pollutants, and acid gases other than SO₂. In addition, the data show that these technologies are reliable and reasonably affordable. Similarly, combustion controls are an available technology for the control of carbon monoxide (CO) emitted by MWCs, and are effective in controlling that criteria pollutant and potentially toxic organic pollutants. EPA's information indicates that this technology also is reliable and reasonably affordable.

III. BACT Guidance for SO₂, PM, and CO.

Accordingly, in considering the range of potential control options during the BACT determination process for MWCs, the reviewing authority must consider a dry scrubber and a fabric filter or electrostatic precipitator as BACT for SO₂ and PM, and combustion controls as BACT for CO. In order to justify a BACT determination calling for a lesser degree of emissions control than can be achieved using these technologies, the permitting authority must demonstrate, based on information contained in the permit file, that significant technical defects, or substantial adverse economic, energy, or environmental impacts or other costs would arise that are specific to the MWC in question. Permitting authorities remain free to make case-by-case judgments in accordance with today's guidance. However, based on the above-referenced information regarding legal requirements and the availability, effectiveness, and cost of these technologies, EPA expects that proper application of this guidance will result in few, if any, BACT determinations entailing application of pollution control technologies less effective than those called for herein.

Today's guidance is general; it is limited to describing types of post-combustion control equipment and to establishing general criteria for combustor design, combustor operating practices, emission monitoring, and operator training. It does not set specific emission limits. Detailed information regarding the maximum degree of emissions control achievable with these technologies is available in the referenced technical documents, the BACT/LAER Clearinghouse, or from EPA. Such information should be used by applicants and permitting authorities setting specific emissions

limits for PSD permits. In addition, today's guidance only addresses control technologies currently in widespread use for MWCs, and establishes minimum criteria for BACT determinations. Permitting authorities are not relieved of their responsibility to consider, on a case-by-case basis, whatever available technologies may be anticipated to provide a greater degree of control than those addressed today. Similarly, because control technologies and the other factors in forming BACT determinations are constantly evolving, the technology providing the greatest degree of emissions control taking economic, energy, and environmental impacts into account may likewise change over time. As one example, flue gas treatment technology for the criteria pollutant nitrogen oxides (NO_x) is in operation at one MWC in the U.S., and this technology should be considered by permitting authorities in making BACT determinations. In addition, emerging technologies in flue gas cleaning may develop which can attain the level of multipollutant control currently demonstrated by dry scrubbing/particulate matter controls, and technologies such as these should be considered in future BACT determinations. Permitting authorities and applicants must keep abreast of new developments. Of course, EPA will assist in this endeavor.

IV. LAER Guidance for Nonattainment Areas.

The technologies discussed herein for control of SO_2 , PM, CO, and NO_x have all been successfully implemented, and thus have been "achieved in practice" by MWCs within the meaning of section 171(3) of the Act. Hence, in nonattainment areas where NSR requirements apply and major new sources and modifications must apply LAER, no less effective pollution control technologies may be imposed as LAER.

V. Implementation.

Today's guidance applies to all ongoing PSD and NSR proceedings, as well as to all new permit applications. In consideration of the needs for program stability and equity to sources which have in good faith relied on pre-existing permitting guidelines, this guidance does not apply to PSD and NSR permit proceedings for which, as of June 26, 1987, final permits have already been issued and, with respect to PSD permits issued by EPA, agency review procedures under 40 C.F.R. Part 124 have been exhausted.

This operational guidance applies to PSD permits issued by EPA directly through its Regional offices and indirectly through State and local agencies pursuant to delegation agreements made under 40 C.F.R. 52.21(u). Such agencies will be notified by letter of this guidance. It will constitute an amendment to the pre-existing delegation agreements. EPA Regional offices will review all draft permits for MWCs issued by delegate agencies during the public comment period to insure proper application. Further program evaluation will take place under the National Air Audit System (NAAS). If delegate agencies should fail to adhere to this guidance, EPA staff may initiate administrative appeal proceedings under 40 C.F.R. Part 124 in appropriate cases. Such action would be appropriate where, for example, failure to follow the guidance results in a finding of fact or conclusion of law which is clearly erroneous, or involves an exercise of discretion or an important policy consideration which the Administrator should review. See 40 C.F.R. 124.19(a). Action would also be appropriate where failure to follow the guidance resulted in an inability to determine,

based on the record, whether a clear error occurred. If necessary, EPA may also revoke the delegation of PSD authority to the State or local agency.

With respect to State PSD permits issued pursuant to a State implementation plan (SIP) program approved by EPA under 40 C.F.R. 51.166 (formerly 51.24), and State NSR programs approved under Part D of the Act and 40 C.F.R. 51.165 (formerly 51.18(j)), EPA expects States to follow today's guidance in generally the same fashion as delegate agencies. EPA will use the guidance as a reference point in its oversight of State MWC permit actions. As with delegated permits EPA will participate in permit proceedings and conduct NAAS evaluations. If agencies processing NSR permits or PSD permits under approved State programs should fail to adhere to this guidance, EPA may initiate administrative and/or judicial action under sections 113 and/or 167 of the Act in appropriate cases. Such action would be appropriate where, for example, failure to follow the guidance results in a finding of fact or conclusion of law which is clearly erroneous, or in an inability to determine whether a clear error occurred. If necessary, EPA may also call for SIP revisions under section 110(a)(2)(H).

Insofar as today's guidance addresses minimum legal requirements for BACT determinations, it simply implements existing regulations and policy, including Agency actions already made by the Administrator in the North County and H-Power cases. To the extent the guidance addresses the technical issues of availability, effectiveness, and cost of control technologies for MWCs, it expresses EPA's view regarding the proper usage, in permit proceedings under existing EPA regulations and SIP programs, of the factual data contained

in the five documents referenced below. Those documents present information on the alternative controls available for MWCs, the performance capabilities and costs of those controls, and the methods for monitoring and measuring emissions from MWCs. Factors to be considered in choosing the "specified values" to be included in permits, as noted in the guidance, such as maximum concentration of CO in emissions and minimum value of furnace temperature, are contained in these references. Thus, the guidance does not constitute rulemaking within the meaning of section 307(d) of the Act or under the Administrative Procedure Act. Accordingly, it is not necessary to implement this guidance, as to EPA permits issued by Regional offices or State and local agencies, through changes in the PSD regulations at 40 C.F.R. 52.21. Likewise, regarding approved State PSD programs, it is not necessary to revise 40 C.F.R. 51.166 and require corresponding SIP revisions.

VI. Technical Guidance.

Today's operational guidance applies to three types of MWCs: massburn, excess air MWCs; excess air MWCs that fire refuse-derived fuel; and modular, starved air MWCs. It applies to those MWCs that operate with energy recovery and those that operate without energy recovery. It applies to both major new and major modified facilities of these types. The guidance requires that values for emission limits and operating parameters be specified in MWC permitting decisions.

One component of control technology for MWCs is the application of the appropriate post-combustion control equipment. The EPA has identified this equipment as a dry scrubber with fabric filter or with electrostatic

precipitator. The concentration of particulate emissions in the exhaust gases from the post-combustion control equipment shall not exceed a specified maximum value; and the SO_2 emissions in the exhaust gases shall not exceed a specified maximum concentration value or the percent reduction in SO_2 emissions across the post-combustion control equipment shall not be less than a specified value. Performance of the dry scrubber and fabric filter or electrostatic precipitator in controlling acid gases, potentially toxic metals, and potentially toxic organic pollutants is affected significantly by the reduction in flue gas temperature which occurs in the dry scrubber. The control system shall be designed and operated such that the flue gas temperature at the outlet from the dry scrubber does not exceed a specified value.

A second component of control technology for MWCs is proper design and operation of the combustion system, which controls CO and potentially toxic organic pollutants. Minimum concentrations of CO in emissions from MWCs are associated with the implementation of several good combustion practices. These practices are also related to the effective destruction of potential emissions of toxic organic pollutants, including dioxins and furans. Concentrations of CO in furnace exhaust gases shall not exceed a specified maximum value, and CO and O_2 concentrations in the exhaust gases shall be monitored continuously. In addition, furnace operating temperatures shall be no lower than a specified minimum value, and a procedure for continuous monitoring shall be established to ensure that the specified temperature is maintained.

The capabilities to control flow rates and distributions of underfire (primary) and overfire (secondary) air, to monitor continuously CO concentration and furnace temperature, to maintain thermal load within a specified range, and to control the process to maintain CO and temperature of the furnace at appropriate levels are all important to good combustion. Detailed information regarding the numerical values to be assigned to the emission levels and equipment design and operating parameters associated with good combustion are provided in the documents cited under References.

References:

Municipal Waste Combustion Study: Emission Data Base for Municipal Waste Combustors.
EPA/530-SW-87-021B

Municipal Waste Combustion Study: Combustion Control of Organic Emissions.
EPA/530-SW-87-021C

Municipal Waste Combustion Study: Flue Gas Cleaning Technology.
EPA/530-SW-87-021D

Municipal Waste Combustion Study: Cost of Flue Gas Cleaning Technologies.
EPA/530-SW-87-021E

Municipal Waste Combustion Study: Sampling and Analysis.
EPA/530-SW-87-021F



Resource Recovery Office

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

April 9, 1987

Mr. Wayne Aronson
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-103) --
Follow-up To Meeting of March 23, 1987.

Dear Mr. Aronson,

I am enclosing the revised Final Determination Tables V-1, V-2, V-3, V-5, and V-6 which we agreed to provide at our meeting on March 23, 1987. If you have any questions concerning these Tables, then please telephone directly to Ken Kosky or Bob McCann of KBN Engineering at (904)375-8000.

I would also appreciate your sending Ken a copy of the draft Final Determination and Permit. Because of an insufficient address which was apparently used on Bruce Miller's transmittal letter to me, we have not yet received this material. I will be out of the office most of next week but I will be in contact with Ken. I would, therefore, appreciate your getting him a copy overnight. Please send the copy by Federal Express and charge it to my account number (1109-9482-6).

Thank you for your assistance.

Sincerely yours,

Thomas M. Henderson
Project Director

cc: Celiene Bruce, County Administrator
Cliff Schulman, Greenberg Traurig Askew
Tim Smith, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

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Andy Zergot, Signal Environmental Systems
Jerry W. Whitt, Waste Management, Inc.
Steve Smallwood, FDER Air Bureau
Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau

Table V-1. Broward County Resource Recovery Facility Source Parameters

Source (1)	UTM - E (km)	UTM - N (km)	Stack Height (M)	Exit Temp. (K)	Exit Velocity (M/S)	Stack Diameter (M)
Unit 1	579.6	2883.3	59.4	381	18.0 (2)	2.29
Unit 2	579.6	2883.3	59.4	381	18.0 (2)	2.29
Unit 3	579.6	2883.3	59.4	381	18.0 (2)	2.29

- (1) Three 750 TPD MSW fired boilers, each with a flue to a common stack. For modeling purposes, the common stack was given a stack diameter of 5.03 m and an exit velocity of 11.2 m/s, providing for a minimum flow rate.
- (2) Estimated by using flow rate of 157,200 ACFM and calculating with given diameters.

Table V-2. Broward County Resource Recovery Facility Maximum Emission Rates^a

Pollutant	(lb/MMBTU)	(PPM)	(lb/hr)	(ton/yr)
PM	0.038 ^b	--	37	162
SO ₂	0.31	124-60 ^c	301	1318 ^c
NO _x	0.56	350 ^d	615.6	2380
CO	0.089	e	425.6	378
VOC	0.013 ^f	--	12.6	55.2
Pb	0.0015	--	1.46	6.4
F ⁻	0.004	--	3.88	17.0
H ₂ SO ₄ Mist	g	--	g	g
Be	9.3x10 ⁻⁷	--	0.0009	0.004
Hg	7.5x10 ⁻⁴	--	0.73	3.2
As	0.000031	--	0.030	0.13

a. Based on facility capacity of 970.5 MMBTU/hr firing MSW. Maximum emissions in lb/hr calculated based on maximum ppm level if applicable. Maximum tons per year based on maximum lb/hr emission rate except for NO_x and CO; these are based on maximum lb/MMBTU level.

b. Based on 0.015 gr/dscf corrected to 12% CO₂.

c. A maximum 3-hour rolling average corrected to 12% CO₂. A removal efficiency of 65% required. Actual tons per year will be between 1318 and 639 depending on actual sulfur in MSW.

d. A maximum 3-hour rolling average corrected to 12% CO₂.

e. Maximum 1-hour average of 400 ppm, maximum 8-hour rolling average of 200 ppm and maximum 30 day rolling average of 81 ppm; corrected to 12% CO₂.

f. Covered under nonattainment provisions for O₃ and not applicable for PSD review.

g. Operating practice to reduce SO₂ (see c).

Table V-3. Broward County Resource Recovery Facility Maximum Air Quality Impacts Compared to the De Minimis Ambient Levels

Pollutant and Averaging Time	Predicted Impact (ug/m ³)	<u>De Minimis</u> Ambient Impact Level (ug/m ³)
SO ₂ (24-hour)	6.2	13
PM (24-hour)	0.8	10
NO ₂ (Annual)	1.4	14
CO (8-hour)	11.8	575
Pb (24-hour)	0.03	0.1
F ⁻ (24-hour)	0.081	0.25
Be (24-hour)	0.00002	0.0005
Hg (24-hour)	0.015	0.025

Table V-5. Broward County Resource Recovery Facility Comparison of New Source Impacts with PSD Increments

Pollutant and Averaging Time	PSD Class II Increment (ug/m ³)	Predicted Increased Concentration (ug/m ³)	Percent Increment Consumed	PSD Class I Increment (ug/m ³)	Predicted Increased Concentration (ug/m ³)	Percent Increment Consumed
SO ₂ *						
3-hour	512	26	5	25	4	16
24-hour	91	6	7	5	1	20
Annual	20	<1	<5	2	<1	<50
PM						
24-hour	37	<1	<3	10	<1	<10
Annual	19	<<1	<<5	5	<<1	<<20

* Based on a maximum emission of 301 lb/hr; actual emissions would likely be much lower based on 65% SO₂ removal efficiency.

Table V-6. Broward County Resource Recovery Facility Comparison of Total Impact with the AAQS

Pollutant and Averaging Time	Maximum Impact Project (ug/m ³)	Maximum Impact (1) All Sources (ug/m ³)	Existing Background (2) (ug/m ³)	Maximum Total Impact (ug/m ³)	Florida AAQS (ug/m ³)
SO ₂					
3-hour	26	625	63 (3)	688	1300
24-hour	6	216	28	244	260
Annual	<1 (4)	-	4	-	60
PM					
24-hour	<1 (4)	-	93	-	150
Annual	<<1 (4)	-	59	-	60
NO ₂					
Annual	1.4	-	42	43	100
CO					
1-hour	64 (4)	-	17,000	-	40,000
8-hour	12 (4)	-	10,000	-	10,000
Pb					
3-months	<0.1	-	0.9	1	1.5

- (1) Maximum impact includes the FPL Port Everglades and Fort Lauderdale power plants.
- (2) Existing background is estimated using the highest monitored concentrations in the area near the proposed facility.
- (3) The 3-hour background is estimated by multiplying the 24-hour background by 2.25.
- (4) Less than significant, no further analysis completed.

Received DER

PALM BEACH COUNTY, FLORIDA

JAN 17 1986

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION ^{P.P.S}

LETTER DATED AUGUST 15, 1985

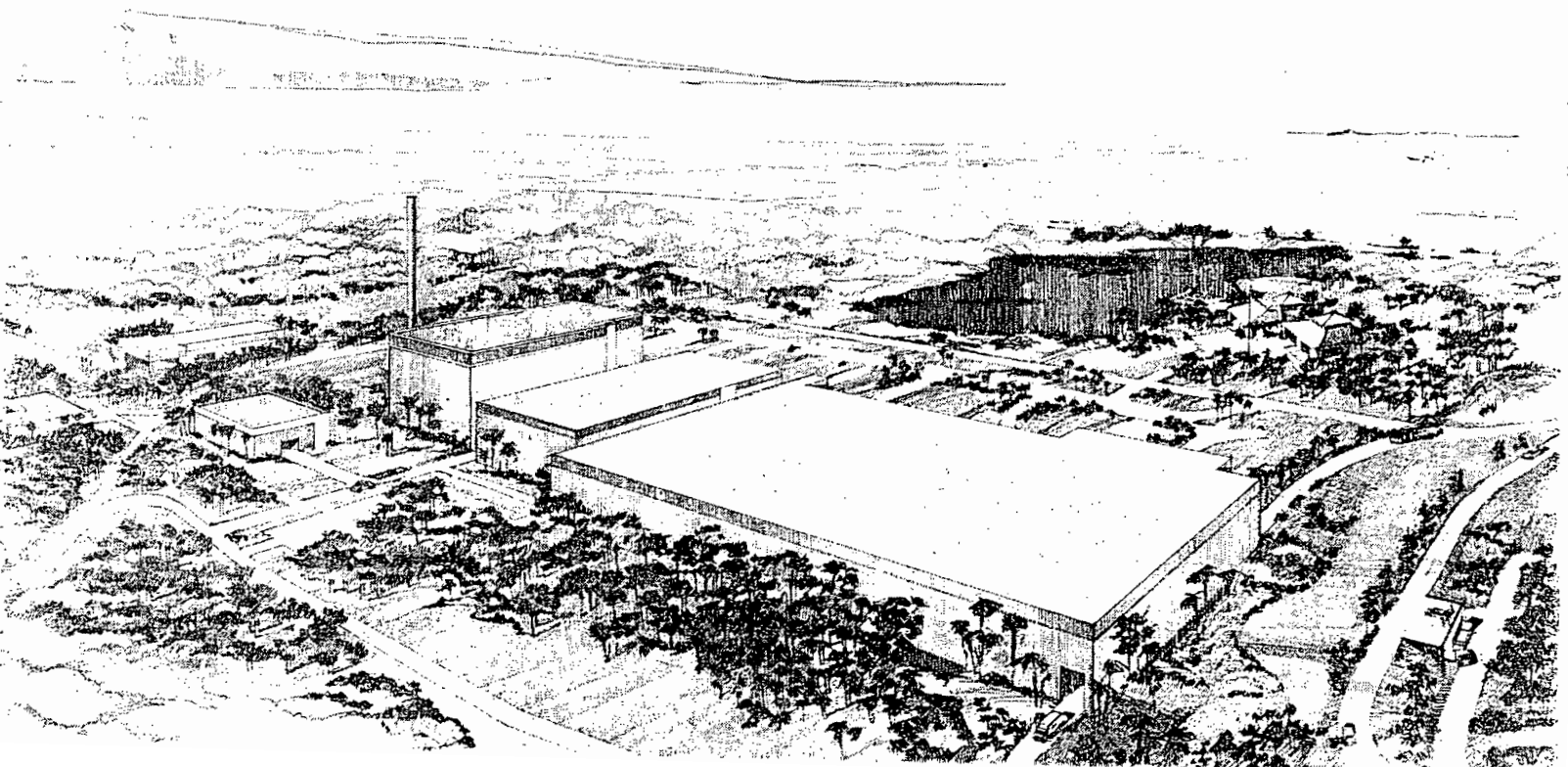
PALM BEACH COUNTY RESOURCE RECOVERY FACILITY

PA 84-20

DOAH CASE NO. 85-2032

SUBMITTED BY

THE PALM BEACH COUNTY SOLID WASTE AUTHORITY



SOLID WASTE AUTHORITY

Palm Beach County



October 21, 1986

DER

OCT 27 1986

BAQM

Mr. Claire H. Fancy, P.E.
Deputy Bureau Chief CAP/BAQM
State of Florida
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

Re: Palm Beach County Solid Waste Authority
Central Resource Recovery Facility
PSD Permitting

Dear Claire:

In accordance with our discussion of October 17, 1986, regarding the issuance of a PSD Permit for the Authority's resource recovery project, the following statements represent my understanding of the procedure through which permit issuance will be accomplished:

Mr. Ed Svec, of your office, will prepare a Final Notice of PSD Permit issuance for transmittal to USEPA Region IV within the next two (2) weeks.

Assuming that USEPA Region IV concurs with FDER's determination, a notice of intent to issue the PSD Permit will be published in the Federal Register. A thirty (30) day comment period will be allowed.

Following the thirty (30) day comment period, the PSD Permit will become effective.

Based upon the foregoing procedure, the following project schedule may be constructed:

FDER Issues Final Notice	November 3, 1986
USEPA Publishes Final Notice	November 10, 1986
PSD Permit Effective	December 10, 1986

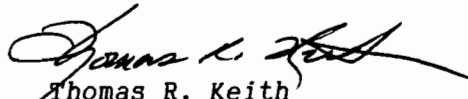
I must reiterate the Authority's critical concern with regard to the timing of this permit issuance. Further delay could result in a

significant economic impact upon the residents of Palm Beach County as the result of changes which would be brought about in the financing of the project. Your assistance in expediting this process will be of value in avoiding these unnecessary and costly consequences.

If you find fault with my analysis of the PSD permitting process or with the projected schedule for permit issuance; or, if you have any suggestions for expediting the process, please do not hesitate to call.

Thank you for your assistance.

Sincerely,


Thomas R. Keith
Deputy Executive Director

TRK/ja

cc: Buck Oven, PPSC Coordinator



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

4APT-AP/ch

Mr. Clair H. Fancy, P. E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

001 9 1986

RE: South Broward and West Palm Beach Counties Resource Recovery Facilities

Dear Mr. Fancy:

This is in reference to your September 25, 1986, letter submitting the staff analysis, hearing officer's recommended orders, and final certifications of the above-referenced power plant site certifications. The staff analyses as presented for both facilities present the Department's preliminary determinations for PSD reviews. However, the public notices were not included. These notices must provide a description of the project, increment consumption, and the opportunity to comment and request a public hearing. We request that you forward these notices to EPA. Based upon our conclusions, drawn from your staff analyses, 90% acid gas control and particulate emissions on the order of 0.015 gr./dscf will be required for both facilities. Although this will be in conflict with the State of Florida final order issued for the South Broward facility, we feel that the BACT determination for acid gas control and stringent particulate emissions limits is in agreement with "state of the art" controls now being employed at similar facilities throughout the country and the PSD remand for the North County Resource Recovery facility in California. The remand states that more stringent BACT requirements for regulated pollutants may be imposed where the simultaneous control of hazardous yet unregulated pollutants is achieved.

Please prepare the final determinations to reflect the requirement for acid gas control and a 0.015 gr/dscf particulate emission limit for the two facilities. Once we receive the final determinations and public notices, we will proceed to issue the PSD permits.

If you have any questions and/or comments regarding this letter, you may contact me at 404-347-2864 or Mr. Wayne J. Aronson at 404-347-4901.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller
Chief
Air Programs Branch
Air, Pesticides, & Toxics
Management Division

DER
OCT 13 1986
BAQM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY

September 25, 1986

Mr. Bruce Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division
U.S. EPA - Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Miller:

Re: South Broward County and **Palm Beach County Resource Projects**

In response to your discussion with Ed Svec in Atlanta on September 11, 1986, we are enclosing copies of the staff analysis, hearing officer's recommended orders, and final certifications of the above referenced power plant site certifications. We feel that these documents contain all the information necessary for your review and issuance of the required PSD permits. However, if you require any additional information, please feel free to contact me.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/ES/s

RECEIVED
MAY 22 1986



Sharyn L. Smith

Director

STATE OF FLORIDA

Department of Administration

Division of Administrative Hearings

Oakland Building, 2009 Apalachee Parkway

TALLAHASSEE

32301

May 21, 1986

Nevin G. Smith
Secretary of Administration

Honorable Bob Graham
Governor
State of Florida
The Capitol
Tallahassee, Florida 32301

Honorable Doyle Conner
Commissioner of Agriculture
The Capitol
Tallahassee, Florida 32301

Honorable Bill Gunter
Insurance Commissioner and
Treasurer
The Capitol
Tallahassee, Florida 32301

Honorable Gerald Lewis
Comptroller
The Capitol
Tallahassee, Florida 32301

Honorable Jim Smith
Attorney General
The Capitol
Tallahassee, Florida 32301

Honorable Ralph Turlington
Commissioner of Education
The Capitol
Tallahassee, Florida 32301

Honorable George Firestone
Secretary of State
The Capitol
Tallahassee, Florida 32301

Re: Palm Beach County Resource Recovery Project,
Power Plant Siting Certification Application
PA 84-20 (Case No. 85-2032).

Dear Members of Siting Board:

Enclosed is my Recommended Order in the referenced proceedings. Under separate cover, I am forwarding the Exhibits and transcript of the certification hearing to Mr. Hamilton Owen of the Department of Environmental Regulation for transmittal to you.

An Affirmative Action/Equal Opportunity Employer

Page two
May 21, 1986
Letter to Members of Siting Board

Please furnish the Division of Administrative Hearings
with a copy of the Final Order rendered in this proceeding so
that our files will be complete.

Very truly yours,


WILLIAM J. KENDRICK
Hearing Officer

/cc
Enclosure

xc: Steve Tribble
Victoria Tschinkel
Glenn Robertson, Jr.
C. Lawrence Keeseey, Esq.
Terrell K. Arline, Esq.
Julia D. Cobb, Esq.
Elizabeth D. Ross, Esq.
Joel T. Daves, Esq.
Herbert C. Gibson, Esq.
Roger G. Saberson, Esq.



STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

Dept. of Environmental Reg.
Office of General Counsel

PALM BEACH COUNTY RESOURCE)
RECOVERY PROJECT, POWER PLANT)
SITING CERTIFICATION APPLICATION) Case No. 85-2032
PA 84-20) (Certification Hearing)
)
)

RECOMMENDED ORDER

Pursuant to notice, the Division of Administrative Hearings, by its duly designated Hearing Officer, William J. Kendrick, held a public hearing in the above styled case on March 17-21, 1986, in West Palm Beach, Florida.

APPEARANCES

For Palm Beach
County Solid
Waste Authority:

Herbert C. Gibson, Esq.
Thela J. White, Esq.
Kathy Loggins, Esq.
Gibson and Adams
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400
Post Office Box 1629
West Palm Beach, Florida
33402

For the Department of
Environmental Regulation:

Julia D. Cobb, Esq.
Karen A. Brodeen, Esq.
Department of Environ-
mental Regulation
2600 Blair Stone Road
Tallahassee, Florida
32301

For the Department of
Community Affairs:

C. Lawrence Keesey, Esq.
Department of Community
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32301

For the South Florida
Water Management
District:

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Irene K. Quincey, Esq.
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For the City of
Riviera Beach:

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Burdick & Daves
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For Treasure Coast
Regional Planning
Council:

Roger G. Saberson, Esq.
110 East Atlantic Avenue
Delray Beach, Florida
33444

For Anti-Dump
Coalition, Inc.,
Concerned Citizens
Against the Dyer
Dump, Inc., S.P.O.
Homeowners Association,
Inc., and the
Florida Wildlife
Federation:

Terrell K. Arline, Esq.
325 Clematis Street
Suite C
West Palm Beach, Florida
33401

PRELIMINARY STATEMENT

On June 18, 1985, Palm Beach County Solid Waste Authority (Authority) filed its application with the Department of Environmental Regulation (DER) for power plant site certification for a resource recovery facility and landfill to be located in Palm Beach County, Florida. Pursuant to Section 403.508(1) and (2), Florida Statutes, a land use hearing was held before the undersigned Hearing Officer on September 12, 1985, and a Recommended Order was submitted to the Governor and Cabinet, sitting as the Siting Board, on November 7, 1985. By order of February 13, 1986, the Siting Board remanded the case to the Hearing Officer, and on April 25, 1986, the Hearing Officer accepted remand, withdrew his Recommended Order, and submitted an Amended Recommended Order to the Siting Board.

By Order Number 15280, issued October 21, 1985, the Florida Public Service Commission (PSC) concluded that a need existed for the electrical generating capacity to be supplied by the proposed resource recovery facility. This Order constituted the final report of the PSC required by Section 403.507(1)(b), Florida Statutes, and creates a presumption of public need and necessity, pursuant to Section 403.519, Florida Statutes.

At hearing the Authority presented the testimony of 12 witnesses and its Exhibits 1A-0, 2, 3, 3A, 4-8, 9, 9A, 10, 11, 11A, 11B, 12, 13, 13A, 14-22, 23, 23A, 24-26, 27, 27A-G, 28, 28A-G, 28I-0, 29, 29A-C, and 30-44, were received into evidence. Testifying on behalf of the Authority were Roger G. Burns, accepted as an expert in the design of resource recovery facilities, with special emphasis on combustion; Edward J. Kaplin, accepted as an expert in meteorology and air dispersion modeling; Allan H. Smith, accepted as an expert in epidemiology

and health risk assessments; Edward T. Wei, accepted as an expert in toxicology; Stanley G. Timmerman, accepted as an expert in mechanical engineering; David E. Deans, accepted as an expert in environmental engineering, with special emphasis on landfill design; Joseph E. Fluet, Jr., accepted as an expert in geosynthetic design of landfills; Vincent P. Amy, accepted as an expert hydrogeologist, with special emphasis on injection wells, water resource development, ground-water management, ground-water contamination, and aquifer exploration; Olin Braids, accepted as an expert in chemistry, with emphasis on water and soil chemistry; Marc C. Bruner, accepted as an expert in Biology, with emphasis on ecology; Jack Lauber, accepted as an expert in environmental air pollution control and air control technology; and Clair Fancy, licensed professional engineer.

Intervenors, Anti-Dump Coalition, Inc., Concerned Citizens Against the Dyer Dump, Inc., S.P.O. Homeowners Association, Inc., and the Florida Wildlife Federation (Coalition) and the City of Riviera Beach (Riviera Beach), presented the testimony of 10 witnesses. Testifying on behalf of the Intervenors were Aaron J. Teller, accepted as an expert in chemical engineering, with emphasis on diffusion, and environmental control systems; John S. Street; John A. Trefry, Jr.; Ralph Dougherty, accepted as an expert on the toxic effects of chlorinated organic compounds on the reproductive systems of animals and humans, and their analysis and control; William T. Cooper, III, accepted as an expert in bio-chemistry and geo-chemistry; Jack Walden; Thomas Curtis, Jr., accepted as an expert in surface and ground water hydrology, and modeling; Nathanael Reed; Dwight Goforth, accepted as an expert in Biology; and Barry Commoner, accepted as an expert in Biology and Biochemistry, with emphasis on dioxins and risk assessment associated with municipal waste incinerators. Intervenors' Exhibits 1-9, 11, 13, and 15 were received into evidence.

DER called Hamilton S. Oven as a witness. DER Exhibits 1-3 were received into evidence. The Department of Community Affairs (DCA), South Florida Water Management District (SFWMD),

and Treasure Coast Planning Council (Treasure Coast) called no witnesses and offered no exhibits. Seven members of the public testified on their own behalf, and Hearing Officer Exhibits 1,2,5,8 and 9 were received into evidence.

The Authority, DER, the Coalition, and Riviera Beach have submitted proposed findings of fact, and they have been reviewed and considered. A ruling has been made on each proposed finding in Appendix III to this Recommended Order.

FINDINGS OF FACT

1. The Palm Beach County Solid Waste Authority (Authority),¹ proposes to construct a resource recovery facility and two landfills to meet the solid waste disposal needs of Palm Beach County. Presently, the Authority operates two landfills, the Lantana landfill and the Dyer Boulevard landfill, which accommodate 88% of the county's municipal solid waste (MSW). The Lantana landfill will reach its capacity by the middle of 1986, and the Dyer Boulevard landfill will reach its capacity by late 1987. The Authority's proposed facility will meet the county's current and expanding need for MSW disposal for more than 20 years.

The Facility

2. The facility proposed by the Authority will initially consist of three refuse derived fuel (RDF) manufacturing lines, one oversize bulky waste and ferrous processing line, two spreader-stoker boilers, one 50 megawatt turbogenerator, a cooling system, and a Class I and Class III landfill for the disposal of ash, non-processables and non-combustibles. To support the facility's operations, a maintenance building, administration building, wastewater treatment plant, potable water storage tank, hazardous waste

¹ The Authority is an independent authority created by the Florida Legislature under the Palm Beach County Solid Waste Act, Chapter 75-473, as amended, Laws of Florida. In creating the Authority, the legislative intent was to form a county-wide authority for the coordinated management of solid waste processing and disposal.

storage and transfer building,² electrical substation, as well as five borrow lakes, will be constructed on site. When completed, the facility will initially dispose of up to 2,000 tons of MSW each day, and generate up to 50 megawatts of electrical power. The ultimate capacity of the facility will be 3,000 tons of MSW each day, and a generating capacity of 75 megawatts.

The Site

3. The site for the proposed RRF and landfills is a 1,320-acre parcel of land located in the unincorporated north-central area of Palm Beach County. The site is bounded on the north by the Beeline Highway (SR 710), on the east by the Florida Turnpike, on the south by a line approximately 610 feet south of 45th Street, on the west by the City of West Palm Beach Water Catchment Area, and on the northwest by a tract of privately owned property. A 73-acre parcel of land located east of the southernmost portion of the site and the Florida Turnpike, paralleling the south side of 45th Street to Haverhill Road, will serve as a corridor for a proposed 138-kilovolt (KV) transmission line from the RRF to Florida Power and Light Company's (FP&L's) existing transmission line corridor. As sited, the facility is accessible to major roadways, proximate to the solid waste centroid of Palm Beach County, and buffered from residential neighborhoods by major thoroughfares.

4. A majority of the proposed site consists of historical wetlands; however, past and present property use have changed the hydrologic regime and topography of the site in many areas. In the northeast portion of the site, there exists an 82 acre borrow lake which supports an active dredge operation. Dredged material is used for construction fill and cover material at the Dyer Boulevard Landfill located east of the Florida Turnpike. Areas to the north of this borrow lake have been scraped below natural elevations, as have areas in the east

² Florida law prohibits the land disposal of hazardous wastes. Any hazardous wastes discovered in the waste stream will be collected and shipped off-site for disposal in accordance with federal and Florida regulations.

central portion of the site. Three abandoned shell pit operations, encompassing approximately 171 acres, occupy the southwest corner of the site. Ditches and culverts, installed to drain the wetlands at the interior of the site, have further altered the site's historical characteristics.

5. The proposed site includes within its boundaries one of the largest nesting assemblages of wading birds catalogued within the Treasure Coast, and a roosting area for the endangered Everglades Kite. The areas most heavily utilized by the wading birds on site are the large marshes at the site's western boundary. The Everglades Kite rookery is concentrated in a series of spoil piles encompassing approximately 10 acres of the abandoned shell pit operation at the southwest corner of the site.

6. The Authority proposes to locate the RRF complex in the south-central area of the site, and the landfills along the site's eastern boundary, abutting the Florida Turnpike.³ The RRF complex will occupy approximately 40 acres of land. The landfills associated with the facility will consist of a 121-acre Class I landfill of double-liner technology with a leachate collection system and a 192-acre Class III landfill of single-liner technology with a collection system. Borrow lakes consisting of approximately 236 acres, dug to a depth of up to 50', will be developed over the life of the landfill to provide fill for construction and cover material for the landfill. The balance of the site's acreage will be utilized for an access road (36 acres), a conservation area (460 acres), and buffer, service roads, and ditches (223 acres). The Authority's Exhibit 12, attached hereto as Appendix I, graphically illustrates the boundaries and proposed development of the site.

7. Underlying the site of the proposed RRF and landfills is the Turnpike Aquifer, the principal source of drinking water in Palm Beach County. This shallow aquifer is recharged by rainfall, and occurs in a band of sandstone several

³ As sited, the proposed landfills are more than 3,000 feet from the water catchment area.

miles wide in the east-west direction, and extends nearly the entire length of the County in the north-south direction. Ground water flow through the aquifer is east to west at a average velocity of 0.33 feet per day in its shallow zone and 0.47 feet per day in its deeper zone. Accordingly, the water catchment area, located west of the site, lies upgradient of the proposed facility.⁴

8. Abutting the western boundary of the proposed site is the City of West Palm Beach Water Catchment Area. This catchment area, a Class I source of drinking water, consists of 11,000 acres of wetlands comprised of wet prairies and marsh interspersed with upland hammock. There is abundant wildlife in the area, including alligator, white tailed deer, bobcat, panther, and fox.

9. The catchment area drains into a canal (the M canal) which runs eastward into Lake Mangonia and Clear Lake. These lakes provide the principal source of drinking water for the City of West Palm Beach. Lake Mangonia has been designated by the Florida Fish and Game Commission as a fish management area.

Impact on Wetlands and Wildlife

10. As proposed, the site development plan will eliminate approximately 200 acres of wetland. To mitigate the impact of the removal of these wetlands, the Authority proposes to restore 178 acres of previously stressed wetlands and create a minimum of 190 acres of new wetlands on site. Additionally, the Authority has agreed to perform a detailed hydrological study,

⁴ A geologic investigation of the site established that the Pamlico Sand is present from land surface to a depth of about 12 feet. The Pamlico Sand consists predominantly of fine gray and brown sand. The Anastasia Formation underlies the Pamlico and includes the entire shallow aquifer. The Anastasia Formation is composed of gray and tan quartz sand and shells; between about 50 to 100 feet in depth, these deposits generally are cemented to form coquina or sandstone. The bottom of the shallow aquifer in the vicinity of the site lies at a depth of 125 feet. Below 125 feet, the Anastasia Formation contains fine-grained materials in a sandy limestone or sandstone, with reduced permeability. The Anastasia Formation extends to a depth of 250 feet. Beneath the Anastasia Formation are the Tamiami and Hawthorne Formations which have a low permeability and serve to confine the underlying Floridan aquifer. The top of the Floridan aquifer lies at a depth of about 1,000 feet.

install water control structures, and refurbish levees to restore the natural hydroperiods to the Florida Game and Fresh Water Fish Commission's J.W. Corbett Wildlife Management Area. This management area consists of 3,400 acres of sawgrass marsh adjacent to the L-8 Canal which, over the years, has been excessively overdrained. When completed, the Authority's mitigation plan will significantly increase wetlands habitat, wildlife populations, and aquatic productivity.

11. To minimize or eliminate any adverse impact to the wading birds which inhabit the western portion of the site, the authority will actively manage the large marsh area on the western portion of the site as a conservation area. To minimize or eliminate any adverse impact to the Everglades Kite, the Authority has agreed to retain the abandoned shell pit area as a rookery, and to screen the rookery from the proposed facility by planting cypress and other native species. The Authority's proposal provides reasonable assurances that the Everglades Kite and the wading birds will not be adversely impacted by the proposed facility.

Impact on water resources

12. The water management system proposed by the Authority provides reasonable assurances that surface and ground waters will not be adversely impacted by the proposed facility.

13. A double liner leachate collection system will underly the landfill area designed for Class I materials (garbage, putrescible waste, bottom ash, fly ash). The double liner system will consist of two layers of geosynthetic textile materials, including a geotextile filter, a geonet, and a high density polyethylene (HDPE) liner, separated by 12 inches of clean sand. ⁵ This system will be constructed on a base of 6 inches of recompacted select fill to prevent any puncture of the liner.

⁵ From top to bottom the liner and leachate collection system will consist of: 24 inches of clean sand (which will filter and trap leachate as well as cushion the liner below); a geotextile filter, a geonet, and a geomembrane (liner) fabricated of HDPE; another 12 inches of clean sand; and another geotextile filter, geonet, and HDPE geomembrane.

Underlying the landfill area designated for Class III materials (yard trash, nonputrescible wastes) will be a single liner leachate collection system. Leachate from the collection system and stormwater from active areas within the landfill area will be collected and processed through an equalization basin and deep well injected. Upon completion, the landfills will be capped with an impermeable layer to prevent further generation of leachate by prohibiting rainfall from entering the landfill. This "cap" will be covered in vegetation to stabilize the landfill and prevent erosion.

14. The liners proposed by the Authority are nearly impermeable,⁶ and nothing anticipated to be present in the waste deposited on the landfill is reasonably expected to degrade the collection system. The system, as proposed, exceeds DER requirements, and meets, as to the Class I landfill, EPA requirements for hazardous waste landfills.

15. As added protection that the ground waters underlying the site will not be adversely impacted, the Authority will install interceptor wells and monitor wells. The interceptor well system will consist of four wells along the eastern boundary of the proposed site and two wells along the eastern boundary of the Dyer landfill. As sited, the wells will be located down gradient of the proposed and existing landfills.

16. The primary purpose of the interceptor well system is to furnish the process water for the facility⁷; however, since the rate of withdrawal greatly exceeds the rate at which water flows beneath the landfills, the system will also serve to capture any leachate that might escape the collection system.⁸

⁶ The proposed liners have a permeability factor of $10E-12$ CM/S (Centimeters per second). To permeate a substance with that permeability factor would require thousands of years.

⁷ An average of 2 million gallons per day (mgd), primarily for cooling, and 0.6 mgd for irrigation of the landfills, will be needed for plant operations. A peak draw of 3.2 mdg will be needed for short periods during the dry season.

⁸ Approximately 1 mgd is flowing through the aquifer beneath the landfills. Since the interceptor wells will be located downgradient of the proposed landfills, pumping in excess of 2 mgd provides reasonable assurances that the interceptor well system will capture any leachate that might escape the collection system.

An additional benefit of the interceptor well system is that it provides an economically efficient and environmentally sound method of disposing of the pollutants emanating from the Dyer landfill.⁹ The wells will not only contain this problem, and prevent its eastward expansion, but will also provide water to serve the non-potable needs of the facility where it can be disposed of in an environmentally sound manner through the facility's deep well injection system.¹⁰

18. The surface water management plan proposed by the Authority is designed so that the 236 acres comprised of borrow lakes will be self-contained and will not contribute runoff to the conservation area or to off-site discharge. The 41-acre area comprising 45th Street, and the borrow lakes and buffer zones south of 45th Street, will likewise be self-contained. Runoff from the remaining 1,043 acres, containing landfills, the resource recovery facility, roadways, buffer areas and the conservation area, will be directed by swales and drain pipes into an on-site wetlands area. This discharge will be controlled to approximate normal hydroperiods and will provide natural treatment of the runoff prior to its ultimate discharge into the conservation area, or the EPB-10 Canal. Baffles, skimmers, or other appropriate mechanisms will be employed to preclude the discharge of petroleum products into the adjacent wetlands from parking areas or other locations in which such pollutants could be present, and a control structure will be installed at the point of discharge into the EPB-10 Canal to limit and manage the previously uncontrolled surface water discharge into the canal.

⁹ The Dyer landfill is partially unlined. There is evidence that mineralized water is leaching from the unlined portion of the landfill into the Turnpike aquifer.

¹⁰ Two injection wells will be constructed at the facility and will be used to dispose of waste water, including cooling tower blow-down, boiler blow-down, domestic wastewater, landfill leachate, and septage. The wastewater will be injected into the "boulder zone" at an approximate depth of 3,000 feet. To monitor the deep well injection system, two annulus monitor tubes will be installed in each well. These tubes will tap both a permeable zone containing salty water located above the confining sequence that caps the boulder zone, and a shallower zone in the Floridian aquifer. Water samples from the monitor tubes will be periodically collected and analyzed.

The authority has agreed to monitor the quality of stormwater runoff.

19. Built as proposed, and subject to the conditions of certification contained in Appendix II, the proposed facility will not adversely impact water resources, and provides reasonable assurances that the requirements of Chapter 40E-4, F.A.C., relating to water quality, quantity¹¹ and environmental impact, will be met.

Air quality impact analysis

20. Where, as here, a proposed facility will emit a regulated pollutant at a rate equal to or greater than 100 tons per year (TPY), the facility is subject to New Source Review (NSR) - Prevention of Significant Deterioration (PSD) for all pollutants it will emit in PSD - significant amounts.¹² NSR requires an ambient air quality analysis for any pollutant for which national or state ambient air quality standards have been established (the criteria pollutants) to assure that the emission levels will not cause or contribute to a violation of ambient air quality standards (AAQS) or any applicable maximum allowable increase (a PSD - increment analysis). For non-criteria pollutants subject to NSR review, NSR requires air quality monitoring to assess ambient air quality for those pollutants in the area to be affected. Finally, NSR requires that the proposed facility apply the Best Available Control Technology (BACT) for each pollutant subject to NSR requirements.

21. Pertinent to this proceeding, the pollutants subject to NSR requirements are the criteria pollutants

¹¹ The drawdown occasion by the withdrawal of the water necessary to operate the proposed facility will reduce the water level in the Water Catchment Area approximately .02 feet a year, an insignificant amount. The water level interference in the City of Riviera Beach well fields located to the east will be approximately 0.4 feet, an insignificant amount. The nominal water demands of this facility, therefore, will not cause or contribute to any detectable salt water intrusion to water resources.

¹² Table 500-2, Rule 17-2.500, F.A.C., establishes a "significant emission rate" in TPY or pounds per year (PPY) for regulated pollutants. If the anticipated emission rate of a pollutant equals or exceeds the established significant emission rate, the pollutant is subject to the NSR requirements.

particulate matter (PM), sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and lead (Pb), and the non-criteria pollutants fluoride (F), sulfuric acid mist, beryllium (Be), and mercury (Hg).

22. To predict the impact of the proposed facility on air quality, the Authority used DER and Environmental Protection Agency (EPA) approved air quality dispersion models.¹³ These models are used to predict maximum and average ground level concentrations for gaseous and fine particulate emissions that travel as gases, and maximum and average deposition concentrations for heavy particulates which settle out. The concentration values, as modeled, represent conservative worst case scenarios,¹⁴ and establish the point of maximum impact for heavy particulate to be located on the western boundary of the site.

23. The Authority's atmospheric dispersion modeling established that the emission rate of the criteria pollutants pertinent to this proceeding (PM, SO₂, NO_x, CO, and Pb)¹⁵, will not cause or contribute to a violation of primary or secondary AAQS.¹⁶ The modeling further established that the emissions from

¹³ This modeling incorporates elements for emissions, stack height and downwash, block averaging time, dispersion coefficients for plume spread, stability of the atmosphere, thermally buoyant plume dispersion, and climatology.

¹⁴ The model assumes constant production of the emission rates and makes no allowance for downtime or variable hours of operation. Further, the model does not consider rainfall or humidity. If rain were considered it would reduce the maximum ground level concentrations because of its diluting and scrubbing effect on pollutants. Similarly, the inclusion of humidity would serve to decrease the concentration of a pollutant at the point of maximum impact.

¹⁵ DER and EPA designate geographic areas which meet AAQS for a pollutant as "attainment," and those areas which do not meet AAQS as "nonattainment." Palm Beach County is designated as an attainment area for all criteria pollutants except ozone. Under such circumstances the Authority would normally be required to undergo "non-attainment - new source review" for the pollutant ozone. However, where, as here, less than 100 TPY of VOC (the regulated pollutant for ozone) will be emitted, nonattainment review is unnecessary.

¹⁶ Federal and state laws establish primary AAQS to protect the public health and secondary AAQS to protect the public interest in animal and plant life, property, visibility, and atmospheric clarity.

the facility will not cause a violation of the PSD - increment standards established for SO₂ and PM.¹⁷

24. In addition to meeting AAQS and PSD - increment standards, NSR also requires a further air quality analysis for the non-criteria pollutants which are expected to be emitted in excess of significant emission rates unless their concentrations are predicted to fall below the "de minimus ambient impact" level established by Table 500-3, Rule 17-2.500, F.A.C. In this case, the predicted emission rates for the non-criteria pollutants are below the de minimus levels requiring further analysis.

Best Available Control Technology (BACT)

25. Although the Authority has met the monitoring and air quality analysis requirements of NSR, NSR also requires that the Authority apply the Best Available Control Technology (BACT) for each pollutant the facility will emit in excess of the significant emission rates established by Table 500-2, Rule 17-2.500, F.A.C. BACT is defined by Rule 17-2.100(22), F.A.C. as:

An emission limitation, including a visible emissions standard, based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of each such pollutant.

26. DER and the Authority initially differed on what emission limitations constituted BACT for the proposed facility. The Authority initially advocated, as BACT, an emission limitation achievable through design efficiencies and an electrostatic precipitator (ESP). As proposed, the facility would have met AAQS and PSD - increment standards and, with the

¹⁷ The PSD - increments represent the amount that new sources in an area may increase ambient ground-level concentrations of SO₂ and PM over the concentrations that existed on December 27, 1977 (the "baseline date").

exception of SO₂, the emission levels of regulated pollutants would have been below de minimus impact levels which require preconstruction air quality modeling; however, the facility's emissions would still substantially exceed the significant emission rates set forth in Table 500-2, Rule 17-2.500, F.A.C. DER advocated, as BACT, an emission limitation achievable through application of a baghouse to control PM and Pb, and flue gas control equipment (dry scrubbers) to control SO₂, F, sulfuric acid mist, and hydrogen chloride (HCL).¹⁸ Adoption of DER's limitation standards would result in a reduction of PM to .015 GR/DSCF¹⁹ corrected to 12% CO₂; F, HCL and sulfuric acid mist (acid gases) by at least 90% of the maximum inlet concentrations; and, significantly reduce SO₂ emission rates. At hearing, the Authority agreed to comply with the limitation standards proposed by DER as BACT, and those standards are hereby found to constitute BACT for the proposed facility.

27. Although the Authority agreed to comply with the emission limitations found to be BACT, Intervenor's assert that the Authority should be compelled to utilize a baghouse/dry scrubber system instead of its proposed ESP/dry scrubber system. Intervenor's assertion is without merit. The purpose of a BACT determination is to establish emission limits, not to stipulate the type of pollution control equipment that must be used.

Impact on human health and the environment

28. Intervenor's assert that the emission of acid mist, heavy metals, VOC, and dioxins from the proposed facility could adversely impact human health, the environment and state waters. While Intervenor's concerns merit consideration, competent

¹⁸ HCL is not a specified "regulated pollutant;" however, DER may properly regulate the discharge of any pollutant which may result in "air pollution," as defined by Rule 17-2.100(7), F.A.C. DER established that HCL is intensely corrosive and that, due to the higher percentage of plastics in future waste streams, the emission rate of HCL will increase in the future. Accordingly, in rendering its BACT determination, DER's consideration of the reduction in HCL emissions achievable through application of dry scrubbers was founded on a rational basis.

¹⁹ Per standard cubic foot of dry gas.

substantial evidence establishes that at the facility's proposed emission rate there will be no adverse effects on human health, the environment, the ecology of the land and state waters and their wildlife and aquatic life.

29. Under the conditions of certification, this facility must achieve at least 90% removal of the maximum projected inlet concentrations of sulfuric acid mist, F, and HCL (acid gases). Acid gases emitted from the facility's stack will rise with the hot plume, disperse as do the other gaseous emissions, and will not form an acid rain or fog. At its maximum point of concentration, any acid gases will have no adverse impact on the surrounding area²⁰ or its population.

30. While the proposed facility will emit some metals, the level of their emission and ultimate deposition will not result in any significant adverse impacts. The Authority has selected RDF technology to dispose of the County's MSW. This technology lends itself to good pollution control since the waste stream is progressively "cleaned" to remove most non-combustibles before the MSW is incinerated. Under the proposed system, 90-95 percent of the ferrous metals, along with a good portion of the tin, lead, glass, aluminum, chromium and cadmium normally found in MSW will be removed. Removal of these products, prior to combustion, significantly reduces pollutant loading of the atmosphere, provides the Authority with recyclable products for resale, and produces a homogeneous medium grade fuel which allows for optimal control and more complete combustion.

31. While extremely high levels of dioxin may cause skin eruptions, there is currently no direct evidence that dioxin is carcinogenic or toxic to humans. Dioxin emissions from resource recovery facilities can, however, be minimized and

²⁰ Intervenor raised concern about the deposition of HCL in the water catchment area. Computer modeling establishes that in a worst case a scenario, assuming all the HCL emitted from the facility acts as a particulate matter as opposed to a gas, the water catchment area would receive a maximum annual deposition of 3.49 lbs/acre. The water in the catchment area has a neutralization capacity of 42-147 times the maximum projected deposition of HCL. Accordingly, the acid emissions from this facility will produce no significant change in water quality.

controlled by maintaining combustion temperatures at 1800 degrees F, with a residence time of at least one second, and through the use of an ESP. The proposed facility will incorporate these techniques to reduce and control dioxin emissions. Under a worst case scenario for the facility, a hypothetical person who never left the area of maximum residential concentration would be subjected to a dioxin dose rate of .0023 pK/Kg/day. This translates to a cancer risk of 0-0.36 cases/million/70 years, or a dosage 40,000 times lower than that which might cause 1% of laboratory animals to display effects, and 100,000 times lower than exposure rates of chemical sprayers who displayed no effects. As proposed, the surrounding area and its population will suffer no adverse impacts from dioxin emissions of this facility. ²¹

32. Intervenors sought to establish, by statistical evidence, a correlation between a decrease in sperm count and the increased production of synthetic organic chemicals (VOC's).²² The relevance, if any, of these observations to the proposed facility is speculative at best. First, the design of this facility permits even and controlled combustion to minimize the emission of VOC's. Second, even if all of the VOC's emitted were dibromochloropropane, the most potent VOC, the exposure level resulting from this facility would be 100,000 times lower than the level which produced any evidence of infertility in animals. The totality of the evidence establishes that there will be no adverse impacts associated with VOC emissions from this facility.

Agency Comments

33. The DER has filed its report as required by Section 403.507(2), Florida Statutes, and has recommended

²¹ Currently there are no concrete standards for dioxin emissions, only guidelines. The New York Department of Health accepts a dose of 2 pg/Kg/day, and the U.S. Center for Disease Control a dose of 1.8 pg/Kg/day. The proposed facility will produce a maximum dose of .004 pg/Kg/day.

²² The regulated pollutant for ozone is hydrocarbons, measured as VOC. VOC's are an amorphous category of chemicals generally consisting of any chemical compound containing carbon, or carbon and hydrogen in combination with any other element, which have vapor pressure greater than 0.10 mm Hg under standard conditions. Rule 17-2.100 (206), F.A.C.

certification, subject to the conditions of certification attached hereto as Appendix II. The Authority has accepted and agreed to be bound by these conditions of certification.

34. The SFWMD and Treasure Coast do not object to certification, subject to the conditions of certification. The DCA has concluded that the proposed project is compatible with the State Comprehensive plan.

CONCLUSIONS OF LAW

1. The Division of Administrative Hearings has jurisdiction over the parties to, and subject matter of, these proceedings.

2. While recognizing the need and demand for increased power generation facilities, it is the policy of this State to ensure that the location and operation of electrical power plants will produce minimal adverse effects on human health, the environment, the ecology of the land and state waters and their wildlife and aquatic life. Thus the need and demand for electrical power is to be balanced with the broad interests of the public. This balancing requires a consideration of the provision of abundant, low-cost electrical energy, technically sufficient operational safeguards and the need versus environmental impacts resulting from construction and operation of the facility. Section 403.502, Florida Statutes.

3. The evidence adduced at the certification hearing established that the construction and operational safeguards for the proposed facility are technically sufficient for the welfare and protection of the citizens of Florida. If performed in accordance with the recommended conditions of certification attached hereto as Appendix II, the construction, operation and location of the proposed facility may be reasonably expected to produce minimal adverse effects on human health, the environment, the ecology of the land and its wildlife, and the ecology of state waters and their aquatic life. Certification is consistent with the premise of abundant, low-cost electrical energy and is a reasonable balance between those minimal environmental impacts

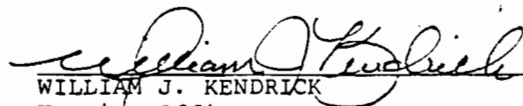
which will occur and the recognized need for the proposed facility.

RECOMMENDATION

Based on the foregoing Findings of Fact and Conclusions of Law, it is

RECOMMENDED that the Governor and Cabinet, sitting as the Siting Board, enter a Final Order granting certification for the location, construction and operation of the proposed facility, subject to the conditions of certification attached to this Recommended Order as Appendix II.

DONE AND ENTERED this 21st day of May, 1986, at Tallahassee, Florida.


WILLIAM J. KENDRICK
Hearing Officer
Division of Administrative Hearings
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RESOURCE RECOVERY FACILITY

MASTER SITE PLAN

BARKER, OSHA & ANDERSON INC.
HAYDEN/WEGMAN INC.
JOINT VENTURE

PALM BEACH COUNTY
SOLID WASTE AUTHORITY



LEGEND

- BORROW LAKE
- PRESERVED FRESH WATER SWAMPS OR SLOUGH
- PRESERVED FRESH WATER MARSH OR WET PRAIRIE
- PRESERVED & RELOCATED CYPRESS
- PRESERVED & RELOCATED UPLAND VEGETATION
- PROPOSED LITTORAL ZONES
- PRESERVED & RELOCATED SWAMPS/MARSH

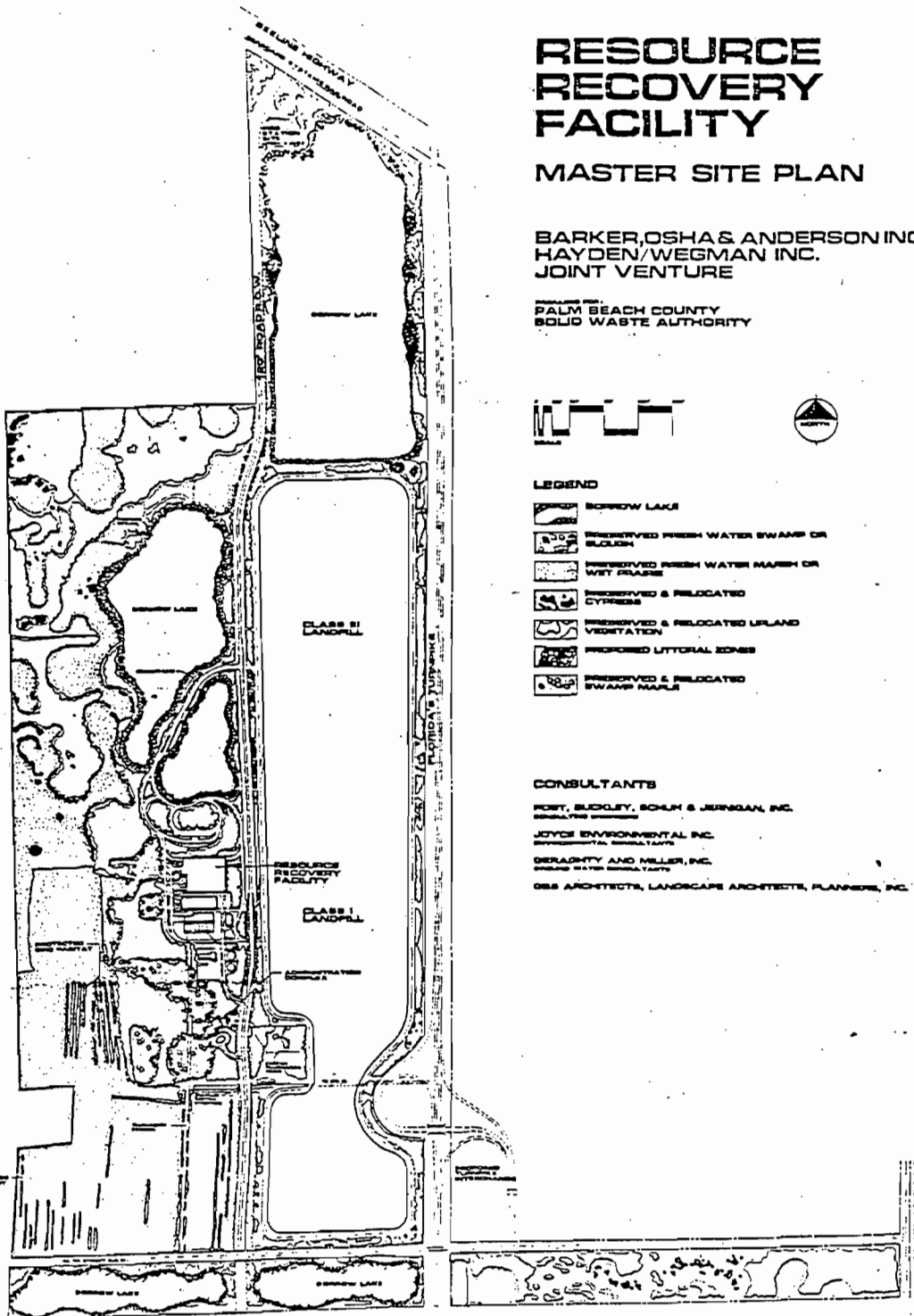
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ROST, BUCKLEY, SCHULZ & JEROME, INC.
CONSULTING ENGINEERS

JOYCE ENVIRONMENTAL INC.
ENVIRONMENTAL CONSULTANTS

GERAGHTY AND MILLER, INC.
DESIGN WATER CONSULTANTS

DBS ARCHITECTS, LANDSCAPE ARCHITECTS, PLANNERS, INC.



3/14/86

State of Florida
Department of Environmental Regulation
Palm Beach County Resource Recovery Facility
Case No. PA 84-20
CONDITIONS OF CERTIFICATION

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State of Florida
Palm Beach County
Resource Recovery Facility
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CONDITIONS OF CERTIFICATION

I. CHANGE IN DISCHARGE

All discharges or emissions authorized herein shall be consistent with the terms and conditions of this certification. The discharge of any regulated pollutant not identified in the application, or more frequent than, or at a level in excess of that authorized herein, shall constitute a violation of the certification. Any anticipated facility expansions beyond the certified initial nameplate capacity of 2,000 TPD, production increases, or process modifications which may result in new, different, or increased discharges of pollutants, change in type of fuel as described in XIV.B., or expansion in steam generating capacity must be reported by submission of a supplemental application pursuant to Chapter 403, Florida Statutes.

II. NON-COMPLIANCE NOTIFICATION

If, for any reason, the Permittee (defined as the Applicant, Palm Beach County Solid Waste Authority or assigns) does not comply with or will be unable to comply with any limitation specified in this certification, the Permittee shall notify the Southeast Florida District Office of the Department of Environmental Regulation (Southeast District Office) and the Palm Beach County Health Department (PBCHD) by telephone within a working day that said noncompliance occurs and shall confirm this in writing within seventy-two (72) hours of becoming aware of such conditions, and shall supply the following information:

- A. A description of the discharge and cause of noncompliance; and
- B. The period of noncompliance, including exact dates and times;

or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying event.

III. FACILITIES OPERATION

The Permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the Permittee to achieve compliance with the terms and conditions of this certification. Stoppages of landfill operations induced by weather conditions shall be allowed until the weather permits operations to resume. In the event of a malfunction of a resource recovery boiler's pollution control system that unit's furnace emissions must be shifted to the extent feasible to the remaining unit having a properly functioning pollution control system. In the event of a prolonged (thirty (30) days or more) equipment malfunction or shutdown of air pollution control equipment, operation could be permitted to continue to take place under a consent order, only if the Permittee demonstrates that such operation will be in compliance with all applicable ambient air quality standards and PSD increments, solid waste rules, domestic waste rules and industrial waste rules. Additionally, during such malfunction or shutdown, the source shall comply with all other requirements of this certification and all applicable state and federal emission standards not affected by the malfunction or shutdown which is the subject of the consent order. Administrative action will not be initiated in the event of such a malfunction for 25 days following a malfunction unless there is an imminent health threat. However, if at thirty (30) days following a malfunction compliance has not been achieved by the source, an Order for Corrective Action may be immediately imposed upon the Applicant, subject to the provisions of Chapter 120 of the Florida Statutes. Operational stoppages exceeding two hours for air pollution control systems or four hours for other systems or operational malfunctions as noted below exceeding two hours for

air pollution control systems or four hours for other systems and as defined in the operational contingency plans as specified in Condition XVII are to be reported as specified in Condition II. Identified operational malfunctions which do not stop operation but do compromise the integrity of the operation shall be reported to the Southeast District Office as specified in Condition II.

IV. ADVERSE IMPACT

The Permittee shall take all reasonable steps to minimize any adverse impact resulting from noncompliance with any limitation specified in this certification, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

V. RIGHT OF ENTRY

The Permittee shall allow during operational hours the Secretary of the Florida Department of Environmental Regulation and/or authorized representatives, upon the presentation of credentials:

- A. To enter upon the Permittee's premises where an effluent source is located or in which records are required to be kept under the terms and conditions of this certification, and
- B. To have access during normal business hours (Mon.-Fri., 9:00 A.M. to 5:00 P.M.) to any records required to be kept under the conditions of this certification for examination and copying, and
- C. To inspect and test any monitoring equipment or monitoring method required in this certification and to sample any discharge or pollutants, and
- D. To assess any damage to the environment or violation of ambient standards.

VI. REVOCATION OR SUSPENSION

This certification may be suspended or revoked for violations of any of its conditions pursuant to Section 403.512, Florida Statutes.

VII. CIVIL AND CRIMINAL LIABILITY

This certification does not relieve the Permittee from civil or criminal penalties for noncompliance with any conditions of this certification, applicable rules or regulations of the Department or Chapter 403, Florida Statutes, or regulations thereunder.

Subject to Section 403.511, Florida Statutes, this certification shall not preclude the institution of any legal action or relieve the Permittee from any responsibilities or penalties established pursuant to any other applicable State Statutes, or regulations.

VIII. PROPERTY RIGHTS

The issuance of this certification does not convey any property rights in either real or personal property, nor any exclusive privileges, nor does it authorize any injury to public or private property or any invasion of personal rights nor any infringement of Federal, State or local laws or regulations.

IX. SEVERABILITY

The provisions of this certification are severable, and if any provision of this certification or the application of any provision of this certification to any circumstances, is held invalid, the application of such provisions to other circumstances and the remainder of the certification shall not be affected thereby.

X. DEFINITIONS

The meaning of terms used herein shall be governed by the definitions contained in Chapter 403, Florida Statutes and any regulations adopted pursuant thereto. In the event of any dispute over the meaning of a term in these conditions which is not defined in such statutes or regulations, such dispute shall be resolved by reference to the most relevant definitions contained in any other state or federal statute or regulation. Words or phrases used herein dealing with conditions of the South Florida Water Management District (SFWMD) shall be defined by reference to Chapter 373, Florida Statutes or applicable rules of the SFWMD. Contaminated water shall include leachate and runoff that have been in contact with ash or solid waste.

XI. REVIEW OF SITE CERTIFICATION

The certification shall be final unless revised, revoked or suspended pursuant to law. At least every five years from the date of issuance of certification the Department shall review all monitoring data that has been submitted to it during the preceding five-year period for the purpose of determining the extent of the Permittee's compliance with the conditions of this certification and the environmental impact of this facility. The Department shall submit the results of its review and recommendations to the Permittee. Such review will be repeated at least every five years thereafter.

XII. MODIFICATION OF CONDITIONS

Pursuant to Subsection 403.516(1), F.S., the Board hereby delegates the authority to the Secretary to modify any condition of this certification dealing with sampling, monitoring, reporting, specification of control equipment, boiler capacity, related time schedules, emission limitations (subject to notice and opportunity for hearing), conservation easements, or any special studies

conducted, as necessary to attain the objectives of Chapter 403, Florida Statutes. Requests for modifications of monitoring requirements shall not be unreasonably withheld by the Department.

All other modifications to these conditions shall be made in accordance with Section 403.516, Florida Statutes.

XIII. CONSTRUCTION

The facility shall be constructed, at a minimum, pursuant to the design standards presented in the application and the standards or plans and drawings submitted and signed by an engineer registered in the state of Florida. The Applicant shall present upon request, specific facility plans, as developed, for review by the Southeast District Office, South Florida Water Management District and PBCHD prior to construction pursuant to the portions of the plans then being submitted. Specific Southeast District Office approval of plans will be required based upon a determination of consistency with approved design concepts, regulations and these Conditions prior to initiating construction of the: leachate collection system; air pollution control equipment; wastewater treatment and disposal systems, composting operations, domestic waste and septage handling and treatment systems; stormwater runoff system; landfill closure plans and hazardous, toxic or pathological handling facilities or areas. Review and action by the Southeast District Office or SFWMD on said plans shall be accomplished in no longer than ninety (90) days from the date of a complete submittal of such plans and any action may be subject to review pursuant to Chapter 120, Florida Statutes. Approvals shall not be unreasonably withheld.

A. Control Measures

1. Stormwater Runoff

To control runoff during construction which may reach and thereby pollute Waters of the State, necessary measures shall

be utilized to settle, filter, treat or absorb silt-containing or pollutant-laden stormwater to ensure against spillage or discharge of excavated material that may cause turbidity in excess of 29 Nephelometric Turbidity Units above background in Waters of the State. Control measures may consist of sediment traps, barriers, berms, and vegetation plantings. Exposed or disturbed soil shall be protected and stabilized as soon as possible to minimize silt and sediment laden runoff. The pH of the runoff shall be kept within the range of 6.0 to 8.5. The Permittee shall comply with Florida Administrative Code Chapters 17-3, 17-25 and 40F-4. The Permittee shall complete the forms required by 17-25.09(1) and 40F-4 and submit those forms and the required information to the SFWMD and Southeast District Office for approval no later than 90 days prior to start of construction including design drawings indicating flow drainage plans during facility construction and operation. To prevent the discharge of turbid water (greater than 29 NTU's above background) from the site during construction, a temporary berm with 3H:1V side slopes and an elevation sufficient to contain the 25 year, 3 day storm event shall be constructed around the resource recovery site (except for the landfill areas and Jog Road) prior to commencement of work on the facility.

2. Burning

Open burning in connection with land clearing shall be in accordance with Chapter 17-5, FAC, and Uniform Fire Code Section 33.101 Addendum. No additional permits shall be required, but prior to each act of burning, the Division of Forestry shall be contacted to determine if satisfactory conditions exist for burning. Open burning shall not occur if the Division of Forestry or Palm Beach County Fire and Rescue Department has issued a ban on burning due to fire hazard conditions.

3. Sanitary Wastes

Disposal of sanitary wastes from construction toilet

facilities shall be in accordance with applicable regulations of the appropriate local health agency.

4. Solid Wastes

Solid wastes resulting from construction shall be disposed of in accordance with the applicable regulations of Chapter 17-7, FAC.

5. Noise

Construction noise shall not exceed either local noise ordinance specifications, or those noise standards imposed by zoning.

6. Dust

The Permittee shall employ proper dust-control techniques to minimize unconfined emissions.

7. Transmission Lines

The directly associated transmission lines from the Resource Recovery Facility electric generators to the existing Florida Power and Light Company transmission system shall be cleared, maintained and prepared without the use of herbicides. Construction of a substation on the certified site east of the Turnpike shall not be allowed without a supplemental application and demonstration of compliance with sections 403.508(1) and (2), F.S.

8. Conservation Easement

Before the commencement of any construction herein authorized, the Permittee shall file and have recorded, in the same manner as any other instrument affecting the title to real

property, a conservation easement pursuant to Section 704.06, Florida Statutes, in the office of the Clerk of the Circuit Court, Palm Beach County, for the designated conservation area identified in the mitigation plan, west of Jog Road and the Resource Recovery Facility west to the Water Catchment Area excluding operational areas.

The Permittee shall pay all recording fees. The conservation easement shall be in favor of the Department of Environmental Regulation and shall restrict any activity including dredging and filling of land, cutting, eradicating or pruning of endemic vegetation beyond the scope of the approved mitigation plan indicated in Section 4.2 of the application and Condition XX. A draft conservation easement and a certified survey with a legal description shall be submitted to the Bureau of Permitting in Tallahassee for review and approval before it is filed (by the County) with the Clerk of the Circuit Court, Palm Beach County.

9. Written Notice

Written notice from the Department indicating that Conditions No. XIII.A.8 has been satisfied shall be obtained by the Permittee prior to the beginning of any construction. All mitigation in the shell pit area shall be in accordance with the time schedule outlined in the mitigation plan approved per Condition XX.

10. Time Limitations

If the proposed construction of the resource recovery facility, within the jurisdictional area has not been completed within 5 years of the date of certification, a permit application shall be resubmitted to the Department for evaluation and shall be accompanied by the appropriate fee.

11. Monitoring

The following surface water monitoring program shall be implemented during construction for:

Parameter: Dissolved oxygen, temperature (C°), pH, total and fecal coliform bacteria, salmonella, iron, lead, copper, mercury, cadmium, zinc, silver and turbidity.

Frequency: Quarterly throughout the year except that the samples shall be collected monthly for April, June, August and September. Sampling shall begin at least 30 days prior to initial construction for background levels. All samples shall be taken for a 24 hour period, at 4 hour intervals beginning one hour before sunrise.

Sampling Locations:

At the discharge to the EPB-10 canal.

Analyses:

Water quality analyses should be performed at detection levels commensurate with water quality criteria for Class III waters (F.A.C. rule 17-3.121). Samples shall be collected in accordance with Standard Methods for Examination of Water and Wastewater and analyzed by a DHRS certified laboratory.

If a violation occurs for any sampled parameter, the Permittee shall, after notifying the Department, institute corrective action to abate the violation if it is the result of activities of the Permittee. Corrective action may include further monitoring to determine the extent and degree of violation. Any modifications shall be coordinated with the Southeast District Office. Department approval shall be obtained prior to any action constituting a modification of this permit.

All monitoring reports shall be submitted to the DER Bureau of Permitting, Tallahassee, Southeast District Office, PBCHD and the SFWMD under a cover letter containing the following information: (1) certification number; (2) handling, storage and methods of analysis of the samples; (3) a map indicating the

sampling locations; and (4) a statement by the individual responsible for implementation of the sampling program concerning the authenticity precision, limits of detection and accuracy of the data. Monitoring reports shall also include the following information for each sample that is taken:

- (1) time of day samples taken;
- (2) depth of water body;
- (3) depth of sample;
- (4) antecedent weather conditions;
- (5) tidal stage and direction of flow; and
- (6) wind direction and velocity.
- (7) status of flow from site stormwater discharge structure. (flowing or not flowing)

Monitoring reports shall be submitted to the Southeast District, PBCHD and SFWMD within 2 weeks of completion of analysis for each sampling period.

12. Protection of Vegetation

The Permittee shall develop the construction site and shall develop the mitigation areas so as to retain endangered and threatened plants, or replant these plants in another suitable environment. Any endangered or threatened plants should be staked in the field or relocated, as appropriate, prior to commencement of any construction or site preparation activities.

13. Dewatering Operations

There shall be no dewatering operations during construction without approval of SFWMD pursuant to XVI.E. Such approval may be obtained by submitting an application to SFWMD at least 90 days prior to start of dewatering operations. Any

discharge of water from dewatering operations shall not violate water quality standards.

14. Borrow Material

Prior to excavation of any borrow material from the northeastern portion of the site for use on this project, a hydro-geological assessment of the effects of the existing excavation as well as continued excavation in this area shall be provided to the Department and the SFWMD. No further excavation shall take place until the Department and the SFWMD concur in writing that the location, depth, method of mining, etc., of the excavation will not pose a further threat to groundwater quality in the area.

B. Environmental Control Program

An environmental control program shall be established under the supervision of a qualified individual to assure that all construction activities conform to applicable environmental regulations and the applicable conditions of certification.

If harmful effects or irreversible environmental damage not anticipated by the application or the evidence presented at the certification hearing are detected during construction, the Permittee shall notify the Southeast District Office as required by Condition II.

C. Reporting

1. Notice of commencement of construction shall be submitted to the Southeast District Office, PBCHD and SFWMD within 15 days of initiation. Starting three (3) months after construction commences, a quarterly construction status report shall be submitted to the Southeast District Office. The report shall be a short narrative describing the progress of construction.

2. Upon or immediately prior to completion of construction of the resource recovery facility or a phase thereof and upon or immediately prior to completion of all necessary preparation for the operation of each landfill cell, the Southeast District Office, PBCHD and SFWMD will be notified of a date on which a site or facility inspection should be performed in accordance with Condition V, and the inspection shall be performed within fourteen (14) days of the date of notification by Permittee.

XIV. OPERATION

A. Air

The operation of the Resource Recovery Facility shall be in accordance with all applicable provisions of Chapter 17-2, 17-5, and 17-7, Florida Administrative Code. In addition to the foregoing, the Permittee shall comply with the following specific conditions of certification:

1. Emission Limitations upon Operation of Units 1 and 2

a. Stack emissions from each unit shall not exceed the following:

1. Emission Limitations upon Operation of Units 1 and 2

a. Stack emissions from each unit shall not exceed the following:

- (1) Particulate matter: 0.015 grains per standard cubic foot dry gas corrected to 12% CO₂.
- (2) SO₂: 0.32 lbs/MBtu average heat input not to exceed 0.62 lb/MBtu heat input one hour average. Compliance with SO₂ emission limits shall be determined by annual stack tests. The average of three or more stack

test runs shall determine the average value.

- (3) Nitrogen Oxides: 0.32 lbs/MBtu heat input
- (4) Carbon Monoxide: 400 ppmv corrected to 12% CO₂
- (5) Lead: 0.0004 lbs/MBtu heat input
- (6) Mercury: 3200 grams/day for the entire facility or when firing sludge or 0.00024 lbs/MBtu whichever is more stringent.
- (7) Odor: there shall be no objectionable odor at the site boundary.
- (8) Visible emissions: opacity shall be no greater than 15% except that visible emissions with no more than 20% opacity may be allowed for up to three consecutive minutes in any one hour except during start up or upsets when the provisions of 17-2.250, FAC, shall apply. Opacity compliance shall be demonstrated in accordance with Florida Administrative Code Rule 17-2.700(6)(a)9., DFR Method 9.
- (9) Fluoride: 0.0032 lb/MBtu heat input
- (10) Beryllium: 7.3xE-7 lb/MBtu heat input
- (11) VOC: 0.016 lb/MBtu heat input
- (12) Sulfuric Acid Mist: 3.2 F-5 lb/MBtu heat input.

b. The height of the boiler exhaust stack shall not be less than 250 feet above grade.

c. The incinerator boilers shall not be loaded in excess of their rated nameplate capacity of 58,333 pounds of RDF or 360.0×10^6 Btu per hour each.

d. The incinerator boilers shall have a metal name plate affixed in a conspicuous place on the shell showing manufacturer, model number, type waste, rated capacity and certification number.

e. Compliance with the limitations for particulates, sulfur oxides, nitrogen oxides, carbon monoxide, fluoride, sulfuric acid mist, VOC and lead shall be determined in accordance

with Florida Administrative Code Rule 17-2.700, DFR Methods 1,2, 3, and 40 CFR 60, Appendix A, Methods 5, 7, 8, (modified with prefilter), 10, 12, 13A or 13B (or modified method 5 for flourides), and 18 or other methods as approved by the DFR. The stack test for each unit shall be performed at $\pm 10\%$ of the maximum heat input rate of 360.0×10^6 Btu per hour or the maximum charging rate of 58,333 pounds of MSW per hour. Compliance with the beryllium emission limitation shall be determined in accordance with 40 CFR 61, Method 103 or 104, Appendix B. Particulate testing shall include one run during representative soot blowing which shall be averaged proportionally to normal daily operations. Visible emission testing shall be conducted simultaneously with soot blowing and non-soot blowing runs.

2. Emission Control Equipment

a. The boiler particulate emission control devices shall be designed and constructed to achieve a maximum emission rate of 0.015 grains per dscf corrected to 12% CO_2 . All other particulate control devices shall be designed to meet the provisions of section 17-2.610.

b. The fluoride, HCl and sulfuric acid mist gas controls system shall be designed to remove at least 90% of the maximum projected inlet concentrations.

c. The Permittee must submit to the Department within thirty (30) days after it becomes available, copies of technical data pertaining to the selected emissions control systems. These data should include, but not be limited to, guaranteed efficiency and emission rates, and major design parameters. The data shall be processed and approved or denied in accordance with F.S. 120.60.

3. Air Monitoring Program

a. The Permittee shall install and operate continuously monitoring devices for flue gas oxygen and opacity. The

monitoring devices shall meet the applicable requirements of Chapter 17-2, Section 17-2.710, FAC, and 40 CFR 60.45, and 40 CFR 60.13, including certification of each device in accordance with 40 CFR 60, Appendix B, Performance Specifications and 40 CFR 60.7 (a)(5). Re-certification shall be conducted annually from initial certification. Data on monitoring equipment specifications, manufacturer, type, calibration and maintenance needs, and its proposed location after the economizer or in the air pollution control equipment shall be provided to the Department for approval prior to installation.

b. The Permittee shall provide sampling ports in the air pollution control equipment outlet duct or stack and shall provide access to the sampling ports in accordance with Section 17-2.700, FAC. Drawings of testing facilities including sampling port locations as required by Section 17-2.700 shall be submitted to the Department for approval at least 120 days prior to construction of the sampling ports and stack.

c. The Permittee shall have a sampling test of the emissions performed by a commercial testing firm within 60 days after achieving the maximum rate at which the boilers will be operated but not later than 180 days of the start of operation of the boilers and annually from the date of testing thereafter. Thirty days prior notice of the initial sampling test shall be provided to the Southeast District Office and PBCHD. Fifteen days prior notice shall subsequently be provided for annual sampling tests.

4. Reporting

a. Two copies of the results of the emissions tests for the pollutants listed in XIV.A.1.a. shall be submitted within forty-five days of the last sampling run to the Southeast District Office and PBCHD.

b. Emissions monitoring shall be reported to the Southeast District Office and PBCHD on a quarterly basis in accordance with Section 17-2.710, FAC, and 40 CFR, Part 60,

Subsection 60.7.

c. Notice of anticipated and actual start-up dates of each incinerator boiler shall be submitted to the DER Southeast District Office and PBCHD.

5. Unconfined Emissions

Proper dust control techniques such as water sprays or chemical wetting agents or other containment method shall be used to control visible unconfined (Fugitive) emissions to the outside air no more than 10% opacity as determined by DER Method 9 for unconfined resource recovery processes. Proper techniques shall also be used to control such emissions to prevent them from crossing the property line to no more than three (3) minutes (cumulative) in any fifteen (15) minute period as determined by 40 CFR, 60, Appendix A, Method 22, with observations being made along the property line. Visible emissions shall not include uncombined water vapor or engine exhausts.

B. Fuel

The Resource Recovery Facility shall utilize refuse such as garbage and trash (as defined in Chapter 17-7, FAC) and natural gas recovered from landfills as its fuel. Use of alternate fuels except for distillate fuel oil or natural gas in start-up burners would necessitate modification of these Conditions of Certification. Refuse as fuel shall not include "hazardous waste" as defined in Chapter 17-30, FAC. The alternate fuel shall not contain more than 0.3% sulfur and shall not be used more than required during boiler startup or shutdown.

C. Wastewater Disposal

1. Plans drawings and specifications for leachate collection systems, pumps, lift stations, sewage collection systems, sewage treatment systems, wastewater treatment systems, deep injection

wells, and wastewater collection systems shall be furnished to the Southeast District Office, PBCHD and the SFWMD for approval at least 90 days prior to start of construction for the particular of such component. All items submitted pertaining to the injection wells shall be directly distributed to the Technical Advisory Committee (TAC) for approval.

2. The deep injection well shall be designed and operated in conformance with Chapter 17-28, FAC, and all other applicable rules.

3. The injection well system bid specifications and plans shall be submitted to the Technical Advisory Committee (TAC) at the Southeast Florida District Office for review and approval prior to beginning the bidding process.

4. The surge protection system design calculations and operational features shall be submitted to all members of the department's Technical Advisory Committee (TAC) for approval prior to construction of the deep well injection system.

5. The successful bidder to construct the injection well system shall submit engineering details and drawings of the packer assembly to the TAC for approval prior to construction of the injection well system.

6. If the successful bidder chooses to use corrosion inhibitor(s) with the fresh water in the monitoring annulus surrounding the 8" injection tubing, this choice of inhibitors shall be submitted to the TAC for approval.

7. The 40" casing for each disposal well shall be set and cemented to the base of the surficial aquifer or to the confining beds below all producing zones used for drinking water, private or public, supplied within the area of review. If the applicant proposes to set and cement the 40" casing above the Hawthorn Formation, he shall provide site specific hydrogeological

information, acceptable to the TAC, confirming that confining strata do in fact exist above the Hawthorn. These data shall be obtained by drilling a pilot hole to the top of the Hawthorn Formation prior to enlarging the hole for the 40" casing.

8. A drawing showing drilling pad dimensions and features (slopes, concrete thickness, storage tank capacities, curb height, etc.) shall be submitted to the TAC for approval prior to the drilling pad construction.

9. The applicant shall specify the disposal location for excess mud, drill cuttings, drilling fluids, etc., for approval at the preconstruction TAC meeting. Property owner's approval will be required in addition to regulatory approval.

10. The question of the timing of the temperature logging for pilot and cased holes shall be discussed at the preconstruction TAC meeting.

11. The daily drilling log shall include at least the following:

- a. Information as to the volume (amount) of weighting materials used to control artesian flow.
- b. Description of the lithology encountered during drilling.
- c. Results of any water quality analyses.
- d. Description of any problems or unusual conditions encountered during drilling and steps that have been taken to correct them.
- e. Deviation survey results.
- f. Any other information required by the consultant.

The report shall run from Friday to Thursday and be mailed to all TAC members on the following Friday.

12. Upon the beginning of the operation and the injection

well system, the applicant will begin a sampling and testing regimen of all individual wastewater streams for the accumulation of data anticipating adverse impacts on the injection zone, formation materials, formation fluids and well construction materials. Sampling and analysis shall also include the investigation of the chemical nature of fluids being injected with respect to hazardous waste characteristics. The parameters to be sampled for and the frequency of sampling shall be approved by the TAC before operation begins. Periodic review by the TAC will determine the need for continued sampling and/or need for additional or revised treatment before injection and/or need for revised estimates of the usable life of the injection system, increased frequency of mechanical integrity testing, etc.

13. Additional detail on proposed monitoring plans should address the following points:

- a. Per 17-28.25(1)(d), FAC, within the area of review, the type, number, and location of wells to be used to monitor any potential migration of fluids into or in the direction of USDW's, and pressure in the USDU's; the parameters to be measured and the frequency of monitoring shall be submitted to DER prior to well construction. The applicant should discuss how these requirements are addressed.
- b. Per 17-28.25(1)(e), FAC, the background water quality of the injection zone and the monitoring zones shall be determined prior to injection.

14. The applicant must, per 17-28.33(2)(o), FAC, submit a certificate that they have ensured, through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well.

15. The cementing program shall be designed with the use of ASTM Type II Cement. Other details of the program shall be made available upon request by the TAC or any of its members.

16. It may be assumed that since the project will be generating electric power there will never be the need for any on-site source of emergency power. The contractors design shall address the need or lack thereof for an emergency power source to maintain the continuous operation of the injection well system.

17. The application states that the injection well system will have 100% redundancy. The contractors design shall include standby pumping capability manifolded to both wells to insure continual injection capability.

18. The Contractor shall supply to the Engineer a complete list of spare parts and special tools to be included in the O & M Manual prepared for the Operating Permit Application.

19. The Contractor shall provide or have provided the means for checking grout sample density during casing cementing.

20. Cemented casings shall not be disturbed for 24 hours after the completion of cementing.

21. The TAC chairman shall be notified at least 24 hours prior to performing any mechanical integrity testing.

D. Water Discharges

1. Surface Water

a. Any discharges from the site stormwater system via the emergency overflow structure which result from an event LESS than a ten-year, 24-hour storm (as defined by the U.S. Weather Bureau Technical Paper No. 40, or the DOT drainage manual, or similar documents) shall meet applicable State Water Quality Standards, Chapter 17-3, FAC, the Standards of Chapter 17-25, FAC, and Chapter 40 E.2 and 40 E.4, FAC.

2. Monitoring Surface Water

b. Sampling of water quality in the surface water

management system shall be sampled at stations labeled 1, 2, 3, 4, 5, 6, and 7 as shown on sheets 18, 19, and 20 of 25 of Appendix 10.4 of the application dated December 3, 1985, as stated below:

Location of Stations:

1. discharge culvert at the southwest acreage of the Class I Landfill on sheet 20 of 25
2. overflow control structure at EPB-10 west of the Class I Landfill on sheet 20 of 25
3. box culvert at EPB-10 east of the Class I Landfill on sheet 20 of 25
4. discharge culvert west of the Class III Landfill on sheet 19 of 25
5. discharge culvert northwest of the Class III Landfill on sheet 19 of 25
6. return dredge line from Dyer Landfill discharging into the existing borrow lake due north of the Class III Landfill on sheet 18 of 25
7. the center of the existing dredge lake one foot above the bottom

Monitoring Type and Schedule

Parameters

1. General (Quarterly)	Total Organic Carbon, Dissolved Oxygen, pH, Turbidity, Specific Conductance, Chemical Oxygen Demand, Alkalinity, Total Suspended Solids, Ammonium N, Nitrate-N, Total Kjeldahl Nitrogen, Oil and Grease, Detergents, Total Coliform, Fecal Coliform, Fecal Streptococcus, Salmonella, Biochemical Oxygen Demand, Total Phosphorus and Chlorides
2. Metals (Semi-annual)	Aluminum, Antimony, Beryllium,

Cadmium, Copper, Cyanide, Iron,
Lead, Mercury, Nickel, Selenium,
Silver, Zinc, Arsenic and
Chromium

c. Water quality reports shall be submitted within 30 days of receipt of analysis results to the Southeast District Office, PBCHD and SFWMD for distribution to the appropriate review personnel.

d. The monitoring program may be reviewed annually by the Department, and a determination made as to the necessity and extent of continuation of the program. Aspects of the program related to sampling, monitoring, reporting, and related time schedules may be modified in accordance with the provisions of conditions number XII.

3. Groundwaters

a. All discharges to groundwaters, such as landfill leachate, shall be collected and treated as necessary, or otherwise be of high enough quality, to be able to meet the applicable Water Quality Standards of Sections 17-3.402 and 17-3.404, FAC, within 100 feet of the landfill perimeter.

4. Groundwater Monitoring Program

a. Sampling of the shallow aquifer groundwater quality shall be conducted in at least eight well clusters and six interceptor wells in the site vicinity. At least one of these well clusters shall be up the hydrologic slope from the landfill area to provide current background data. Other wells shall be located down the hydrologic slope from the landfill areas. All wells shall be surveyed by a state certified land surveyor and the locations of each well depicted on a topographical aerial map with the appropriate elevations noted for each well.

b. Operational background monitoring shall commence at least one year prior to operation of the resource recovery

facility. Construction of monitoring wells and the collection of samples shall be in accordance with EPA recommended methods as contained in Procedures Manual for Ground Water Monitoring at Solid Waste Disposal Facilities (EPA/530/SW-611). The wells shall be deep enough to ensure that groundwater samples can be obtained with the groundwater table elevation at its estimated lowest point and shall be protected from damage and destruction. Samples shall be analyzed in accordance with the methods described in Chapter 17-4, FAC. Analyses shall be performed by laboratories which are approved by the Department of Health and Rehabilitative Services to conduct analyses pursuant to Section 403.863, F.S., the State Public Water Supply Laboratory Certification Program.

c. Sampling of groundwater quality of monitoring well clusters labeled M-1, M-2, M-3, M-4, M-5, M-6, M-7, M-8, IW-1, IW-2, IW-3, IW-4, IW-5, IW-6 as shown on Figure 4.2-1 dated December 2, 1985, shall be performed quarterly for all parameters for three years and thereafter as stated below:

Monitoring Type and Schedule

Parameters

1. General (Quarterly)	pH, Specific Conductance, Temperature, Chloride, Total Organic Carbon (TOC), Sulfate, Bicarbonate, Magnesium, Organic Nitrogen, Ammonia, Nitrate, Chemical Oxygen Demand, Color, Turbidity, Total Iron, Total Dissolved Solids (TDS), Zinc, Calcium, Manganese, Total Nitrogen, Ammonium
2. Yearly (After first three years)	M.B.A.S., Organics as listed in S.17-22.104, FAC, Trichloroethylene, Tetrachloroethylene, Carbon Tetrachloride, Vinyl Chloride, 1,1,1-Trichloro-

ethane, 1,2-Dichloroethane,
Benzene, Ethylene Dibromide,
Chlorinated Phenolic Compounds,
Chlorides, Sodium, Lead,
Copper, Nickel, Chromium,
Cadmium, Iron, Mercury,
Arsenic, Selenium, Barium,
Silver, COD, Chemical Oxygen
Demand, Total Coliform, Fecal
Coliform, Fecal Streptococcus

d. Water quality monitoring reports shall be submitted within 30 days of receipt of analysis results to the Southeast District Office, the PBCHD and SFWMD for distribution to the appropriate review personnel.

e. The monitoring program may be reviewed annually by the Department, and a determination made as to the necessity and extent of continuation of the program. Aspects of the program relation to sampling, monitoring, reporting, and related time schedules may be modified in accordance with the provisions of condition number XII.

E. Solid/Hazardous Waste

1. Operation of the associated landfill shall be done in accordance with all applicable portions of Chapter 17-7, FAC, including prohibitions, procedures for closing of the landfill, and final cover requirements, or, as provided in this condition (XIV.E.) in its entirety. The plans of the final landfill design shall be provided to the Department for review and approval at least 90 days prior to start of construction. The final plans for this Facility shall include provisions for the isolated temporary handling of suspected hazardous, toxic or pathological wastes.

2. No suspected or known hazardous, toxic, or infectious wastes as defined by federal, state or local statutes, rules,

regulations or ordinances shall be burned or landfilled at the site. The Permittee shall prepare and submit for approval to the South Florida District Office and PBCHD a written training program on the detection and handling of hazardous, toxic or infectious wastes.

3. Rodent and insect control shall be provided as necessary to protect the health and safety of site employees and the public. Pesticides used to control rodents, flies, and other vectors shall be as specified by the Florida Department of Agriculture and Consumer Services.

4. Storage of putrescible waste for processing shall not exceed storage capacity of the refuse bunker or tipping floor as designed on the approved plan, or be stored on the tipping floor for more than 48 hours.

5. Ash prior to transport to the landfill shall be stored in an enclosed building on an impervious surface or other method approved by the Southeast District Office. Final disposal of the ash shall be into the lined landfill or other method approved by the Southeast District Office. Any leachate generated within the building shall be collected and disposed of by a method approved by the Southeast District Office. The Southeast District Office shall notify the SFWMD of the plans and specifications regarding the above referenced method.

6. A monthly report shall be prepared detailing the amount and type (putrescible, special wastes, boiler residue, etc.) of materials landfilled at the site, and the treatment provided (see condition XIV.E.2. above). These reports shall be furnished to the Southeast District Office and PBCHD quarterly, commencing 120 days after the Resource Recovery Facility becomes operational and is producing residues.

7. The temporary hazardous waste storage and transfer facility shall be designed, constructed and operated in conformance with section 17-30.171, FAC. The design of the facility, operational procedures, personnel training program, contingency plans and closure plans shall be submitted to the department, PBCHD and SFWMD for review and approval.

8. All cells or disposal areas will be constructed to promote leachate drainage to provide for effective leachate collection; all leachate collection in active or inactive cells shall be pumped or transported to the leachate collection system for transmission to the treatment system. Leachate collected above the primary liner shall be monitored quarterly for conductivity, pH, copper, arsenic, zinc, phenols, oil and grease and total organic halogens. Results of such monitoring shall be reported to the Southeast District Office and PBCHD. Leachate collected between the primary and secondary liners shall be monitored quarterly for conductivity, chlorides, ammonia, iron, sulfur, nitrates, and zinc. Results will be reported to the Southeast District Office and PBCHD quarterly. The monitoring parameters set forth herein may be modified dependent upon the type of liners utilized and the manufacturer's recommendations to protect the integrity of the liners due to the classes of chemical constituents in the leachate which will be in contact with the liner(s). The Permittee shall provide the Southeast District Office with a certified letter from the liner manufacturer stating what classes of chemical constituents could damage the liners' integrity and include those parameters as part of the quarterly monitoring program noted above.

9. An EP toxicity analysis of the ash residue being land-filled for the chemicals listed and using the prescribed method as set forth in 40 CFR s261, Appendix II, shall be conducted within 30 days after commencement of commercial operation. In addition, said ash residue shall be tested for dioxin (2, 3, 7, 8 - TCDD) content.

10. Results from said residue analysis shall be sent to the Southeast District Office and the PBCHD within 30 days of receipt. Results will be used to determine whether or not these materials constitute a "Hazardous Waste" as defined by applicable Federal or state regulations. Results of these analyses may also be used for correlation with groundwater monitoring information and in any subsequent modification of conditions.

11. If residue materials are determined to be a "Hazardous Waste", then measures shall be taken to treat or dispose of the residues pursuant to rule promulgated by Federal, State or Local authorities, as may be applicable.

12. If the nature of materials received at the facility becomes altered, either due to modification of conditions, i.e., the facility is allowed to incinerate already known hazardous wastes such as pesticides, or if groundwater monitoring reveals abnormal groundwater conditions which may be attributable to the landfilling of this residue, then a subsequent analysis may be required at that time.

13. There shall be no discharge to waters of the State of polychlorinated biphenyl compounds.

14. The Permittee shall provide the Southeast District Office and the PBCHD with a set of full-sized (24"x 36") engineering drawings and supporting information, signed and sealed by an engineer registered in the State of Florida for the operational and closure phases of the landfill for review and approval at least 90 days prior to implementation of those phases. Within 90 days after completion on the closure phase of the project, the Permittee shall submit certified as-built plans signed and sealed by a Florida Registered Professional Engineer.

15. To ensure that the bottom liners are continuous through-

out the cell, the liners will be installed either under the supervision of the manufacturer or by a competent experienced lining contractor according to the manufacturer's specifications. In addition, as part of quality control measures, field seams between in-place liner and newly installed liner will be tested according to ASTM specifications to ensure integrity between materials and certified in writing by the liner manufacturer, contractor, and engineer of record to the Southeast District Office and PBCHD. Top liners, if required, shall be installed in accordance with Closure requirements of the Southeast District Office, PBCHD and SFWMD.

16. The extension of the EPB-10 canal shall be placed in properly designed and constructed reinforced concrete culverts. The landfill height above the culvert shall not exceed 40 feet.

F. Operational Safeguards

The overall design and layout of the facilities shall be such as to mitigate potential adverse effects to humans and the environment. Security control measures shall be utilized to prevent exposure of the public to hazardous conditions. The Federal Occupational Safety and Health Standards will be complied with during construction and operation. The safety standards specified under Section 440.56, Florida Statutes, by the Industrial Safety Section of the Florida Department of Commerce will be complied with during operation.

G. Transmission Lines

The directly associated transmission lines from the Resource Recovery Facility electric generators to the Florida Power and Light Company transmission system shall be kept cleared without the use of herbicides.

H. Noise

Operational noises shall not exceed local noise ordinance limitations nor those noise standards imposed by zoning.

I. Potable Water System

The potable water system (wells, pipes, pumps and treatment facilities) shall be designed, constructed and operated in conformance with the applicable provisions of Chapters 17-21 and 17-22, FAC. Plans and specifications for these facilities shall be provided to the Southeast District Office and the Palm Beach County Health Department for review and approval 90 days prior to construction.

XV. WATER MANAGEMENT DISTRICT CONDITIONS - GENERAL

A. The Solid Waste Authority shall prosecute the work authorized under the Certification in a manner so as to minimize any adverse impact of the works on fish, wildlife, natural environmental values, and water quality. The Solid Waste Authority/Vendor shall institute necessary measures during the construction period, including full compaction of any fill material placed around newly installed structures, to reduce erosion, turbidity, nutrient loading and sedimentation in the receiving waters.

B. The operational phases of the surface water management system authorized under this Certification shall not become effective until a Florida registered professional engineer certifies upon completion of each phase that these facilities have been constructed in accordance with the design approved by the District. Within 30 days after completion of construction of each phase, the Authority shall submit the engineer's certification, and notify the District that the facilities are ready for inspection and approval.

C. All road centerlines shall be set at or above the flood elevation generated by a three-year, twenty-four hour storm event,

in accordance with Palm Beach County criteria, as may be amended, and in accordance with the South Florida Water Management District's Rule 40.E-4., as may be amended.

D. All building floors shall be set at or above flood elevations generated by a three-day, one hundred year storm event, in accordance with Palm Beach County criteria, as may be amended, and in accordance with the South Florida Water Management District's Rule 40.E-4., as may be amended.

E. Off-site discharges during construction and development shall be made only through the discharge structures authorized by this Certification.

F. No construction authorized herein shall commence until the Permittee has agreed, in writing, by letter or resolution, that it will be responsible for the construction, operation, and perpetual maintenance of the entire surface water management system, both during operation of the facility and following the closure of the whole or any part of the facility. Responsibility for the operation and maintenance of the surface water management system shall not be assigned or delegated without prior written approval of the District.

G. This Certification is based on the applicant's submitted information to the District which reasonably demonstrates that adverse off-site water resource related impacts will not be caused by the authorized activities. The plans, drawings, and design specifications submitted by the applicant shall be considered the minimum standards for compliance. It is also the responsibility

of the Permittee to ensure that adverse offsite water resource related impacts do not occur during construction.

H. The Permittee shall secure a well construction permit prior to construction, repair, or abandonment of any wells as described in Chapter 40E-3, F.A.C.

I. In the event of a declared water shortage, water use reductions may be ordered by the SFWMD in accordance with the Water Shortage Plan, Chapter 40E-21, F.A.C.

J. This project must be constructed in compliance with and meet all requirements set forth in Chapter 373, Florida Statutes, and Chapter 40E-2, 40E-3, and 40E-4, FAC.

K. The Permittee shall hold and save the SFWMD harmless from any and all damages, claims, or liabilities which may arise by reason of the construction, operation, maintenance or use of any facility authorized by this Certification, to the extent permitted under Florida law.

L. Authorized representatives of the District shall be allowed to enter the premises to inspect and observe the operation of the surface water management system and associated landfill facilities, mitigation areas, and monitoring wells in order to determine compliance with the conditions of this Certification, as provided in Condition V.

XVI. WATER MANAGEMENT DISTRICT - SITE SPECIFIC STANDARDS

A. Prior to construction of any phase of either the Solid Waste Energy Resource Recovery Facility or the ash residue/unprocessable materials landfill, a complete set of paving, grading, and drainage plans with supporting calculations for the 40-acre Resource Recovery Facility and Jog Road must be submitted to the South

Florida Water Management District for review and written approval that the plans are in compliance with Chapters 40F-2 and 40F-4, F.A.C. Said plans shall include the following:

1. Paving, grading and drainage plans with special attention to perimeter site grading; and

2. Drainage calculations including:

a. Design storms used including depth, duration and distribution;

b. Stage-storage computations for the project and stage-discharge computations for the outfall structure(s);

c. Acreages and percentage of property proposed as:

(1) impervious surfaces (excluding water bodies)

(2) pervious surfaces (green areas)

(3) lakes, canals, retention areas, etc.

(4) total acreage of the project

d. Runoff routing calculations showing discharges, elevations, and volumes detained during applicable storm events; and

e. Calculations required for determination of minimum building floor and road elevations..

B. Any subsequent modifications to the drawings and supporting calculations submitted to the South Florida Water Management District which alters the quantity or quality of discharge of water offsite shall be pursuant to Section 403.516, F.S., and Rule 17-17.211, F.A.C. Such modifications shall be submitted to the District for a determination that the modifications are in compliance with Chapters 40F-2 and 40F-4, F.A.C. This includes modification of the discharge route.

C. Minimum standard 24" x 36" surface water management construction plans for the project as proposed as well as any modifications shall be submitted to this District for review and written

approval 30 days prior to the commencement of construction.

D. Prior to use and/or connection with any District works, the District shall be notified and the Permittee shall obtain written approval pursuant to Chapter 40E-6.041, F.A.C.

E. Prior to lowering of water levels in excavation sites, the following conditions shall be met:

1. Withdrawal rates, and depending on the methods proposed, well construction details, well and pump capacities and locations, and the data from the groundwater monitoring network shall be provided to the District for review and written approval;
2. The impacts of the proposed withdrawals shall be assessed and provided to the District;
3. No dewatering discharge shall be allowed to drain from the property and
4. The District concurs in writing that there will be no adverse impacts as a result of the proposed withdrawals under sections 373.223(A)-(C) of the Florida Statutes.

F. Final water use rates for process and irrigation and well locations shall be submitted to the District for review and written approval prior to well construction when a Vendor and final plant design are determined.

G. Prior to closure, detailed closure plans pursuant to Chapter 17-7, F.A.C., shall be submitted to the District for review and written approval.

H. On-site areas which are dedicated for the fire station and Turnpike Interchange are considered by this District as separate from the Certification, and therefore subject to permitting requirements, pursuant to Chapter 373, F.S.

I. Any on-site hazardous materials temporary storage and transfer facility constructed at this site pursuant to the Water Quality Assurance Act should be considered separate from the Certification process and subject to regulatory permits. The design of the building and related infrastructure should be submitted to this District for review and verification that the proposed facility has been designed to prevent any stored or transferred hazardous materials from coming in contact with the surface water management system.

J. If modification and/or realignment of Northern Palm Beach County Water Control District's Canal EPB 10 is necessary, a modification must be obtained for Surface Water Management Permit No. 50-01347-5.

K. Prior to construction of either the Solid Waste Resource Recovery Facility or the ash/residue/unprocessable materials landfills, a phasing plan for the landfills shall be submitted to the District for review and written approval, including detailed drawings and supporting calculations showing how leachate will be separated from runoff in the working area (temporary berms, diversion dikes, cover material, etc.).

L. Surface Water Management plans shall be revised to include spreader swales (or District approved equivalent) to approximate sheetflow discharge into the wetland areas. In addition, a sedimentation "trap" shall be designed, subject to District approval of calculations and discharge locations into the wetlands.

M. Discharge structures shall include a baffle, skimmer, or other mechanism suitable for preventing oil, grease, or other floatable materials from discharging to and/or from retention/detention areas.

N. Prior to landfill construction, a screw gate shall be installed on the water control structure at EPB 10, capable of

restricting discharge of poor quality surface water, up to and including the 25 year, 3 day level.

O. Critical areas, including the conveyance and perimeter swales, and areas adjacent to the let down pipes or conduits shall be stabilized to prevent erosion.

P. Energy dissipators shall be used whenever let down pipes discharge into perimeter swales, or the let down pipes or conduits meet the terraces.

Q. Water quality samples shall be taken at the discharge surface water discharge structure locations of the water management system into EPB 10 during periods of discharge according to the schedule below. Flow shall be measured continuously at the discharge location into EPB 10 by means of a recording flow meter. A laboratory certified by the State of Florida shall be responsible for all water quality analyses. Chain of custody documentation shall be maintained for all sampling. Reports of water quality results and discharge rates shall be submitted to this District for review and written approval on a semi-annual basis. Results of any additional stormwater quality sampling required by the Florida Department of Environmental Regulation shall be provided to the District. Monitoring requirements will be evaluated by this District following two years of data collection.

Monitoring
Type Schedule

Parameters

A. General (Quarterly)	Total Organic Carbon, Dissolved Oxygen, pH, Turbidity, Specific Conductance, Chemical Oxygen Demand, Alkalinity, Total Suspended Solids, Ammonium N, Nitrate N, Total Kjeldahl Nitrogen
B. Organics (Semi-annual)	Trichloroethylene, Tetrachloroethylene, Carbon Tetrachloride, Vinyl Chloride, 1,1,1,-Trichloroethane, 1,2-Dichloroethane, Benzene, Ethylene Dibromide
C. Metals (Semi-annual)	Aluminum, Antimony, Beryllium, Cadmium, Copper, Cyanide, Iron, Lead, Mercury, Nickel, Selenium, Silver, and Zinc

R. Any Northern Palm Beach County Water Control District facilities which have been permitted (Surface Water Management Permit No. 5001347-S) by this District and are not yet constructed but would be affected by this project must be fully operational prior to commencement of stormwater discharge from this project. The additional 60" CMP at Florida Power and Light's transmission crossing of EPB-10, and one 72" CMP at the confluence of EPB-10 and C-17 shall be so constructed.

S. There shall be a quarterly groundwater monitoring frequency for the groundwater monitoring network. The District shall be copied on the data results of the network, and any other groundwater monitoring data required by the Florida Department of Environmental Regulation.

T. At least 60 days prior to the commencement of construction, the District staff must have received and reviewed any pertinent additional information required to be submitted under the District's site specific standards and the conditions of certification. Written approval for the desired construction must be obtained prior to commencement of construction.

U. Sixty days prior to the commencement of construction of the transmission line, the permittee shall provide the District with the location of areas in which fill and associated facilities will be placed. Written confirmation that the fill and associated facilities will not cause adverse off-site impacts shall be received from the District prior to commencement of construction.

XVII. OPERATIONAL CONTINGENCY PLANS

A. Operating Procedures

The permittee shall develop and furnish the Southeast District a copy of written operating instructions for all aspects of the operation which are critical to keeping the facility working properly. The instructions shall also include procedures for the handling of suspected hazardous, toxic and infectious wastes.

B. Contingency Plans

The Permittee shall develop and furnish the Southeast District Office written contingency plans for the continued operation of the system in event of breakdown. Stoppages which compromise the integrity of the operations must have appropriate contingency plans. Such contingency plans should identify critical spare parts to be maintained on site.

C. Current Engineering Plans

The Permittee shall maintain a complete current set of modified engineering plans, equipment data books, catalogs and documents in order to facilitate the smooth acquisition or fabrication of spare parts or mechanical modifications.

D. Application Modifications

The permittee shall furnish appropriate modifications to drawings and plot plans submitted as part of the application, including operational procedures for isolation and containment of hazardous wastes.

XVIII. TRANSFER OR ASSIGNMENTS OF RIGHTS, DUTIES, OR OBLIGATIONS

If contractual rights are transferred under this certification, Notice of such transfer or assignment shall immediately be submitted to the Department of Environmental Regulation and South

Florida Water Management District by the previous certification holder (Permittee) and Assignee. Included within the Notice shall be the identification of the entity responsible for compliance with the certification. Any assignment or transfer shall carry with it full responsibility for the limitations and conditions of this certification.

XIX. PROPRIETARY DOCUMENTS OR INFORMATION - CONFIDENTIALITY

Proprietary or confidential data, documents or information submitted or disclosed to any agency shall be identified as such by the Permittee and shall be maintained as such pursuant to applicable Florida law.

XX. MITIGATION

A. On-Site Restoration and Mitigation.

1. Within ninety (90) days of certification issuance, the Palm Beach Solid Waste Authority shall submit and on-site restoration and mitigation plan (hereinafter "The Plan"). The purpose of the Plan and its implementation being the mitigation of the impact of the project on the site's wetlands and values associated therewith. The Plan shall indicate in a detailed manner the on-site measures and improvements necessary to accomplish all restoration and mitigation, (i) set forth in the application as amended, (ii) as required below and (iii) as may be required by the department of Environmental Regulation.

2. The Plan shall include but not be limited to a specification of the commencement and completion dates of all anticipated restoration and mitigation work including a specification of all revegetation of the shell pit mining areas, creation of littoral zones around all lakes, interconnection of wetland areas, areas of wetlands to be created (including the type and extent thereof which shall be not less than 190 acres), dredge and fill volumes, elevations, methods of construction, nature and extent of required improvements to accomplish the above referenced work, and planting schedules together with methods to insure vegetative survival for each area. As part of the plan it shall

also be required that (i) littoral zones will be constructed around all existing and proposed borrow lakes, (ii) where it can be done with a reasonable probability of success, cypress trees proposed for elimination shall be transplanted to areas of wetland creation or roost enhancement, and (iii) willow, cypress and other hardwood species shall be planted on the spoil windrows of the abandoned pit South of the roost area to provide future roost availability, and the existing roost shall be monitored over a seven year period.

3. The Plan shall be submitted to the Department of Environmental Regulation, the Florida Game and Fresh Water Fish Commission, the U.S. Fish and Wildlife Service, Treasure Coast Regional Planning Council, and other appropriate governmental authorities or agencies.

4. The Department of Environmental Regulation shall review the Plan and it shall be subject to the approval of the Department of Environmental Regulation in consultation with the Florida Game and Fresh Water Fish Commission, U.S. Fish and Wildlife Service and Treasure Coast Regional Planning Council. The Palm Beach County Solid Waste Authority in the event of disapproval of the Plan by the Department of Environmental Regulation shall include such revisions therein as may be required by the Department of Environmental Regulation.

5. The Palm Beach County Solid Waste Authority shall complete all restoration and mitigation work set forth in the Plan approved by the Department of Environmental Regulation in accordance with the time schedules set forth in the approved Plan.

B. Off-Site Restoration and Mitigation.

1. The off-site restoration and mitigation area, is an area of approximately 3400 acres in the L-8 Marsh area of the J. W. Corbett wildlife management area designated by the Florida Game and Fresh Water Fish Commission and shown on Exhibit A attached hereto and made part hereof (hereinafter referred to as the "preservation area").

2. The Solid Waste Authority shall perform a detailed hydrological study the scope and content of which shall be subject to approval by the Department of Environmental Regulation in

consultation with the Florida Game and Fresh Water Fish Commission, U.S. Fish and Wildlife Service and Treasure Coast Regional Planning Council. The purpose of the hydrological study shall be to identify and detail those modifications and improvements that would be necessary to the preservation area in order to restore a hydroperiod to this area which approximates the natural wetland hydroperiod. The Solid Waste Authority shall pay all costs, engineering and otherwise for such study and the study shall be completed within two years from the date that certification has been issued. The Solid Waste Authority will at its sole cost and expense make such modifications and improvements to the preservation area including but not limited to payment of all engineering and permitting fees, all costs of labor, material, equipment and physical improvements (all of the foregoing being collectively hereinafter referred to as the "improvements") as identified in the approved hydrological study to restore a hydroperiod to the preservation area which approximates the natural wetland hydroperiod for such area.

3. The hydrological study shall be submitted to the Department of Environmental Regulation, the Florida Game and Fresh Water Fish Commission, U.S. Fish and Wildlife Service and Treasure Coast Regional Planning Council and other appropriate governmental authorities or agencies.

4. The Department of Environmental Regulation shall review the hydrological study and the proposed implementation thereof. The study and the implementation thereof shall be subject to the approval of the Department of Environmental Regulation in consultation with the Florida Game and Fresh Water Fish Commission, U.S. Fish and Wildlife Service and Treasure Coast Regional Planning Council.

5. The Palm Beach County Solid Waste Authority in the event of disapproval of the recommendations contained in the hydrological study by the Department of Environmental Regulation shall include such revisions therein as may be required by the Department of Environmental Regulation.

6. In the event that the improvements required by the approved hydrological study are projected to significantly exceed

\$420,000.00 plus the inflation factor as set forth below then the Palm Beach County Solid Waste Authority may apply to the Department of Environmental Regulation for consideration to (i) reduce the size and scope of the mitigation and restoration project or (ii) utilize alternative methods to accomplish the required mitigation and restoration as set forth above. The fact that the cost of the improvements in the approved hydrological study are projected to significantly exceed the amount set forth above, shall not, entitle the Palm Beach County Solid Waste Authority, as a matter of right, to reduce or modify the mitigation required herein. Whether, and the extent to which, the mitigation or restoration requirements shall be reduced or modified shall rest solely in the discretion of the Department of Environmental Regulation in consultation with the Florida Game and Fresh Water Fish Commission, U.S. Fish and Wildlife Service and Treasure Coast Regional Planning Council.

7. The Palm Beach County Solid Waste Authority shall complete all restoration and mitigation work set forth in the approved hydrological study including the implementation measures contained therein, within five years from the date of certification issuance.

B. Inflation Factor:

In paragraph B(6) the sum of \$420,000.00 is referred to. The actual number to be utilized in place of \$420,000.00 in condition B(6) shall be a sum using \$420,000.00 as a base and adding any increase in the index thereto; i.e., in the event there has been a 10% increase in the index from December 3, 1985 through the end of the time period under consideration then there shall be an increase of 10% in the sum of \$420,000.00. The Solid Waste Authority shall make no application for modification of the mitigation and restoration until after the completion of the approved hydrological study. For purposes of projecting and determining the actual amount to be utilized in condition B(6) with reference to the \$420,000.00, as to improvements to be constructed in the future, there shall be added to the \$420,000.00 the following (i) a sum which represents the percentage increase in the index from December 3, 1985 through the date of

approval of the hydrological study and (ii) a sum representing the estimated percentage increase in the index through the date a specific improvement is projected to be constructed in the approved hydrological study. The estimated percentage increase shall be the average annual increase in the index from December 3, 1985 through the date of approval of the hydrological study; i.e., if the average annual increase has been 10% and a specific improvement is to be constructed nine months after the approval of the hydrological study there shall be added (in addition to the amount referred to in (i)) to the \$420,000.00 the sum of \$31,500.00 representing three quarters of the 10% increase.

Index:

The term index as utilized herein shall mean: The Engineering News-Record, Construction Cost Index, published by McGraw-Hill, Inc.

In the event that the Construction Cost Index is discontinued then the Department of Environmental Regulation shall choose another index similar in nature, to utilize in connection with this off-site mitigation and restoration condition.

FIGURE 1

PROJECT LOCATION

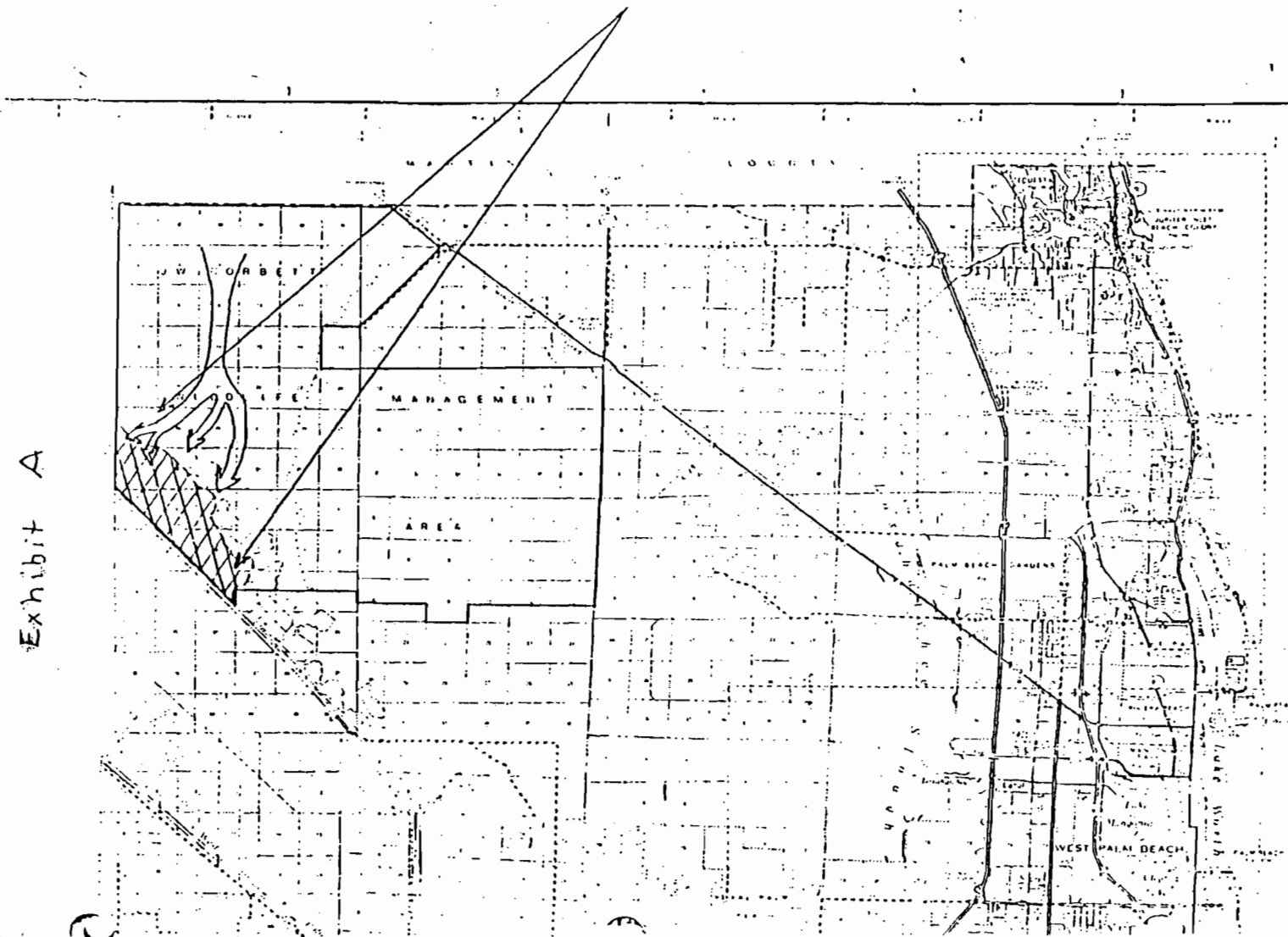


Exhibit A

Appendix III

The Authority's proposed findings of fact are addressed as follows:

1. Addressed in paragraph 1, and the Preliminary Statement.

2. Addressed in paragraph 3 & 4.

3. Addressed in paragraph 3.

4. Not relevant.

5. Addressed in paragraph 2.

6. Addressed in paragraph 1 and the Preliminary Statement.

7. Addressed in paragraph 30.

8. Addressed in paragraphs 12-17, and 33.

9. Addressed in paragraph 2.

10. Addressed in paragraph 7.

11. Addressed in paragraphs 13&14.

12. Addressed in paragraphs 15&16.

13. Addressed in paragraph 15.

14. Addressed in paragraph 17.

15. Addressed in paragraph 17.

16. Addressed in paragraph 19.

17. Addressed in paragraph 18.

18.-19. Addressed in paragraphs 10&11.

20. Addressed in paragraphs 20&21.

21. Addressed in paragraphs 22&29.

22. Addressed in paragraphs 23&24.

23. Addressed in paragraphs 25-27.

24. Addressed in paragraph 29.

25. Addressed in paragraph 30.

26. Addressed in paragraph 32.

27. Addressed in paragraph 31.

28. Addressed in paragraph 28.

29. Addressed in paragraphs 8, 19&29.

30. Addressed in paragraphs 10, 11, 28-32.

31. Addressed in paragraph 33.

DER's proposed findings of facts are addressed as follows:

1. Addressed in paragraph 26.
- 2-3. Addressed in paragraph 31.
4. Addressed in paragraph 26.

The Coalition's and Riviera Beach's proposed findings of fact are addressed as follows:

1. Addressed in paragraphs 2&6.
2. Addressed in paragraphs 1,2,3,13.
- 3-4. Addressed in paragraphs 13&27.
5. Addressed in paragraph 18.
6. Addressed in paragraph 17.
7. Addressed in paragraph 3.
8. Addressed in paragraph 8.
9. Addressed in paragraph 9.
10. Addressed in paragraph 5.
11. The parties have stipulated that Intervenor's have standing.
- 12-13. Addressed in paragraphs 7&19.
- 14-16. Addressed in paragraphs 3 & 12-19.
17. Addressed in paragraph 32.
18. Addressed in paragraphs 31 & 32.
19. Addressed in paragraph 29.
20. Addressed in paragraphs 31 & 32.
21. Addressed in paragraphs 12-17&31.
22. Addressed in paragraph 30.
- 23-25. Addressed in paragraphs 7 & 12-17.

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION



Interoffice Memorandum

TO: Al Devereaux

FROM: Clair Fancy *Clair Fancy*

DATE: April 18, 1986

SUBJ: Broward County Resource Recovery Hearing Transcripts

FOR ROUTING TO OTHER THAN THE ADDRESSEE	
TO: <i>Andrews</i>	LOCN: _____
TO: _____	LOCN: _____
TO: _____	LOCN: _____
FROM: _____	DATE: _____

This week I have read the entire hearing records on the air testimony. The most important facts, in my opinion, that I derived from the testimony are stated below.

- o Cost figures on particulate-acid gas greatly exaggerated by Broward County. Hearing officer cited lower figures of \$6.00/ton for total controls.
- o Broward discussed possible problems with baghouses, clogging, cementing, burning. Hearing officer found baghouses and scrubbers efficient and reliable.
- o Much of energy impact and cost information put on by Broward was related to wet scrubbers even though all experts felt that was not proper technology and was so stipulated that if acid gas control was required, wet scrubbers would not be used.
- o Data suggest 3 stage ESP could achieve 0.02 grains/SCF. Has been done by several existing facilities.
- o They had three experts on dioxin and health effects. We had none. They said no health effects and this was stipulated to as we had no witnesses to argue differently. This was before Department's Dioxin Report.
- o Modeling of Broward's proposal showed only slight changes in air quality levels. Less than 10% of any PSD increment and less than 3% of ambient standards for SO₂ and particulate.
- o Broward discussed lost revenues for when pollution control equipment inoperable. Said it could cost \$3.4 million per year. Since they need to burn all the garbage anyway, this was wrong. Hearing officer apparently recognized this.

Al Devereaux
Page Two
April 18, 1986

- o Dry scrubber baghouses are used extensively in Europe and Japan, but not here. Only one currently in use here (Framingham, Mass.).
- o For new units, thirteen states were requiring acid gas control at time of hearing. Many of these states do specifically regulate HCl emissions. New Jersey has required scrubbers for several proposed installations.
- o We used recent Connecticut BACT as large basis for our determination.
- o Big part of hearing was on cost per ton of removal for pollutants. 1978 EPA guideline for NSPS is \$2000. Cost for this project are about \$3500/ton for particulate and \$3500 for regulated acid gases, excluding HCl. In light of inflation-in ballpark. We would also control fine particulate (heavy metals) and dioxin if adsorbed on fine particulate. If unregulated HCl were added to other acid gases, would come down to \$1100 per ton. HCl emissions from this facility will exceed 5000 tons per year.
- o We indicated good combustion efficiency, 99.8-99.9%, as measured by CO concentrations would help to minimize dioxin and that baghouse would remove more fine particulates. Also that New York State is requiring dioxin tests on all plants every 18 months (our New York State expert).
- o We stressed how BACT should be considered: NSPS, all information available to department, BACTs of other states, and economic and social considerations-per 17-2.630. Stated economics much more than just dollars per ton and that resident outcry in 1984 was a social impact.
- o They stressed how BACT should be considered: environmental impacts, energy costs, economic impacts. This is from a federal publication as contrasted to the above, which is somewhat different. Hearing officer agreed with their interpretation.
- o We stressed the necessity of leaving room for scrubbers if not in hearing officer's recommended order.

Al Devereaux
Page Three
April 18, 1986

- o Plant construction costs about \$187 million, (excluding land). Control equipment costs as we proposed at about \$15 million. As they proposed, about \$5-7 million.

CHF/ks

cc: Victoria Tschinkel
Howard Rhodes
Mimi Drew
Buck Oven
Julie Cobb

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY

March 20, 1986

Mr. Don W. Chester
Chairman, Board of Trustees
American Lung Association
2701 N. Australian Ave.
West Palm Beach, Florida 33407

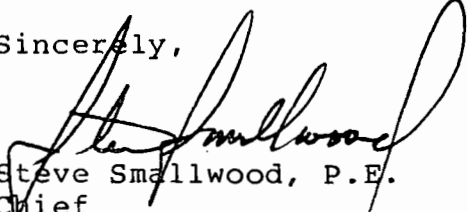
Dear Mr. Chester:

In your March 5 letter you advised me that the Board of Trustees of the American Lung Association of SE Florida held its board meeting on February 26 and voted unanimously to support the air pollution control recommendations of DER for the proposed Palm Beach County Solid Waste Resource Recovery facility in Riveria Beach.

The department very much appreciates the support of the American Lung Association in this issue. I think you are correct that if the people who live in the area were to vote on this issue that a majority of them would also support the department's position.

I have advised other interested persons within the department and the Palm Beach County Local Air Program of your support.

Sincerely,


Steve Smallwood, P.E.
Chief
Bureau of Air Quality
Management

SS:jr

cc: Victoria Tschinkel
Howard Rhodes
Steve Fox
Clair Fancy
Bill Thomas ✓
Buck Oven
Isidore Goldman
Gene Sacco

AMERICAN LUNG ASSOCIATION *of Southeast Florida, Inc.*
The "Christmas Seal" People

Serving:

Palm Beach

Martin

St. Lucie

Indian River

Okeechobee

counties

March 5, 1986

2701 N. Australian Ave.
West Palm Beach, Florida 33407
(305) 659-7644

Steve Smallwood, Bureau Chief
Bureau of Air Quality and Management
Department of Environmental Regulation
2600 Blairstone Road
Tallahassee, FL 32301

DER

MAR 10 1986

BAQM

Dear Mr. Smallwood:

The Board of Trustees of the American Lung Association of Southeast Florida at its board meeting February 26 voted unanimously to support the air pollution control recommendations of DER for the proposed Palm Beach County Solid Waste Resource Recovery facility in Riviera Beach.

We understand that the recommendation includes Latest Available Emission Controls specifically the combination of a dry scrubber with a bag house. According to our information this would provide the best control of particulates as well as harmful gaseous emissions.

The Lung Association believes that due to the location of this plant in relation to the populated area it would be prudent to install the best technology to control air pollution.

In addition it is our belief that the people of this area would demand no less if given the chance to vote on the issue.

Furthermore Palm Beach County residents over 65 years of age comprise 25% of the population, this is twice the national average and is a group of people more sensitive to air pollution.

Finally according to page 34 of Palm Beach County Solid Waste Authority Feasibility Study Interim Report of November 1981 it was long ago planned that, "Due to the location of the central plant in proximity to the populated areas, the cost figures include the expensive equipment and high O & M costs to meet LAER (Lowest Achievable Emission Rates) which has the most stringent requirement even though it may not be required by the regulatory agencies."

Steve Smallwood, Bureau Chief
March 5, 1986
Page 2

We commend you for your efforts on behalf of the people of Palm Beach County to keep one of our most valuable resources, the very air we breathe, as clean as possible.

Sincerely,



Don W. Chester
Chairman, Board of Trustees

DWC:jca

cc: Frank Sineath, Chairman
Palm Beach County Solid Waste
Authority

DER
MAR 10 1986
BAQM

DER

MAR 3 1986

27 February, 1986

BAQM

TO: Barry Andrews - Florida Dept. of Environmental Regulations
FROM: A. J. Teller - Teller/Research-Cottrell, Inc.
SUBJ: Solids Discharge Summary - Palm Beach County

Solids Discharge Summary

<u>Source</u>	<u>Tons/Yr.</u>	<u>% of Discharge</u>
Bottom Ash	132212	32.98
Flyash	30000	7.48
Trommel Discharge	221040	55.14
Pollution Control Reaction Product	16751	4.18
Tesisorb	900	0.22
Total	400903	100.00

Therefore, the addition to landfill as a result of the acid gas recovery is 4.50% of the total landfill discharge.

There will be additional flyash sent to landfill consisting of the fine particulate with high concentrations of toxic heavy metals that would have entered the air basin of Palm Beach County from the proposed electrostatic precipitator. This is approximately 500 tons per year. The heavy metals, in the main, will be rendered insoluble by the excess lime. This will add about 0.1% to the landfill.

The total landfill area indicated in the application was 314 acres. Assuming 50% is associated with the sanitary landfill operation, the area available for sanitary landfill is 6.8 million square feet.

The estimated additional solid discharge resulting from acid gas recovery is about 18000 tons/year for 2000 TPD RDF combustion for 300 days/year. The bulk density for the landfill was assumed in the application to be of the order of 62 lb/ft³ with a volume addition of 4520 cu. yd./day or 40680 cu. ft./day. For the entire landfill, this represents an increase in average height of 10.8 in./yr.

TO: Barry Andrews - DER
FROM: A. J. Teller

27 February, 1986
Page 2.

The acid gas control solid discharge, 18000 tons per year, at the same bulk density, compressed on the landfill as the average waste, would contribute an additional 0.5 in./yr or 4.7% increase. If the bulk density representing non-compressed discharge, 40 lb/ft³, were used, the height added would be 0.75 in./yr. or a 6.9% increase.

TO: Barry Andrews - DER
FROM: A. J. Teller

27 February, 1986
Page 3.

Solids Discharge from Proposed Palm Beach County Incinerator

Basis - Combustion	2000 TPD RDF
Operation	300 Days/Yr.
Total Burn	600,000 TPY

Bottom Ash - Fig 3.1.2 Volume 1, SWB Proposal

Combustion Rate	624 TPD RDF/Boiler
Bottom Ash	275 TPD/2 Boilers

Therefore for 2,000 TPD rate of burn

$$\text{Bottom Ash } \frac{275 \times 2000}{624 \times 2} \times 300 = 132212 \text{ TPY}$$

Flyash - Par. 3.4.1.4.1.2

100 lb/ton

Therefore for 2,000 TPD or 600,000 TPY Combustion

$$\text{Flyash } \frac{100}{2000} \times 600,000 = 30,000 \text{ TPY}$$

Trommel - Section 1 - Waste Fig 3.1-2

30.7 TPH

Therefore $30.7 \times 24 \times 300 = 221,040 \text{ TPY}$

Reaction Product - Basis $\alpha = 2$

90% HCl, 70% SO₂ Recovery

Product

Ca(OH) ₂	6593 TPY
CaCl ₂ , CaSO ₃	10158 TPY
Total	16751 TPY

TO: Barry Andrews - DER
FROM: A. J. Teller

27 February, 1986
Page 4.

HCl EMISSIONS

There appears to be total inconsistency in the estimate of HCl emissions from combustion.

Based on the fuel composition in Tables 1-1 and 1-2 of Volume 3, the maximum emissions of HCl based on 1800 TPD RDF combustion, the emissions would be 4931 TPY.

Based on projected emissions, Table 3-2 at the same combustion rate, the estimate is 1150 TPY.

Based on the combustion product compositions in Table 3.4 Volume 1 and the flows stated, the estimate is 2700 TPY.

The question is what is the real hydrochloric emission

From Tables 1-1 and 1-2 (Vol 3)	4931 TPY
Table 3-2 - (Vol 3)	1150 TPY
Table 3.4 - (Vol 1)	2760 TPY
Response to DER (Nov 1985)	864 TPY
Based on 3.2 lb HCl/ton (PA84-20)	

On the basis of 0.73% Cl in the fuel and the historical evidence of 80% volatilization of the chloride content, the emissions will be of the order of 3950 TPY.

Thus the SWB has underestimated its Hydrochloric emissions by

71% in their material balance submitted to the DER as basis for non-control.

32% on their flue gas composition and
77% in their defense response.

Hayden | Wegman

Consulting Engineers

February 24, 1986

Mr. Timothy F. Hunt, Jr.
Executive Director
Palm Beach County Solid
Waste Authority
5114 Okeechobee Boulevard
Suite 2C
West Palm Beach, Florida 33417

Reference: Power Plant Siting Application DOAH
Case No. 85-2032 Air Quality

Dear Tim:

The DER Draft Conditions of Certification for the Palm Beach County Solid Waste Authority's Resource Recovery Facility have been reviewed in the section concerning air emissions. The DER is recommending the addition of dry scrubbers to the Air Pollution Control (APC) equipment to control the emissions of chlorides, sulfuric acid mist, and fluorides specifically to meet BACT. The FDER agreed that all the regulated pollutants met BACT with the Electro-static Precipitators and good combustion control as stated by the Authority.

The Authority received proposals from four Vendor's on January 6, 1986 for the construction and operation of the Resource Recovery Facility. As part of the proposal, the Vendor's were required to bid the additional cost to construct and operate dry scrubbers. These are the actual costs the Authority would incur, and not some estimate based on supplier information.

The following figures are taken from the apparent low bidder's proposal.

Capital Cost (1986) - \$13,665,000 (3 units)
O&M Costs (1986) - \$ 2,960,580 (3 units)

Debt Service (10% Bond interest)
 $\$13,665,000 \times 1.5 \times 0.1175 = \$2,408,456$ annually
where do these come from.
20 year Bond period = \$48,169,120

O&M Costs (6% escalation)
20 year O&M (1989 thru 2008) = \$129,709,560

Total Cost over 20 years

Debt Service	=	\$ 48,169,120
O&M Costs	=	\$129,709,560
		<u>\$177,878,680</u>

The annual tonnage of RDF combusted in the three boilers would be approximately 700,000 tons, or 14,000,000 tons over 20 years.

$$\text{Average Additional Cost/Ton} = \frac{177,878,680}{14,000,000} = \$12.71/\text{Ton}$$

This calculates to \$ 8.48/Ton 1989
 \$18.68/Ton 2008

There are other costs that are not included above. Additional residues collected from the electrostatic precipitator over 20 years will add an additional 300,000 to 400,000 tons to be landfilled. This will reduce the class I landfill life by about 10%. An average landfill cost of \$50/Ton over the 20 year period add another \$15,000,000 to \$20,000,000 to costs.

It is expected the availability of the boilers would be reduced with the addition of dry scrubbers, that would result in reduced electric revenues and the landfilling of raw MSW. It is difficult to put a dollar cost on loss of electric revenues expected to total over \$600,000,000 over the 20 years, but every 1% loss equates to \$6,000,000.

A very noticable plume will occur because of the reduced gas exit temperature and increased moisture content, and if it is necessary to reheat the gas to reduce the flume before it exits the stack, this additional cost must be added.

The main reason given for the addition for dry scrubber is the reduction of chlorides, fluorides and sulphuric acid mist. Only chlorides represent a significant emission, and does not even remotely present a health hazard. Palm Beach County being located along the sea coast experiences a high ambient level of chlorides from the ocean, which results in an average disposition rate of 50 lbs/year/acre in the catchment area. Based on the apparent low bladders guaranteed maximum, only 4 lbs/year/acre would be deposited in this area of maximum impact (Authority figures supplied in the application would be one quarter this amount). Homes with swimming pools are experiencing higher chloride impacts from their swimming pools than the proposed plant would produce.

The assumption that percentage of chlorides increase annually in direct ratio with the increase of plastics in the waste stream is not valid. The just completed study (issued October 1985) NBSIR 85-3213 by U.S. Department of Commerce investigated the "Chlorine Content of Municipal Solid Waste from Baltimore County, Maryland and Brooklyn, New York". The report investigate the percentage of chlorine in plastics (insoluble) and chlorine in paper (soluble). The Baltimore refuse had 56% of the chlorine (soluble) in the paper fraction. Even with a doubling of the plastic fraction the increase would be less than 50% assuming the same mix of plastics. In Palm Beach County the plastic fraction in the Class I refuse (garbage) was primarily composed of beverage containers and packaging materials that are largely not chlorinated plastic types.

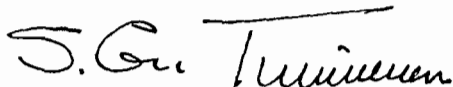
The original composition studies on MSW carried out in 1981 in Palm Beach County were basically for a determination of the higher heating value (HHV) of the MSW. The Elmer Kaiser work on heat value and composition of municipal solid waste (1977) was used as a basis for the value used for the Authority reports. The plastics data was for a representative mix of plastics at that time and place, and is probably not representative of what is presently in Palm Beach Class I refuse today. Based on Baltimore refuse (garbage to National Ecology Plant) the chlorine and sulphur quantities for Palm Beach County refuse are probably stated too high by about 65%. Since neither sulphur or chlorine as stated, even remotely presented any concern, the cost of further expensive studies to refine sulphur, chlorine, or other constituents was not deemed warranted.

With about 70% of the chlorine going up the stack, the total chlorides in Baltimore refuse results in 6.3 lbs of chlorides per ton of refuse as gas emissions of which 2.8 lbs is from plastics. The 3.5 lbs of chloride emissions per ton of refuse modelled for Palm Beach should be increased by a factor of 2 based on the Baltimore experience to be on the conservative side. This level is still low, and would add about 10% to present ambient conditions. The 2700 tons per year of chlorides emissions would be reduced with a dry scrubber by 2430 tons per year for a first year cost of \$5,934,554 in 1989. This is \$2,442 per ton of chlorides removed, and when all costs are included (loss of electric revenues, landfill costs, etc.), the figure will be substantially higher and well above the suggested EPA limit of \$2,000 per ton.

The assumption that increased plastics will increase chloride levels does not follow. The growth in Class I plastics is for beverage containers and food packaging which are primarily non-chlorinated. I believe it is evident that the cost to reduce chlorides is not justified.

Very truly yours,

HAYDEN-WEGMAN CONSULTING ENGINEERS



Stanley G. Timmerman

SGT/bbj

Received DER

JAN 13 1986

P.P.S

PALM BEACH COUNTY, FLORIDA

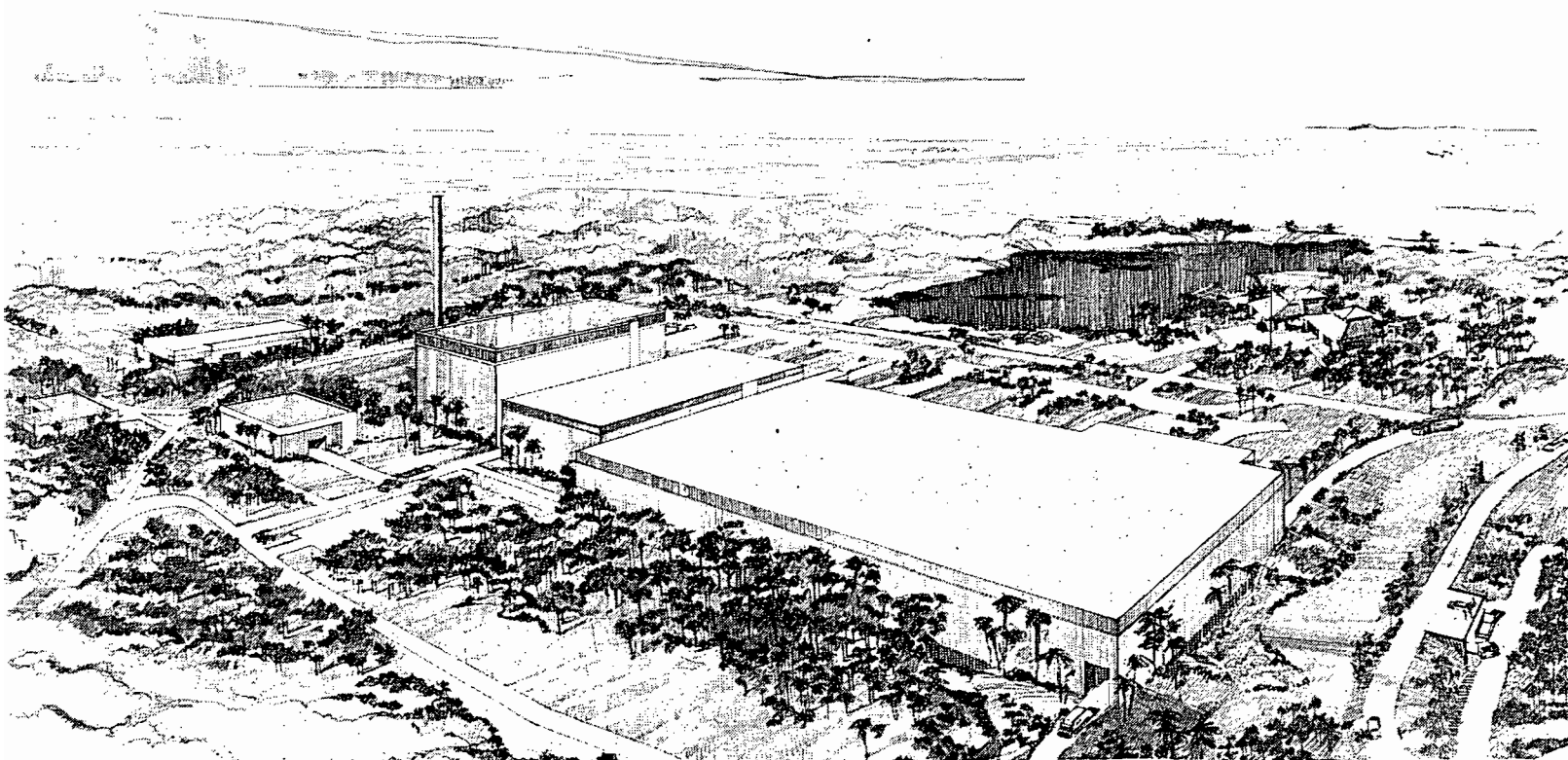
SOLID WASTE RESOURCE RECOVERY FACILITY
UPDATE TO THE APPLICATION FOR
POWER PLANT SITE CERTIFICATION

SUBMITTED BY

SOLID WASTE AUTHORITY Palm Beach County



DECEMBER, 1985



Key:



SECTIONS KEPT
FOR AIR PERMIT
FILES

PALM BEACH COUNTY SOLID WASTE AUTHORITY



December 30, 1985

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

Attn: Mr. Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

Re: Update to the Application
Application for Power Plant Siting Certification
Resource Recovery Facility
PA 84-20, DOAH CASE NO. 85-2032
Solid Waste Authority
Palm Beach County, Florida

Dear Mr. Oven:

Accompanying this letter are 45 copies of the Update to the Application dated December 2, 1985. The Application and Appendices were updated due to a modification to the Resource Recovery Facility Master Site Plan. The modification is based on several meetings with regulatory agencies concerning the protection of the roost/rookery area.

UPDATE FORMAT

The format described below was used to organize material included in this Update.

First, copies of those sections of the original Application which have been updated are included. Typewritten pages which present updated material follow the appropriate page(s) of the original Application. The typewritten pages are numbered for easy reference. For example, Page 4-7 of the original Application is followed by Updated page 4-7A or pages 4-7A, 4-7B, 4-7C, etc.

Additionally, each copied page of the original Application which has been updated includes notations indicating the type of change. The notations appear in the left margin of the page adjacent to the appropriate paragraph(s) or section(s). Following is an explanation of each notation:

1. REVISED SECTION X.X.X: the indicated section (i.e., Section 1.1.1, 1.2.1, etc.) has been updated in its entirety; the revised material appears under an identical notation on the following page(s).

2. REVISED 1, REVISED 2, REVISED 3, et.: the indicated paragraph or paragraphs have been revised; the revised material appears under an identical notation on the following page(s).
3. INSERT SECTION X.X.X: a new section (i.e., Section 1.1.1, 1.2.1, etc.) has been inserted at the point indicated in the text; the new material appears under an identical notation on the following page(s).
4. INSERT 1, INSERT 2, INSERT 3, etc.: a new paragraph or paragraphs have been inserted at the point(s) indicated in the text; the new material appears under an identical notation on the following page(s).
5. REVISED TABLE: the indicated table has been revised; the new table appears on the following page(s).
6. UNCHANGED: the indicated paragraph is unchanged.
7. DELETE: the indicated paragraph has been deleted in its entirety.

UPDATED APPENDICES

The Appendices which have been updated are listed below. Those appendices which are noted as "full" require the application holder to remove the appendix in its entirety and replace it with the updated appendix. Those appendices which are noted as "partial" require the application holder to supplement and/or replace sections or pages of the original appendices with the appropriate revised material included in the Update.

VOLUME II - APPENDICES

<u>Appendix No. and Name</u>	<u>Update</u>
10.1.4 Section 10 or 404 Applications/Permits	Partial
10.4 Class I & III Sanitary Landfill Construction and Operation Data	Partial
10.5 Surface Water Management Plan	Full

VOLUME III - APPENDICES

<u>Appendix No. and Name</u>	<u>Update</u>
10.10 Correspondence Related to Governmental Jurisdiction	Partial
10.12 Ecology	Partial
10.15 Environmental Noise Study	Full

State of Florida
Department of
Environmental Regulation
December 30, 1985
Page Three

VOLUME IV - AIR QUALITY

<u>Appendix No. and Name</u>	<u>Update</u>
10.1.5 Prevention of Significant Deterioration DER Form 17-1.202(1)	Full Partial

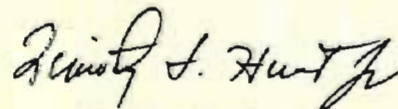
UPDATED FIGURES

The following figures have been updated and replace those contained in the original application. Figure 4.2-1, which was originally omitted in the Application, has been updated and included in this update to the Application. For easy reference, the preceding page of each updated figure in the Application is listed below.

<u>Figure No. and Name</u>	<u>Follows Page</u>
2.1-2 Resource Recovery Facility and Adjacent Properties	2-1
2.2-2 Special Category Areas within 1 Mile of Plant	2-3
2.2-3 Interaction of Resource Recovery Facility with Comprehensive Plan	2-5
2.3-31 Traffic Assignment	2-49
2.3-32 Solid Waste Management Facilities Locations	2-50
3.2-1 Resource Recovery Facility Site Plan	3-5A
3.2-3 Master Site Plan	3-6A
4.2-1 Interceptor and Monitor Well Locations and Approximate Cones of Depression	4-8
5.6-1 PSD Increment	5-16A
5.6-2 Contributions to AQSTD	5-17A
6.1-1 Transmission Line Corridor	6-1A

Should there be any further questions concerning the application please contact our office.

Very truly yours,



Timothy F. Hunt, Jr.
Executive Director

TFH/pc
enclosures

of the refuse is an additional benefit. Its sale to FP&L will help offset the overall cost of operating the facility. An affirmative determination of need from the Florida Public Service Commission has been applied for as part of this document. Other materials may be recovered as market conditions warrant.

The Authority will contract with a full-service vendor to design, construct, and operate the plant. The Authority will own the facility.

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

FACILITY DESCRIPTION

UNCHANGED

The proposed project will be a RDF Resource Recovery Facility with an initial continuous design rate processing capacity of 2,000 tons per day of municipal solid waste (MSW) and a gross electrical generating capacity of approximately 50 megawatts (MW). In anticipation of future disposal needs, Palm Beach County is seeking certification for ultimate site electrical generating capacity of approximately 75 MW (gross), using 3,000 tons per day of MSW.

REVISED

1

The landfill associated with the Resource Recovery Facility will consist of a 150 acre Class I landfill of double-liner technology with a leachate collection system and a 235 acre Class III landfill of single-liner technology with a leachate collection system. Borrow lakes consisting of approximately 243 acres will be developed over the life of the landfill to provide fill for construction and cover material for the landfill contents.

APPLICATION OVERVIEW

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

The application consists of four (4) volumes:

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

Volume II and III (Appendices) — contain the appendices of the application (Chapter 10). In addition to those appendices specifically required in the DER Instruction Guide, included are thirteen (13) additional appendices which are more appropriately included in Volume II or III than in the application text of Volume I.

Volume IV (Air Quality) — contains DER Form 17-1.202(1), Application to Operate/Construct Air Pollution Sources; the specific requirements of the Prevention of Significant Deterioration (PSD) review; a Best Available Control Technology (BACT) analysis and an air quality impact analysis.

FACILITY DESCRIPTION

REVISED

1

The landfill associated with the Resource Recovery Facility will consist of a 121-acre Class I landfill of double-liner technology with a leachate collection system and 192-acre Class III landfill of single-liner technology with a leachate collection system. Borrow lakes consisting of approximately 236 acres will be developed over the life of the landfill to provide fill for construction and cover material for the landfill contents.

As required by Chapter 17-17.121(3)(a) FAC, also submitted, under separate cover, are three (3) copies of materials which show the procedures taken to accomplish compliance of the site with existing land use plans and zoning ordinances. This compilation of information is referred to as the "Compliance Document".

PRINCIPAL FINDINGS

UNCHANGED

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

UNCHANGED

- Air Quality — As discussed in the Appendix 10.1.5 — Air Quality Impact Analysis, the combustion process for the facility will be environmentally sound. The results of the Prevention of Significant Deterioration (PSD) analysis indicate:

- Best Available Control Technology (BACT) for the proposed source is the use of emission controls inherent to the system design with an Electrostatic Precipitator (ESP) designed to meet an outlet grain loading of 0.03 gr/dscf corrected to 12% CO₂;

- The facility will operate in compliance with the Prevention of Significant Deterioration (PSD) increments, National Ambient Air Quality Standards (NAAQS), and Florida Ambient Air Quality Standards (FAAQS) for all criteria pollutants;

- Fugitive dust created during construction of the facility is addressed in Section 4.5. With suggested standard mitigative measures there will be no adverse effects due to fugitive emissions.

- Total Suspended particulates (TSP) are examined in Section 5.6.1 and Appendix 10.1.5. The proposed resource recovery plant emissions will result in an ambient impact equal to approximately 1.3 percent of the Florida Ambient Air Quality Standard for TSP;

- As discussed in Section 3.4.1, the tipping area and RDF plant will be enclosed and under negative air pressure. Thus, odors will not be able to leave the resource recovery plant. Odors within the building will be drawn into the furnace and destroyed in the combustion process; and

- The emissions from the facility will not have an adverse effect on surrounding soils, vegetation or visibility.

UNCHANGED

- Land Use and Zoning — (Section 2.2.2 and Compliance Document) A series of advertised formal public hearing have been conducted concerning the awarding of a Special Exception to the Agricultural Residential Zoning of the site. At those hearings public input, testimony and documents were entered into the official record as land use and zoning issues were evaluated. Even though the Palm Beach County

Planning Commission (CPC) voted against the requested Special Exception, the staff of the County Planning, Zoning and Building Department had recommended to the CPC approval of the Special Exception, indicating that the requested use conformed to the County Zoning Code and the Land Use Plan. The Board of County Commissioners (BCC) concluded that the proposed Resource Recovery Facility is compatible with the Land Use Plan and zoning patterns in the area. Accordingly, the Board of County Commissioners approved the Special Exception with a number of conditions.

UNCHANGED

- Noise — The Environmental Noise Study (Section 5.7 and Appendix 10.15) indicated that the predicted noise levels resulting from the operation of the facility will not exceed recommended noise level criteria for any location off of the Resource Recovery Facility site. There are a few areas on-site where the level of noise will exceed recommended levels; however these areas are localized or enclosed and no personnel would work within any of the areas for extended periods of time. The effects of these noise levels can be mitigated using standard equipment and procedures.

UNCHANGED

- Traffic — (Section 5.9.1 and Appendix 10.16) The potential traffic impact which the proposed Resource Recovery Facility would have on the adjacent roadway network was determined. The facility will meet the County's Traffic Performance Standards as a Category C Project. The Authority has committed itself to construct or upgrade a number of vicinity roads, insuring continued acceptable levels of service.

UNCHANGED

- Groundwater — This facility will lie over portions of the Turnpike Aquifer, a principal source of drinking water in Palm Beach County. Thorough hydro-geologic investigations were conducted to determine existing groundwater quality and to serve as a basis for future monitoring programs (Section 2.3.1). The current groundwater quality beneath the site is good. A plume of mineralized water has been identified beneath the existing Dyer Boulevard Landfill, adjacent to the site. Some of the non-potable water for the resource recovery plant use will be drawn from this plume, eliminating what could have become a serious problem. (Section 3.5)

UNCHANGED

- Surface Water — Existing hydraulic connections of on-site and adjacent waters were identified and the surface water quality on site was determined by sampling and analysis. (Section 2.3.4) The only problems identified related to color and turbidity, otherwise the surface water quality was satisfactory. The design of the resource recovery plant and landfills will insure adequate retention and natural treatment of stormwater run-off on-site. This same surface water management plan is closely tied to the site wetlands mitigation scheme. Any long-term effects on surface water associated with the operation of the Resource Recovery Facility will not be adverse. (Sections 3.8, 4.2 and 5.3.1)

UNCHANGED

- Soil And Foundation Conditions — Preliminary investigations have indicated that there appears to be a competent bearing layer starting at a depth of 50 to 70 feet over most of the site. Piles or piers placed into this stratum will be used as the foundation for major structures. However, the present position, density, composition and degree of cementation of the soils beneath the site are quite variable, particularly in reference to depth. Therefore, a careful determination will be made of the subsurface conditions in order to insure adequate foundation design for the resource recovery plant and associated facilities. (Section 2.3.1.1 and 2.3.1.2.2)

REVISED**1**

- **Plant and Animal Communities** — (Sections 2.3.5 and 2.3.6) The presence of extensive wetlands within a 5 mile radius of the site increases the possibility that important species associated with wetlands may occur. However, this site presents no outstanding or exceptional features to attract important species. The populations that utilize the site would be present in approximately equal amounts in any similar area in the region. Although the development of the Resource Recovery Facility will have a significant effect on the ecology of the site it does not pose a threat to any plant or animal communities.

UNCHANGED

- **Archaeological Sites and Historic Preservation Areas** — (Section 5.10) There are no historical or prehistoric resources known to be present within the project site boundaries as confirmed by field investigations. Projected use of the project site will not impact any historic or prehistoric cultural resources.

PROJECT STATUS

The Palm Beach County solid waste energy recovery facility will be designed, constructed and operated by a full-service vendor under contract to the Authority. The selected contractor will have to guarantee compliance with the terms and all conditions of the site certification and rezoning conditions. As currently envisioned, construction of the facility will begin in 1986 with startup expected in 1989.

Access to the site is made from 45th Street by traveling north on a shell rock road located between the two shell pits bordering on 45th Street. At the northern boundary of the shell pits, this road proceeds east to the eastern site boundary. Within the site, the road meanders in a northerly direction, terminating at the active borrow lake.

2.1.3 Site Modifications

UNCHANGED

The proposed site development plan for the site is shown in Figure 2.1-2. Space has been allocated for Class I and Class III Sanitary Landfills, a north-south roadway, borrow lakes, the resource recovery plant, and perimeter buffer zones. The western portion of the site will serve as a multiple-purpose conservation area — habitat preservation, buffer, stormwater retention and wetlands mitigation will all be accomplished in this area. Throughout the rest of the text, these specific usages are discussed with no general reference to the conservation area.

UNCHANGED

In accordance with the Water Quality Assurance Act of 1983, a landfill cannot be constructed within 3,000 feet of a Class I water body. The West Palm Beach Water Catchment Area (WCA) is classified as a Class I surface water body. (DER Docket Number 83-32R, Rule Number 17-3.161, Classified Waters.) Therefore, all landfill activities will occur within the eastern 1,900 feet of the site in order to comply with these minimum setback requirements. The existing borrow lake in the northeast portion of the site will be expanded to allow maximum utilization of the designated area for dredging fill material to be used at the Dyer Boulevard Landfill, as well as the landfill areas to be constructed on the site.

UNCHANGED

The western region of the site within the 3,000-foot setback from the WCA will be utilized to accommodate the 40-acre resource recovery plant, including a laydown area, employee parking, wastewater treatment plant and other associated facilities, roadway right-of-way, additional borrow areas, wetlands mitigation and stormwater management. Two borrow lakes will be developed on the property south of 45th Street within the boundaries of the site while allowing for the extension of the north-south roadway south of 45th Street. An access service road for the landfill will be maintained within the 200-foot setback west of the Turnpike canal.

UNCHANGED

The landfill height has been established to provide the capacity for a Class I and a Class III landfill to serve the County in excess of twenty years. Existing ground elevations on the site average + 17.5 feet NGVD (National Geodetic Vertical Datum) (± 1 foot). The base of landfill operation will begin at an elevation of + 30 feet NGVD. The proposed final elevations of the designated Class I and Class III landfill areas of the site are + 130 feet NGVD.

The proposed land use for the site is summarized as follows:

REVISED
TABLE

Class I Landfill	150 acres
Class III Landfill	235 acres
Borrow Lakes	243 acres
Roadway	30 acres
Conservation Area	427 acres
Resource Recovery Plant	40 acres
Buffer, Roads, Ditches, etc.	195 acres
TOTAL SITE	1,320 acres

SECTION 2.1.3 Site ModificationsREVISED
TABLE

Class I Landfill	121 acres
Class III Landfill	192 acres
Borrow Lakes	248 acres
Roadway (Jog Road)	36 acres
Conservation Area	460 acres
Resource Recovery Plant	40 acres
Buffer, Roads, Ditches, etc.	<u>223 acres</u>
TOTAL SITE	1,320 acres

UNCHANGED

After the landfill capacity has been exhausted, the landfill area is planned to be developed as a recreation facility.

2.1.4 100-Year Flood Zone

As indicated in Figure 2.1-3, none of the proposed site lies within a 100-Year Flood Zone.

2.2 SOCIO-POLITICAL ENVIRONMENT

2.2.1 Governmental Jurisdictions

Available maps and literature were examined to identify local, regional, State and Federal areas stipulated in the application guide. In addition to this review, the governmental units listed in Table 2.2-1 were contacted to provide supplemental information.

Information on the special category areas is listed in Table 2.2-2 and shown graphically in Figure 2.2-1 and Figure 2.2-2. Local parks of the Cities of Palm Beach Gardens, Riviera Beach and West Palm Beach, and the Towns of Lake Park and Mangonia Park are located within 5 miles of the site. None of these lie within 1 mile of the plant. The City of West Palm Beach Water Catchment Area is directly adjacent to the western border of the site. This area of approximately 19 square miles is the drinking water source for West Palm Beach, and is a wetland area. While it is not strictly a private holding as indicated in Table 2.2-2, the catchment area is managed for environmental protection by the City.

The existing Dyer Boulevard Landfill is scheduled for closure in 1987. This area is planned to be developed as a recreational facility, and is anticipated to be managed as a Palm Beach County Park.

Table 2.2-1
Agencies Contacted in Survey of Governmental Jurisdictions

FEDERAL	U.S. Fish and Wildlife Service
STATE	Florida Department of State -Bureau of Historical Preservation Florida Department of Natural Resources -Recreation and Parks Division Florida Agricultural and Consumer Services -Forestry Division Florida Game and Freshwater Fish Commission
COUNTY	Parks and Recreation Department Planning, Zoning and Building Department -Planning Division
LOCAL	City of Palm Beach Gardens City of Riviera Beach City of West Palm Beach Town of Lake Park Town of Mangonia Park

REVISED
TABLE
2.3-12TABLE 2.3-12
SIGNIFICANT EMISSION RATES AND TOTAL FACILITY
POTENTIAL TO EMIT (THREE UNITS AT 600 TPD EACH)
VALUES FOR PSD REGULATED POLLUTANTS

Pollutant	Significant Emission* Rates (Tons/Year)	Potential to # Emit (Tons/Year)
Particulate Matter (TSP)	25	214
Carbon Monoxide (CO)	100	3,942
Nitrogen Oxides (NO _x)	40	1,314
Sulfur Dioxide (SO ₂)	40	2,957
Ozone (VOC)	40	65.6
Lead (Pb)	0.6	0.46
Asbestos	7.0 E-2	—
Beryllium (Be)	4.0 E-3	3.0 E-3
Mercury (Hg)	0.1	0.98
Vinyl Chloride	1.0	—
Fluorides	3.0	13.2
Sulfuric Acid Mist	7.0	0.131
Total Reduced Sulfur (including H ₂ S)	10	—
Reduced Sulfur (including H ₂ S)	10	—
Hydrogen Sulfide (H ₂ S)	10	—
Hydrogen Chloride	—	1,150
2,3,7,8-TCDD	—	1.8 E-5

* 17.2 (V) Table 500.2

1,800 TPD RDF fired (based on 3 units at 600 TPD each)

REVISED
TABLE
2.3-13TABLE 2.3-13
COMPARISON OF IMPACT OF PALM BEACH COUNTY RDF FIRED
SPREADER STOKER FURNACES TO DE-MINIMUS LEVELS (ISC MODEL)
SIGNIFICANT MONITORING CONCENTRATIONS

Pollutant	Averaging Time	De-Minimus Guidelines ug/m ³	Highest 2nd High- est# Concentration ug/m ³	Distance (km) From Source to De-Minimus Level	
				High	H ₂ ndH
TSP	24 Hour	10	2.0	##	##
SO ₂	24 Hour	13	27.9	9.0	9.0
CO	8 Hour	575	81.1	##	##
NO _x	24 Hour	14	12.3	1.5	##
Ozone (VOC)	1 Hour	*	3.0**	##	##
Mercury	24 Hour	0.25	9.3E-3	##	##
Fluorides	24 Hour	0.25	0.12	##	##
Lead	24 Hour	0.1	4.3E-3	##	##
Beryllium	24 Hour	5.0E-4	9.9E-5	##	##

* No value established. Ambient air standard: 235 ug/m³ not to be exceeded on more than an average of one day per year over a three year period.# Model analyses for SO₂ based on 2,100 TPD and 9% S. Concentrations for other pollutants based on their emissions ratio to SO₂.

** Assumes all VOC becomes ozone.

Less than de-minimus values at all distances greater than 0.6 km from the source. Minimum distance from RDF source to site boundary: 0.73 km.

SECTION 2.3.7.2 Ambient Air Quality

REVISED
TABLE
2.3-12

TABLE 2.3-12
SIGNIFICANT EMISSION RATES AND TOTAL FACILITY
POTENTIAL TO EMIT (THREE UNITS AT 600 TPD EACH)
VALUES FOR PSD REGULATED POLLUTANTS

Pollutant	Significant Emission* Rates (Tons/Year)	Potential to # Emit (Tons/Year)
Particulate Matter (TSP)	25	214
Carbon Monoxide (CO)	100	3,942
Nitrogen Oxides (NO _x)	40	1,314
Sulfur Dioxide (SO ₂)	40	2,957
Ozone (VOC)	40	65.6
Lead (Pb)	0.6	4.6
Asbestos	7.0 E-2	—
Beryllium (Be)	4.0 E-3	3.0 E-3
Mercury (Hg)	0.1	0.98
Vinyl Chloride	1.0	—
Fluorides	3.0	13.2
Sulfuric Acid Mist	7.0	0.131
Total Reduced Sulfur (including H ₂ S)	10	—
Reduced Sulfur (including H ₂ S)	10	—
Hydrogen Sulfide (H ₂ S)	10	—
Hydrogen Chloride	—	1,150
2,3,7,8-TCDD	—	1.8 E-5

* 17.2 (V) Table 500.2

1,800 TPD RDF fired (based on 3 units at 600 TPD each)

REVISED
TABLE
2.3-13

TABLE 2.3-13
COMPARISON OF IMPACT OF PALM BEACH COUNTY RDF FIRED
SPREADER STOKER FURNACES TO DE-MINIMUS LEVELS (ISC MODEL)
SIGNIFICANT MONITORING CONCENTRATIONS

Pollutant	Averaging Time	De-Minimus Guidelines ug/m ³	Highest 2nd High- est# Concentration ug/m ³	Distance (km) From Source to De-Minimus Level	
				High	H ₂ ndH
TSP	24 Hour	10	2.0	##	##
SO ₂	24 Hour	13	27.4	10.0	10.0
CO	8 Hour	575	78.6	##	##
NO _x	24 Hour	14	12.2	1.6	##
Ozone (VOC)	1 Hour	.	3.0**	##	##
Mercury	24 Hour	0.25	9.1E-3	##	##
Fluorides	24 Hour	0.25	0.12	##	##
Lead	24 Hour	0.1	4.3E-2	##	##
Beryllium	24 Hour	5.0E-4	2.7E-5	##	##

* No value established. Ambient air standard: 235 ug/m³ not to be exceeded on more than an average of one day per year over a three year period.

Model analyses for SO₂ based on 2,100 TPD and 9% lb/ton S. Concentrations for other pollutants based on their emissions ratio to SO₂.

** Assumes all VOC is OZONE.

Less than de-minimus values at all distances greater than 0.6 km from the source. Minimum distance from RDF source to site boundary: 0.73 km.

There are thirteen active ambient air quality monitoring sites with a range of 50 km from the proposed RDF facility. These sites are listed in Table 2.3-14. The maximum and second highest maximum concentrations and their sites as measured in 1983, are shown in Table 2.3-15 along with the Federal and Florida ambient air quality standards. It has been determined by the Florida DER that the existing monitoring facilities are sufficient to provide ambient air background in the study area. Pre-construction monitoring is not required.

**REVISED
TABLE
2.3-14**

**TABLE 2.3-14
MONITORING STATION LOCAL ADDRESSES, UTM COORDINATES AND LOCATION
(DISTANCE & ANGLE) RELATIVE TO THE PROPOSED PALM BEACH COUNTY RDF
FIRED WATERWALL FURNACE FACILITY**

(FACILITY UTM COORDINATES 2960180N; 585820E; UTM ZONE 17)

Site No.	Address (Monitoring Capability)	UTM Coordinates Zone 17	Distance From Proposed Facility (Meters)	Direction Relative To Proposed Facility (North = 0(360) Degrees (Degrees)
1	West Palm Beach Water Treatment Plant First St. & Tamarind Ave. West Palm Beach, Florida (CO, NO ₂ , Meteorology)	2955030N 0593232E	9,026	125
1A	Palm Beach County Health Dept. 901 Evernia Street West Palm Beach, Florida (Suspended Particulate)	2955030N 0593232E	9,026	125
2	North Palm Beach Water Treatment Plant 603 Anchorage Drive North Palm Beach, Florida (Suspended Particulate)	2965817N 0592780E	8,956	51
3	Lake Worth Water Treatment Plant 301-303 College Street Lake Worth, Florida (Suspended Particulate)	2943537N 0592793E	18,045	157
4	Delray Beach Water Treatment Plant 202 NW First Street Delray Beach, Florida (Suspended Particulate)	2927488N 0592195E	33,308	169

SECTION 2.3.7.2 Ambient Air Quality

REVISED
TABLE
2.3-14

TABLE 2.3-14
MONITORING STATION LOCAL ADDRESSES, UTM COORDINATES AND LOCATION
(DISTANCE & ANGLE) RELATIVE TO THE PROPOSED PALM BEACH COUNTY RDF
FIRE WATERWALL FURNACE FACILITY

(FACILITY UTM COORDINATES: 2960474N; 585820E; UTM ZONE 17)

Site No.	Address (Monitoring Capability)	UTM Coordinates Zone 17	Distance From Proposed Facility (Meters)	Direction Relative To Proposed Facility (North = 0(360) Degrees (Degrees)
1	West Palm Beach Water Treatment Plant First St. & Tamarind Ave. West Palm Beach, Florida (CO, NO ₂ , Meteorology)	2955030N 0593232E	9197	126
1A	Palm Beach County Health Dept. 901 Evernia Street West Palm Beach, Florida (Suspended Particulate)	2955030N 0593232E	9197	126
2	North Palm Beach Water Treatment Plant 603 Anchorage Drive North Palm Beach, Florida (Suspended Particulate)	2965817N 0592780E	8774	053
3	Lake Worth Water Treatment Plant 301-303 College Street Lake Worth, Florida (Suspended Particulate)	2943537N 0592793E	18316	153
4	Delray Beach Water Treatment Plant 202 NW First Street Delray Beach, Florida (Suspended Particulate)	2927488N 0592195E	33596	169

REVISED
TABLE
CONTINUED

TABLE 2.3-14 (Continued)

Site No.	Address (Monitoring Capability)	UTM Coordinates Zone 17	Distance From Proposed Facility (Meters)	Direction Relative To Proposed Facility (North = 0(360) Degrees (Degrees)
5	Boca Raton Fire Station #1 1151 North Federal Highway Boca Raton, Florida (Suspended Particulate)	2915768N 05913137E	44,750	173
6	Southwest Fire Department 1180 S. Military Trail West Palm Beach, Florida (Suspended Particulate)	2949018N 0588207E	11,414	168
7	College of Boca Raton 1151 North Federal Highway Boca Raton, Florida (Suspended Particulate)	2918354N 0587320E	41,853	178
8	South Florida Water Mgmt. Pump Station Twenty Mile Bend State Road 80 (Suspended Particulate, Ozone, Meteorology)	2951402N 0562879E	24,563	249
9	Pahokee Sewage Treatment Plant 1050 McClure Road Pahokee, Florida (Suspended Particulate)	2964200N 0532300E	53,671	274
10	Royal Palm Beach R.V. Area 10999 Okeechobee Blvd. Royal Palm Beach, Florida (Ozone, Meteorology)	2954150N 0578100E	9,796	232
11	Palm Beach County Health Department Warehouse 2030 Avenue "L" Riviera Beach, Florida (Sulfur Dioxide)	2962350N 0592480E	7,005	72
12	Belle Glade Health Dept. 1024 NW Avenue "D" Belle Glade, Florida (Suspended Particulate)	2953082N 0533160E	53,136	262

REVISED
TABLE
CONTINUED

TABLE 2.3-14 (Continued)

Site No.	Address (Monitoring Capability)	UTM Coordinates Zone 17	Distance From Proposed Facility (Meters)	Direction Relative To Proposed Facility (North = 0(360) Degrees (Degrees)
5	Boca Raton Fire Station #1 1151 North Federal Highway Boca Raton, Florida (Suspended Particulate)	2915768N 05913137E	45042	173
6	Southwest Fire Department 1108 S. Military Trail West Palm Beach, Florida (Suspended Particulate)	2949018N 0588207E	11702	168
7	College of Boca Raton S. Military Trail Boca Raton, Florida (Suspended Particulate)	2918354N 0587320E	42147	178
8	South Florida Water Mgmt. Pump Station Twenty Mile Bend State Road 80 (Suspended Particulate, Ozone, Meteorology)	2951402N 0562879E	24669	248
9	Pahokee Sewage Treatment Plant 1050 McClure Road Pahokee, Florida (Suspended Particulate)	2964200N 0532300E	53650	274
10	Royal Palm Beach R.V. Area 10999 Okeechobee Blvd. Royal Palm Beach, Florida (Ozone, Meteorology)	2954150N 0578100E	9980	231
11	Palm Beach County Health Department Warehouse 2030 Avenue "L" Riviera Beach, Florida (Sulfur Dioxide)	2962350N 0592480E	6919	074
12	Belle Glade Health Dept. 1024 NW Avenue "D" Belle Glade, Florida (Suspended Particulate)	2953082N 0533160E	53176	262

The Secondary shredder will be air swept and reduce the overs from the two stage rotary trommel. Optimum size will be determined but will be in a range from minus 2 by minus 2 by minus 2 to minus 4 by minus 4 by minus 4. The output of the secondary shredder and tramp materials from Section 2 of the trommel will be conveyed to a final screen from which the overs will be returned to the secondary shredder for reduction. The unders from this final screen will comprise the RDF stream for delivery to the RDF Energy Plant storage building.

The RDF stream from each line will discharge to a collection conveyor which will transfer to a combination tripper and shuttle conveyor system to build a storage pile of sufficient fuel for operation of the boilers for two days. The enclosed RDF storage building will have a fire protection system with sprinklers, hose racks, and smoke arrestors. Front end loaders will be used to maintain the storage pile and feed the boiler infeed conveyors.

The RDF will be combusted in waterwall spreader stoker furnace systems. Each independent boiler will be a natural circulation, drum type design provided with an economizer section for feedwater heating. The furnace feed system will consist of stokers of the pneumatic spreader type with continuous ash discharge, forward traveling grates and a wet trough drag conveyor residue system for handling bottom ash including siftings and flyash. The residue removal system will include 2 conveyors, each of which is designed to individually handle all the residue, siftings and flyash. Each conveyor system will consist of a drag chain and flights riding in a water trough with an inclined section to simultaneously dewater and elevate the residual solids for discharge from the ash pit. The ash will discharge into 40 CY open top ash trucks and be delivered to the Class I landfill for disposal.

The steam turbine-electric generating plant will be operated in conjunction with the boiler plant. The closed loop cooling system will utilize a cooling tower for dissipation of heat.

The 138 KV transmission line will link the switchyard at the resource recovery plant with Florida Power & Light's existing transmission lines. See Chapter 6 for details.

The ferrous fraction that has been recovered and stockpiled will be processed in the ferrous processing line. The process includes shredding, magnetic separation, air scrubbing, and baling of the cleaned ferrous to produce a #2 bundle.

The aluminum cans which will be hand picked will also be shredded in a separate process. They may also be baled for compaction or shipped shredded depending upon the market requirements.

3.1.2.2 The Landfills

UNCHANGED

The acreage requirements for support facilities associated with development of the proposed Resource Recovery Facility at the site such as the Class I landfill, Class III landfill, borrow lakes drainage and stormwater management systems, etc., have been estimated based on a number of assumptions, including the landfill operating periods, resource recovery plant startup and expansion dates, and South County Class III Landfill start-up date.

UNCHANGED

It appears that at the present rate of use the Dyer Boulevard Landfill will close in 1987. Therefore, all Class I and Class III waste managed by the Authority will be disposed in the new landfills possibly starting prior to closure of the Dyer facility. Under the

assumption that the Resource Recovery Facility landfills will both become operational in 1987, the new Class I and Class III landfills will be operated over the planned lifetime of the facility.

UNCHANGED

Once the resource recovery plant is operational, the Class I landfill will receive three types of wastes: ash, process rejects, and by-pass (unprocessed due to facility capacity or shutdown). The resource recovery plant will initially have capacity exceeding the incoming Class I waste quantity at plant startup in 1989, and again at expansion in 1999. In these instances some selected Class III material will be processed and combusted. Otherwise, Class III material will be landfilled.

REVISED**1**

The size of the landfills developed on the site will directly affect the acreage occupied by borrow lakes throughout the site development and at closure. The existing borrow lake will be expanded and several borrow lakes will be created on the site to support site preparation and landfill operation. It is estimated that approximately 12,860,000 cubic yards of sand/soil will be required to construct and operate the landfills on the site. Uses of the borrow material include: construction fill for landfill base, internal leachate containment berm construction, perimeter access roads construction, daily and/or intermediate cover for landfill lifts, and final cover landfill. The Dyer Boulevard Landfill will also continue to utilize borrow material from the existing lake on the site until landfill closure at the Dyer site is complete. This demand is estimated to equal approximately 1,630,000 cubic yards from July 1984 through closure (scheduled for late 1987).

REVISED**2**

In meeting the total demand for borrow material (14,490,000 cubic yards), approximately 243 acres will be occupied by borrow lakes (to be excavated to a depth of 50 feet) after the closure of the landfills on the site.

3.2 SITE LAYOUT

3.2.1 Layout of the Resource Recovery Plant

REVISED**1**

The general site development plan is shown in Figure 3.2-1, and depicts the conceptual building layout with the location of the stack where gaseous wastes leave the plant. All structures will be set back a minimum of 150 feet from all property lines, with the resource recovery plant and wastewater treatment plant set back a minimum of 450 feet. The total site area is approximately 40 acres.

UNCHANGED

The Authority, located in the Administration building, will operate the landfills, wastewater treatment plant, maintenance facilities, the water supply wells and the injection well for disposal of effluents. A full service contractor under contract to the Authority will operate the resource recovery plant. The facility design and layout coordinates for efficient operation (entrances, roadways, fences, retention basins, buffers, signs, etc.) of the separately operated units.

UNCHANGED

Figure 3.2-2 shows the profile of the resource recovery plant, which will be composed of three separate structures. The 250 foot high stack where gaseous waste leaves the plant is shown in relation to the surrounding structures.

UNCHANGED

Liquid wastes do not leave the site but will be disposed of by deep well injection. Refer to Section 3.5.1.5 and Appendix 10.8 for a detailed description.

SECTION 3.1.2.2 The Landfills

REVISED

1

The size of the landfills developed on the site will directly affect the acreage occupied by borrow lakes during site development and at closure. The existing borrow lake will be expanded and several borrow lakes will be created on the site to support site preparation and landfill operations. It is estimated that approximately 11,543,200 cubic yards of sand/soil will be required to construct and operate the landfills on the site. The borrow material will be used as construction fill for the landfill bases, internal leachate containment berms, and perimeter access roads; as daily and/or intermediate cover for landfill lifts; and as final cover for the landfills. The Dyer Boulevard Landfill will also continue to utilize borrow material from the existing lake on the site until landfill closure at the Dyer site is complete. This demand is estimated to equal approximately 1,630,000 cubic yards from July 1984 through closure (scheduled for late 1987). The resource recovery plant will require an estimated 402,400 cubic yards of construction fill.

REVISED

2

In meeting the total demand for borrow material (13,579,900 cubic yards), approximately 248 acres will be occupied by borrow lakes excavated to a depth of 50 feet after closure of the landfills on the site.

SECTION 3.2.1 Layout of the Resource Recovery Plant

REVISED

1

The general site-development plan is shown in Figure 3.2-1 and depicts the conceptual building layout with the location of the stack where gaseous wastes leave the plant. The total site area is approximately 40 acres.

3.2.2 Layout of the Landfills

UNCHANGED

The proposed preliminary site development plan for the site is shown in Figure 3.2-3. Space has been allocated for Class I and Class III landfills, the north-south roadway, borrow lakes, the resource recovery plant, a conservation area and perimeter buffer zones.

UNCHANGED

In accordance with the Water Quality Assurance Act of 1983, a landfill cannot be constructed within 3,000 feet of a Class I water body. Because the West Palm Beach Water Catchment Area (WCA) is classified as a Class I surface water body, all landfill activities must occur within the eastern 1,900 feet of the site in order to comply with these minimum setback requirements. The existing borrow lake in the northeast portion of the site will be expanded to allow maximum utilization of the designated area for dredging fill material to be used at the Dyer Boulevard Landfill as well as the landfill areas on the site.

UNCHANGED

The area of the site within the 3,000 foot setback from the WCA will be utilized to accommodate the resource recovery plant, the north-south roadway, additional borrow lakes, and a conservation area which includes wetlands mitigation and stormwater management. Two borrow lakes will be developed on the property south of 45th Street within the boundaries of the site, while allowing for the extension of the roadway south of 45th Street.

UNCHANGED

Within the limited area for landfill base available within the eastern region of the site which is suitable for waste disposal, the landfill height must be established to provide the volume required for 22 years of Class I landfill operation and 22 years of Class III landfill operation. Existing ground elevations on the site average + 17.5 feet NGVD (± 1 foot). The proposed peak final elevation of the designated Class I and Class III landfill areas is 130.0 feet NGVD.

UNCHANGED

The landfilling operation will be set back a minimum of 200 feet from all borrow lake/water body edges. Within this 200-foot-wide area the property will be graded, landscaped, and planted to buffer landfill and resource recovery plant operations from public view.

UNCHANGED

Site buffering will also be provided along the northern boundary of the site in keeping with one of the conditions that has been placed on the zoning special exception by the Palm Beach County Board of County Commissioners.

UNCHANGED

Natural site drainage is to the east. Site construction will alter this drainage pattern. However, any outfall from the site will ultimately flow to the eastern boundary of the site for release.

REVISED**1**

Maximum side slopes at time of closure on the landfill will be four horizontal to one vertical (4:1). With every 20-foot change of elevation incurred in landfill operation, a 30-foot drainage terrace will be accommodated. Drainage swales on the terraces will intercept stormwater runoff flowing down the side slopes and direct this flow to drainage spillways which will traverse the side slope and terminate at the base of the landfill, discharging intercepted runoff into a landfill perimeter canal. The landfill side slope will be vegetated to minimize erosion and filtration. The drainage terrace will be planted and landscaped to improve the appearance of the landfill. Stormwater runoff from the closed cells of the landfill, roadways, resource recovery plant and parking areas will be directed to sedimentation basins then released into wetland areas. Leachate generated from the landfills will be collected separately by the leachate collection system. (Section 3.5.6) A more complete description of the on-site stormwater management system is provided in Section 3.8.

UNCHANGED

Forty-Fifth Street will be used by waste collection/transfer vehicles to access the Resource Recovery Facility. The 45th Street right-of-way will be 120 feet wide. A turn lane

SECTION 3.2.2 Layout of the Landfills

REVISED

1

Stormwater runoff from the vegetated surfaces of the closed cells of the landfill will be relatively clean and free from turbidity. Stormwater runoff from the unvegetated active areas will be directed to temporary sedimentation basins located on land reserved for future landfill development. The velocity of the runoff through these basins will be low enough for particle settlement. The clean water will be routed to the perimeter ditches and ultimately conveyed/released into the wetland areas. Temporary turbidity control measures, such as the use of hay bales, will also be employed on an as-needed basis, or until sufficient vegetation is sustained in closed areas. Leachate generated from the landfills will be collected separately by the leachate collection system (see Section 3.5.6). A more complete description of the on-site stormwater management system is provided in Section 3.8.

will be provided at the site entrance. A north-south roadway will be constructed from 45th Street to the Beeline Highway. A 120-foot right-of-way for the roadway will be accommodated in the site layout.

UNCHANGED

Landfill access roads will be provided at the base of the landfill. The roadways will be 12 feet wide, with an 8-foot shoulder on each side and will have a design speed of 30 miles per hour. Roadways extending from the landfill base to the working face of the fill operation will have a maximum slope of seven percent (7%), a width of 40 feet, and a design speed of 20 MPH.

UNCHANGED

At least six acres of the site will be reserved to be conveyed to Fire Service at the time of closing. This parcel will probably be located near the intersection of the north-south roadway and the Beeline Highway. Approximately nine acres will be reserved in the vicinity of 45th Street for a Turnpike interchange.

UNCHANGED

The site will contain the following structures in addition to the Class I and Class III Landfills:

- Resource Recovery Plant
- Maintenance Building
- Administrative Building
- Wastewater Treatment Plant
- Scale House
- Potable Water Storage Tank
- Hazardous Waste Storage and Transfer Building
- Electrical Substation

UNCHANGED

It is planned that there be three entrances from the north-south roadway: to the administration building; to the maintenance building (controlled gate); and to the scale house, resource recovery plant, citizen's convenience area, and landfills.

UNCHANGED

This separation allows public and employee access to the Administration complex without mixing with refuse delivery vehicles. Also, the service vehicles with business in the maintenance area would have separate access through a controlled gate. A parking area will be provided in the vicinity of resource recovery plant. The number of parking spaces provided will accommodate resource recovery plant personnel and landfill personnel. Shift overlap will be considered. A parking area will be provided near the administration building to accommodate administrative personnel and visitors.

UNCHANGED

The structures have been located to preserve wetlands, woodlands, and ponds to present an attractive appearance. The site will be graded, landscaped, and bermed to provide screening where needed.

3.3 FUEL

Diesel fuel will be stored on-site in the designated maintenance area to be utilized by the vehicles operating at the resource recovery plant and the landfills. Areas in which fuels are stored and dispensed will be equipped with emergency sumps from which any spilled fuels can be collected and then properly disposed.

The generating plant will use refuse derived fuels (RDF) for combustion which will be manufactured from MSW as discussed in Section 3.1.2.1. No provision is made for auxiliary fuel, except for natural gas which is expected to be used for a start-up fuel. With the

UNCHANGED

Routine inspections of the site will occur as a result of various other monitoring programs. It is anticipated that evaluation of the general ecological conditions of the site will be made coincidentally to these other monitoring programs. Efforts will be made to ensure that individuals making these inspections report any disturbance such as disease or pest outbreaks to appropriate persons in the Solid Waste Authority for corrective measures.

INSERT
1-2

4.5 AIR IMPACT

4.5.1 Landfill Construction

This has been discussed thoroughly in Section 3.4.2.

4.5.2 Resource Recovery Plant Construction

4.5.2.1 Emission Rates

Construction activities have the potential for causing localized, short-term adverse air quality impacts. Possible impacts include: fugitive dust emissions from land clearing and site preparation activities, and mobile source emissions from construction at the construction site.

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

The emissions from present construction across the Turnpike at the Dyer Boulevard Landfill site for expansion and closure would approximate what might be expected at the new site, and therefore not further degrade air quality in the general area.

4.5.2.2 Mitigating Measures for Particulate Emissions

The construction site is located in an attainment area. The emissions are expected to have a short term impact that are typical of those found with other construction activities.

Construction requirements for fill and concrete will result in truck traffic along the site access road. This makes the unpaved roads a source of particulate matter. Several mitigating measures are available to reduce these emissions. Routine watering of the roadway will provide a reduction of roadway emissions of about 50 percent. A watering truck is usually on site for various other activities. Partial dedication of this truck or the addition of a second truck will be accomplished. Surface treatment with penetrating chemicals would provide a 50 percent reduction depending on the frequency of application. The application of penetrating chemicals is more costly than a routine watering but fewer applications are required. The purchase of chemicals, time to mix the chemicals, and the partial use of a watering truck or some other vehicle would contribute to the cost. Soil stabilization alone

SECTION 4.4.2 Measuring and Monitoring Programs

INSERT

1

In addition to the general monitoring program discussed in Section 2.3.6.3, the Authority will conduct a monitoring program specifically concerned with the impact of the construction and operation of the proposed facilities on the roost/rookery. This program will be developed in cooperation with the USFWS and FGFWFC and will incorporate their comments and suggestions where feasible. It is anticipated that routine surveys will be conducted to assess species composition, population levels and activity in the roost/rookery.

INSERT

2

Results of the monitoring program will be provided to the USFWS and FGFWFC. In the event of unexplained or unexpected negative responses concerning the bird populations, the Authority will coordinate its responses and activities with the appropriate agencies.

It will be the responsibility of the facility operator to determine if the ash residue is classified as hazardous according to EPA or DER regulations. Experience at other similar facilities has shown that the bottom and fly ash can pass the EP toxicity test; i.e., considered a non-hazardous waste material. This waste material would be suitable for disposal in a permitted Class I sanitary landfill.

A chemical analysis of the combustion residue will be conducted after commencement of operation to ensure compatibility for disposal in a sanitary landfill.

5.5 SANITARY AND OTHER WASTE DISCHARGES

Solid waste generated by plant operations (employee refuse, packaging materials, etc.) will be collected in receptacles located throughout the plant and fed into the main solid waste stream. All sanitary wastewater will be treated and disposed of as described in Section 3.5.2.

5.6 AIR QUALITY IMPACTS

5.6.1 Impact Assessment

Air quality modeling analysis was conducted in three phases: screening, refined-RDF facility only, and refined-RDF facility plus other sources. Screening analyses were used to determine operational worst-case load conditions for the RDF facility, to identify those pollutants which had significant impacts, to locate the area(s) of maximum probable impact, and to define the screening area. The screening was performed using hypothetical meteorological data. EPA Models PTPLU and PTDIS were used for screening purposes. Based on the significant levels as defined in Table 5.6-1, there were no significant impacts at distances greater than 25 kilometers from the source.

REVISED
1

REVISED
TABLE
5.6-1

TABLE 5.6-1
SIGNIFICANCE LEVELS FOR AIR QUALITY IMPACTS

Pollutant	Averaging Time	Sign. Level Conc. (ug/m ³)	Distance (km) from source To Significance Level	
			Highest	High Second High
Sulfur Dioxide	3 Hour	25	24.5	9.0
	24 Hour	5	25.0	20.0
	Annual	1	15.0	NA
Total Suspended Particulate	24 Hour	5	#	#
	Annual	1	#	NA
Nitrogen Dioxide	Annual	1	5.0	NA
Carbon Monoxide	8 Hour	2,000	#	#
	Annual	500	#	NA

NA Not Applicable.

Less than significant levels at all distances. Minimum boundary line distance from RDF Source: 0.73 km.

SECTION 5.6.1 Impact Assessment

REVISED

1

An air-quality modeling analysis was conducted in three phases: screening, refined-RDF facility only, and refined-RDF facility plus other sources. Screening analyses were used to determine operational worst-case load conditions for the RDF facility, identify those pollutants which had significant impacts, locate the area(s) of maximum probable impact, and define the screening area. The screening was performed using hypothetical meteorological data. EPA Models PTPLU and PTDIS were used for screening purposes. Based on the significant levels of pollutants as defined in Table 5.6-1, there were no significant impacts at distances equal to or greater than 25 kilometers as determined from all modeling efforts.

REVISED

TABLE

5.6-1

TABLE 5.6-1
SIGNIFICANT LEVELS FOR AIR QUALITY IMPACTS

Pollutant	Averaging Time	Sign. Level Conc. (ug/m ³)	Distance (km) from Source To Significance Level	
			Highest	High Second High
Sulfur Dioxide	3 Hour	25	25.0	15.0
	24 Hour	5	25.0	20.0
	Annual	1	15.0	NA
Total Suspended Particulate	24 Hour	5	#	#
	Annual	1	#	NA
Nitrogen Dioxide	Annual	1	5.0	NA
Carbon Monoxide	8 Hour	2,000	#	#
	Annual	500	#	NA

NA Not Applicable

Less than significant levels at all distances. Minimum boundary line distance from RDF Source: 0.73 km.

Principal Findings

REVISED

1

The presence of extensive wetlands within a five mile radius of the site increases the possibility that important species associated with wetlands may occur. A population of Snail Kites, listed as an endangered species by the United States Fish and Wildlife Service and the Florida Game and Fresh Water Fish Commission, has been discovered roosting on the site. The roosting area has been designated as a unique habitat, and all measures to preserve this area and maintain foraging areas for the Kites have been taken. Except for the Snail Kite, plant and animal populations which utilize the site are present in approximately equal amounts in any similar area in the region. Hence, although development of the Resource Recovery Facility will have a significant effect on the ecology of the site, it will not pose a threat to any plant or animal communities.

**REVISED
2**

A minimum distance of 730 meters has been designated from the source itself to the source property boundary line. The distance of the source to its property boundary line is a variable based on direction. The maximum distance is approximately 3,000 meters to the north of the source.

UNCHANGED

Subsequent refined modeling was accomplished including three additional major emission sources with an area of 25 kilometers relative to the proposed facility. These sources and their emissions characteristics were provided by the Florida DER. Two analyses were accomplished with these sources:

- Effect of proposed source on existing sources.
- Effect of existing sources downwind of the proposed site.

UNCHANGED

An additional screening area was, however, defined for additional sources to be considered for inclusion in subsequent refined modeling analyses. This area extended to at least 50 kilometers (31 miles) from the applicant's source.

UNCHANGED

Refined modeling was accomplished using EPA's Industrial Source Complex Model (ISC) in both its short and long term form. The refined modeling used five years of meteorological data for the years 1970-1974. Surface weather data were from the climatological record of the Palm Beach International Airport and the appropriate upper air data were from the climatological records of the Miami International Airport. These data were supplied in pre-processed format by the Florida DER.

UNCHANGED

The initial refined modeling was restricted to impact determination from the RDF facility. A detailed discussion of the procedures and results are contained in Appendix 10.1.5.

UNCHANGED

All impacts were determined for the pollutant sulfur dioxide (SO_2). Impact concentrations for all other pollutants were determined by adjustment of SO_2 impacts by the emission rate of the pollutants to the emission rate of SO_2 .

UNCHANGED

The air quality standards as noted in Table 2.3-14 are not violated until a receptor exceeds the relevant standard twice in a given year. Therefore, the highest value is not the value compared to the air quality standards. The next highest value, or "highest second highest value," is the one for which impact is evaluated. Hence, the highest second highest impact concentrations have been chosen for presentation, although the highest values were determined and have been presented in Appendix 10.1.5.

UNCHANGED

Sulfur dioxide (SO_2) is the only pollutant whose impact exceeds significant levels (Sec. 2.3.7.2). PSD (Prevention of Significant Deterioration) regulations have established limits for increases in concentrations of two pollutants, total suspended particulate and sulfur dioxide. The maximum limits are shown in Table 5.6-2. These values may be decreased by any major sources constructed since January 6, 1975 and to the extent that these increments will cause or accelerate violations of applicable ambient air quality standards. In a given area, the starting point for tracking of PSD increment consumption is the date after January 6, 1975 on which the first PSD source permit application was submitted for regulatory review. This date defines the base line for the given area. No major source has triggered a base line date in Palm Beach County. On this basis, the full increment is available provided the ambient air quality standards are not jeopardized.

UNCHANGED

Figure 5.6-1 shows the percent of SO_2 PSD increment consumed by the proposed RDF source at the point of maximum composite impact (RDF facility plus other major sources).

SECTION 5.6.1 Impact Assessment

REVISED

2

A minimum distance of 730 meters has been designated from the source itself to the source-property boundary line. The distance of the source to its property boundary line is a variable based on direction. The maximum distance is approximately 2,700 meters to the north of the source.

TABLE 5.6-2
ALLOWABLE PSD INCREMENTS
($\mu\text{g}/\text{m}^3$)

	Class I Area	Class II Area	Class III Area
Sulfur Dioxide			
* Annual	2	20	40
* 24-Hour	5*	91*	182*
* 3-Hour	25*	512*	700*
Total Suspended Particulate Matter			
* Annual	5	19	37
* 24-Hour	10*	37*	75*

* Not to be exceeded more than once a year.

UNCHANGED

Figure 5.6-2 shows the percent the proposed source will effect the appropriate Federal and Florida ambient air quality standards for SO_2 at the point of maximum facility and major sources impacts when combined with the highest second highest concentrations measured locally in 1983.

REVISED 3

As shown in Figure 5.6-1, the proposed RDF facility itself will consume approximately 10% of the available 3 hour PSD increment and 25% or less of the 24 hour and annual increments at the point of maximum combined impact. In relation to the Florida SO_2 ambient air quality standards, the proposed source will be an increase of only 4-8% in the background concentrations at the point of maximum combined sources impact.

UNCHANGED

Assuming that all VOC emissions are converted to ozone, the maximum 1 hour source impact in any year would be .002 ppm. Based on local 1982-83 ambient air quality data as background, this maximum impact would not exceed the ozone standard.

REVISED 4

There are no existing legal ambient air quality standards for the compound 2,3,7,8-TCDD. The New York State Department of Environmental Conservation in its Air Guide No. 1 (revised 12/15/83) has recommended an acceptable ambient air level (AAL) on an annual average basis of $9.2 \times 10^{-8} \mu\text{g}/\text{m}^3$. The maximum annual impact generated by the conservative assumptions of this report is $3.4 \times 10^{-8} \mu\text{g}/\text{m}^3$.

UNCHANGED

Based on conservative assumptions, the proposed RDF facility will not significantly increase background levels of criteria or designated pollutants beyond the boundaries of the facility complex, with the exception of SO_2 , and then only to the extent as has been noted. On an annual basis, all impacts on the West Palm Beach Catchment Basin area will be less than any established de-minimus levels.

SECTION 5.6.1 Impact Assessment

REVISED

3

As shown in Figure 5.6-1, the proposed RDF facility will consume approximately 9% of the 3-hour PSD increment, and 10% and 19% of the 24-hour and annual PSD increments at the point of maximum combined impact. In relation to the Florida SO₂ ambient air-quality standards, the proposed source will be an increase of only 3-7% in the background concentrations at the point of maximum combined-sources impact.

REVISED

4

There are no existing legal ambient air-quality standards for the compound 2,3,7,8-TCDD. The New York State Department of Environmental Conservation in its Air Guide No. 1 (revised 12/15/83) has recommended an acceptable ambient air level (AAL) on an annual average basis of 9.2×10^{-8} ug/m³. The maximum annual impact generated by the conservative assumptions of this report is 3.6×10^{-8} ug/m³.

**INSERT
SECTIONS**

5.6.1.1-5.6.1.1.3

5.6.2 **Monitoring Programs****UNCHANGED**

The Monitoring Stations listed in Table 2.3-14 will continue to monitor ambient air quality after the resource recovery plant begins operations. No significant change in the program for collecting data will be expected or needed.

UNCHANGED

Stack monitoring equipment shall be provided to continuously monitor carbon monoxide, oxygen, SO₂, NO_x, and opacity. This equipment is described in Section 3.4.1.4.4.5 (Control Loops, 4. Combustion Quality Control). The equipment shall be installed, calibrated and maintained in accordance with FAC 17-2.710 and 40 CFR 51, Appendix P. Compliance Testing shall be in accordance with FAC 17-2.700 and 40 CFR 60.

**REVISED
TABLE
5.6-3**

**TABLE 5.6-3
SUMMARY OF MAXIMUM AIR QUALITY IMPACTS OF THE
PROPOSED PALM BEACH COUNTY WASTE TO ENERGY FACILITY**

Pollutant	FL Ambient Air Quality Standard (ug/m ³)	Prevention of Significant Deterioration (PSD) Increment (ug/m ³)	Background Concentration (ug/m ³)(2)	Palm Beach County Waste to Energy Facility Impact (ug/m ³)(3)	Total Point Source Impact (ug/m ³)(5)
SULFUR DIOXIDE					
Max 3-Hour Concentration	1,300 (1)	512	63	72	277
Max 24-Hour Concentration	260 (1)	91	29	28	68
Annual Arithmetic Mean	60	20	7	4	15
PARTICULATE MATTER					
Max 24-Hour Concentration	150 (1)	37	107	2	NC
Annual Geometric Mean	60	19	43	0.3	NC
NITROGEN DIOXIDE					
Annual Arithmetic Mean	100	No Standard	20	2	22 (6)
OZONE					
Daily Max 1-Hour Concentration	235 (1)	No Standard	172	NE	NA
LEAD					
Quarterly Arithmetic Mean	1.5	No Standard	NM	4.3E-03 (4)	1.1E-02 (4)
CARBON MONOXIDE					
Max 1-Hour Concentration	40,000 (1)	No Standard	9,943	182	NC
Max 8-Hour Concentration	10,000 (1)	No Standard	4,500	81	NC

NA = Not Applicable; NC = Not Calculated Since Proposed Facility's Impact is Below Significance Level;
NE = Not Emitted; NM = Not Monitored.

1. Concentration limits not to be exceeded more than once per year.
2. Background information is based upon data compiled by the Palm Beach County Annual Report Dated 1983.
3. Detailed modeling results for the proposed source covering 5 years of hourly meteorological data.
4. Quarterly mean not generated. Value cited is 24-hour maximum 2nd-high.
5. Total impacts are inclusive of the proposed source.
6. Total impacts were assumed to be equal to background levels since NO₂ emission levels of other sources were not readily available and the proposed source's impact was virtually at the significance level (1.6 ug/m³ vs. 1.0 ug/m³).

SECTION 5.6.1.1 Class I Impact Analyses

INSERT
SECTION
5.6.1.1

Computer analyses have been executed using the EPA ISCST Model for the meteorological years 1970-1974. The proposed RDF source has been located at the UMT coordinates 2960474N, 0585820E, Zone 17. The nearest Class I area, Everglades National Park is located, at its closest point, at UMT coordinates 2848635N, 0533619E, Zone 17. This site was included in the modeling as a discrete receptor. The modeling was based on hourly meteorological data obtained from Palm Beach International Airport, West Palm Beach, Florida. It was assumed that these meteorological conditions changed between the RDF source and the Everglades National Park receptor point. The receptor is on a bearing of 205° and at a distance of approximately 123 km (76 miles) from the proposed facility. This distance is substantially greater than the 50 km range that is normally considered as the range of validity for most models. For additional conservatism, no decay of pollutants was considered.

SECTION 5.6.1.1.1 Sulfur Dioxide Impaction

INSERT
SECTION
5.6.1.1.1

The SO₂ maximum impaction values [highest second highest (HSH) for 3-hour and 24-hour averaging periods and highest annual] are tabulated in Table 5.6.1.1.1-1 for the proposed RDF facility and for the RDF facility combined with existing local sources.

Based on the modeling and its assumptions, Table 5.6.1.1.1-1 indicates that the combined-source impactions exceeded significant 3-hour impact levels in 1970, 1971 and 1973. The significant impact for the 24-hour averaging period with the combined sources was exceeded in 1970. The combined sources did not exceed the annual average. In instances where the impact level was exceeded, the proposed RDF source was not a contributing factor. The impact of the RDF is at less than significant levels for all averaging periods in pollutant parameters.

The proposed RDF facility will not cause existing sources to exceed levels of significant impact and PSD increments to the Everglades National Park Class I, nor will the proposed RDF facility significantly exacerbate those instances where the impact would be exceeded as projected from existing sources.

TABLE 5.6.1.1.1-1

RDF AND COMBINED SOURCES
 MAXIMUM PROJECTED HIGHEST SECOND HIGHEST (HSH)
 SO₂ IMPACT CONCENTRATIONS (μgm^{-3})
 ON EVERGLADES NATIONAL PARK
 (BEARING 205° FROM RDF AT 123 KM)

<u>YEAR</u>		<u>FDER</u> <u>AAQS</u>	<u>SIGNIF</u> <u>IMPACT</u> (2)	<u>MAX</u> <u>PSD</u> (2)	<u>PROPOSED</u> <u>RDF</u>	<u>PERCENT</u> <u>SIGNIF.</u>	<u>COMBINED</u> <u>SOURCES</u>	<u>PERCENT RDF</u> <u>CONTRIBUTION</u> (3)
1970	HSH 3 HR	1300(1)	25	25	4.16	16.6	44.7	9.3
	HSH 24 HR	260(1)	5	5	0.57	11.4	6.3	9.0
	ANNUAL	60	1	2	0.014	1.4	2.3E-1	6.0
1971	HSH 3 HR	1300(1)	25	25	1.53	6.1	35.6	4.3
	HSH 24 HR	260(1)	5	5	0.19	3.8	4.4	4.3
	ANNUAL	60	1	2	0.005	0.5	1.7E-1	3.0
1972	HSH 3 HR	1300(1)	25	25	3.87	15.5	19.9	19.4
	HSH 24 HR	260(1)	5	5	0.60	12.0	3.7	16.4
	ANNUAL	60	1	2	0.016	1.6	1.8E-1	8.7
1973	HSH 3 HR	1300(1)	25	25	2.71	10.8	75.9	3.6
	HSH 24 HR	260(1)	5	5	0.34	6.8	3.0	11.3
	ANNUAL	60	1	2	0.009	0.9	1.7E-1	5.4
1974	HSH 3 HR	1300(1)	25	25	2.57	10.3	19.8	13.0
	HSH 24 HR	260(1)	5	5	0.32	6.4	2.5	13.0
	ANNUAL	60	1	2	0.008	0.8	1.4E-1	5.8

NOTE 1: Not to be exceeded more than once per year

NOTE 2: Class I

NOTE 3: The percentages are based on the highest second high values (HSH) as tabulated. The maximum HSH impact values for the RDF and the combined sources were not generated on the same meteorological day. It is assumed, therefore, that the RDF impact concentration contribution to the maximum HSH impact of the combined sources will always be less than the maximum HSH impact concentration shown for the RDF source itself.

SECTION 5.6.1.1.2 Other Pollutants

INSERT
SECTION
5.6.1.1.2

The emission ratios of the pollutants nitrogen dioxide and total volatile organics relative to sulfur dioxide can be used to generate the maximum RDF facility impact of these pollutants at its closest receptor point in the Everglades National Park. These results are summarized below:

<u>Average Interval</u>	<u>Pollutant Concentrations (ugm^{-3})</u>	
	<u>Nitrogen Dioxide</u>	<u>Total Volatile Organics</u>
3 hour*	1.8	9.2E-2
24 hour*	0.3	1.3E-2
Annual	7.0E-3	3.5E-4

* Highest second highest value.

A significant impact level exists only for the nitrogen dioxide annual average. This value is 1.0 ugm^{-3} . The projected impact from the proposed RDF source is only 0.7% of this value and is negligible relative to the FDER AAQS of 100 ugm^{-3} .

The projected impacts shown above are negligible with respect to ozone formation in the Park.

SECTION 5.6.1.1.3 Visibility Screening

INSERT
SECTION
5.6.1.1.3

A visibility screening analysis has been performed based on the instructions for Level-1 Screening Analysis as available in Latimer and Ireson, Workbook for Estimating Visibility Impairment, Draft, July, 1980.

Emission factors for this analysis have been derived from Section 2.3.7.2, Table 2.3-12.

The absolute values of the contrast parameters obtained were significantly less than the critical level of 0.1 at a distance of 120 km from the proposed facility (see Table 5.6.1.1.3-1).

TABLE 5.6.1.1.3-1

SCREENING ANALYSIS
VISIBILITY LEVEL ONE

DIST. TO LVL. I AREA	BKGND VISUAL RANGE	SIGMA Z AT STABL: F
120. KM	40. KM	100. M
MASS EMISSIONS: MTPD	OPTICAL THICKNESS:	CONTRAST PARAMETER:
0.531 QPAR	0.00885 PART	-0.000883 CSKY
3.265 QNOX	0.00925 NO2	-0.000008 CTER
7.348 QS02	0.00431 ASOL	0.001581 CS/T

SECTION 5.6.2 MONITORING PROGRAM

REVISED
TABLE
5.6-3

TABLE 5.6-3
SUMMARY OF MAXIMUM AIR QUALITY IMPACTS OF THE
PROPOSED PALM BEACH COUNTY WASTE-TO-ENERGY FACILITY

	FL Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$)	Prevention of Significant Deterioration (PSD) Increment ($\mu\text{g}/\text{m}^3$)	Background Concentration ($\mu\text{g}/\text{m}^3$)(2)	Palm Beach County Waste to Energy Facility Impact ($\mu\text{g}/\text{m}^3$)(3)	MAXIMUM Total Point Source Impact ($\mu\text{g}/\text{m}^3$)(5) (3)	
					TOTAL	REF INCR.
SULFUR DIOXIDE						
Max 3-Hour Concentration	1,300 (1)	512	63	76.7	495	45
Max 24-Hour Concentration	260 (1)	91	29	27.4	85.6	8.7
Annual Arithmetic Mean	60	20	7	3.8	12.7	3.8
PARTICULATE MATTER						
Max 24-Hour Concentration	150 (1)	37	107	2	NC	
Annual Geometric Mean	60	19	43	0.28	NC	
NITROGEN DIOXIDE						
Annual Arithmetic Mean	100	No Standard	20	1.7	5.6 (6)	
OZONE						
Daily Max 1-Hour Concentration	235 (1)	No Standard	172	NE	NA	
LEAD						
Quarterly Arithmetic Mean	1.5	No Standard	NM	4.3E-02 (4)	0.11 (6)	
CARBON MONOXIDE						
Max 1-Hour Concentration	40,000 (1)	No Standard	9,943	182	NC	
Max 8-Hour Concentration	10,000 (1)	No Standard	4,500	78.6	NC	

NA = Not Applicable; NC = Not Calculated Since Proposed Facility's Impact is Below Significance Level; NE = Not Emitted; NM = Not Monitored.

1. Concentration limits not to be exceeded more than once per year.
2. Background information is based upon data compiled by the Palm Beach County Annual Report Dated 1983.
3. Detailed modeling results for the proposed source covering 5 years of hourly meteorological data.
4. Quarterly mean not generated. Value cited is 24-hour maximum 2nd-high.
5. Total impacts are inclusive of the proposed source.
6. Total impacts assume same emission factor for all sources applied to annual averages.

REVISED
TABLE
5.6-4

TABLE 5.6-4
MAXIMUM PROJECTED IMPACTS ON
PALM BEACH COUNTY AIR QUALITY MONITORING SITES

Site No.	Saroad No.	(ug/m ³) Parameter	Aver. Period	Summary of Ambient Air Data				RDF Source Max. Impact	
				1982		1983		H	HSH
				H	HSH	H	HSH		
11	3840-003-G	SO ₂	3 Hr	140	112	65	63	24.0	21.0
			24 Hr	112	53	40	29	6.0	5.9
			Annual	10	NA	7	NA	0.32	NA
1A	4760-003-G	TSP	24 Hr	72	60	124	103	0.55	0.45
			Annual	33	NA	33	NA	0.03	NA
2	3060-001-G	TSP	24 Hr	59	59	117	101	0.37	0.32
			Annual	26	NA	26	NA	0.02	NA
3	2220-001-G	TSP	24 Hr	121	95	130	98	0.31	0.26
			Annual	35	NA	35	NA	0.02	NA
4	1000-002-G	TSP	24 Hr	76	74	126	107	0.15	0.13
			Annual	33	NA	34	NA	0.01	NA
5	0280-001-G	TSP	24 Hr	70	69	134	90	0.21	0.15
			Annual	33	NA	33	NA	0.01	NA
6	0280-002-G	TSP	24 Hr	62	56	116	82	0.44	0.32
			Annual	25	NA	27	NA	0.02	NA
7	3340-001-G	TSP	24 Hr	85	79	100	86	0.15	0.13
			Annual	39	NA	38	NA	0.00	NA
8	3420-006-G	TSP	24 Hr	72	70	122	104	0.30	0.25
			Annual	36	NA	40	NA	0.03	NA
9	3420-006-G	TSP	24 Hr	128	50	73	69	0.29	0.17
			Annual	24	NA	25	NA	0.02	NA
12	0240-003-G	TSP	24 Hr	87	81	102	84	0.17	0.17
			Annual	45	NA	43	NA	0.01	NA
1	4760-001-G	NO ₂	Annual	-	NA	20	NA	0.20	NA
1	4760-001-G	CO	1 Hr	24E3	20E3	10E3	10E3	0.07	0.06
			8 Hr	9E3	8E3	8E3	8E3	0.02	0.02

Site No.	Saroad No.	(ug/m ³) Parameter	Aver. Period	Summary of Ambient Air Data						RDF Source*	
				1982			1983			H	HSH
				H	HSH	HTH	H	HSH	HTH		
8	3420-006-G	Ozone	1 Hr	.08	.08	.08	.09	.08	.07	3.4E-4	2.7E-4
10	3420-007-G	Ozone	1 Hr	.12	.09	.09	.09	.09	.08	5.6E-4	3.4E-4

H Highest

HSH Highest Second Highest

HTH Highest Third Highest

NA Not Applicable

* Assumes total conversion of volatile organics to ozone.

5.7 NOISE

5.7.1 Noise from On-Site Sources

UNCHANGED

The on-site ambient noise level for the Resource Recovery Facility is not expected to exceed 76 dBA, according to the Environmental Noise Study (Appendix 10.15). Taking into consideration the nature of sound propagation from the facility site, areas at distances of greater than some 300 feet from the facility are expected to experience insignificant changes in their ambient noise levels. Noise levels from the facility would then be reduced to levels in the range of 50 dBA or less. These sound levels would be comparable to or less than presently existing traffic noise levels in areas in the vicinity of the site.

SECTION 5.6.2 Monitoring Programs

REVISED
TABLE
5.6-4

TABLE 5.6-4
MAXIMUM PROJECTED IMPACTS ON
PALM BEACH COUNTY AIR QUALITY MONITORING SITES

Site No.	SARoad No.	(ug/m ³) Parameter	Aver. Period	Summary of Ambient Air Data				RDF Source Max. Impact	
				1982	1983	1982	1983	H	HSH
11	3840-003-G	SO ₂	3 Hr	140	112	65	63	26.0	21.6
			24 Hr	112	53	40	29	6.2	5.2
			Annual	10	NA	7	NA	0.28	NA
1A	4760-003-G	TSP	24 Hr	72	60	124	103	0.58	0.48
			Annual	33	NA	33	NA	0.03	NA
2	3060-001-G	TSP	24 Hr	59	59	117	101	0.42	0.33
			Annual	26	NA	26	NA	0.02	NA
3	2220-001-G	TSP	24 Hr	121	95	130	98	0.30	0.23
			Annual	35	NA	35	NA	0.01	NA
4	1000-002-G	TSP	24 Hr	76	74	126	107	0.14	0.13
			Annual	33	NA	34	NA	0.01	NA
5	0280-001-G	TSP	24 Hr	70	69	134	90	0.21	0.15
			Annual	33	NA	33	NA	0.01	NA
6	0280-002-G	TSP	24 Hr	62	56	116	82	0.43	0.31
			Annual	25	NA	27	NA	0.02	NA
7	3340-001-G	TSP	24 Hr	85	79	100	86	0.15	0.13
			Annual	39	NA	38	NA	0.00	NA
8	3420-006-G	TSP	24 Hr	72	70	122	104	0.25	0.24
			Annual	36	NA	40	NA	0.02	NA
9	3420-006-G	TSP	24 Hr	128	50	73	69	0.30	0.17
			Annual	24	NA	25	NA	0.01	NA
12	0240-003-G	TSP	24 Hr	87	81	102	84	0.17	0.17
			Annual	45	NA	43	NA	0.01	NA
1	4760-001-G	NO ₂	Annual	-	NA	20	NA	0.20	NA
1	4760-001-G	CO	1 Hr	24E3	20E3	10E3	10E3	66.7	58.1
			8 Hr	9E3	8E3	8E3	8E3	20.1	16.7

Site No.	SARoad No.	(PPM) Parameter	Aver. Period	Summary of Ambient Air Data						RDF Source* Max. Impact	
				1982	1983	1982	1983	1982	1983	H	HSH
8	3420-006-G	Ozone	1 Hr	.08	.08	.08	.09	.08	.07	4.3E-4	3.1E-4
10	3420-007-G	Ozone	1 Hr	.12	.09	.09	.09	.09	.08	4.7E-4	3.9E-4

H Highest

HSB Highest Second Highest

HTH Highest Third Highest

NA Not Applicable

* Assumes total conversion of volatile organics to ozone.

APPENDIX 10.1.5

PREVENTION OF SIGNIFICANT DETERIORATION

**UPDATE TO THE APPLICATION
DECEMBER 2, 1985**

PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE-TO-ENERGY FACILITY

REPORT ON AIR QUALITY IMPACTS ANALYSIS

November, 1984

Revised: March, 1985

Revised: December, 1985

PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE-TO-ENERGY FACILITY
REPORT ON AIR QUALITY IMPACTS ANALYSIS

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PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE-TO-ENERGY FACILITY

REPORT ON AIR QUALITY IMPACTS ANALYSIS

1.0 INTRODUCTION

The Palm Beach County Solid Waste Authority (PBCSWA) intends to construct a Resource Recovery Facility designed to convert 2000 tons per day (tpd) of municipal solid waste (MSW) into electricity for sale to the Florida Power and Light utility grid. This report describes the technical analyses that have been performed to determine the air quality impact of the proposed facility. Such analyses are required as a condition for obtaining a permit to construct and operate facilities that may emit air pollutants. The analyses reported upon herein have been performed in accordance with the requirements and specifications of the Florida Department of Environmental Regulation (FDER) and the United States Environmental Protection Agency (EPA).

This section of the report contains a brief description of the proposed facility, its location, the study area for air quality impacts produced by the proposed facility, and the current attainment status of the air quality standards in the study area. Section 2.0 provides a discussion of how state and federal laws and regulations regarding prevention of significant Deterioration (PSD) in air quality apply to the proposed facility. Section 3.0 is the analysis of the Best Available Control Tech (BACT). In Section 4.0, the pollutants that will be emitted by the proposed facility are identified and the pollutant emission rates are quantified. Section 5.0 presents a discussion of the dispersion modeling analyses that have been performed to determine the air quality impacts of the proposed facility and provides a detailed review of modeling results. Section 6.0 is a summary and conclusions of this report regarding the air quality impact of the proposed Palm Beach County Solid Waste-to-Energy Facility. Section 7.0 provides references utilized for this report.

1.1 Source Description

The initial Resource Recovery Facility construction involves the installation of 2000 TPD of MSW processing capacity. Within 5 years of initial construction an additional 1000 tpd of MSW processing capacity is planned. Accordingly, the PBCSWA and its consultants considered it prudent to file for permits for the ultimate plant capacity of 3000 tpd of MSW.

The MSW will be processed from 4500 Btu/lb heterogeneous MSW into a more homogenous 6200 Btu/lb Refuse Derived Fuel (RDF) in an RDF Manufacturing Facility located on a common site with the combustion facility. Table 1-1 provides a breakdown of MSW components and heating values. Table 1-2 provides a breakdown of RDF components and heating values. 1800 tpd₇ of RDF will be produced by the RDF Manufacturing Plant from the 3000 tpd₆ of MSW.

1.2 Source Location

The proposed waste-to-energy facility for Palm Beach County will be located on a 1320 acre parcel of land bounded on the north by the Beeline

Highway; on the south by 45th Street; on the east by the Florida Turnpike; and on the west by the West Palm Beach Water Catchment Area. The ground elevation at the proposed site is 17 feet above mean sea level as are the surrounding areas of the county.

1.3 Study Area

The land surface of Palm Beach County slopes gently to the south. Highest general elevations (approximately 25 feet above mean sea level) occur near the north county line. The southern Everglades have the lowest base level elevations at approximately 11 feet above mean sea level.

The proposed combustion facilities stack is located approximately 2600 ft to the west of the Florida Turnpike and 3300 ft to the north of 45th Street. Since the proposed waste-to-energy facility is subject to PSD regulations (see Section 2.0) the area considered as the study area for the air quality analyses included all PSD Class I areas located within a radius of 100 kilometers (62 miles). For PSD Class II, all areas within a radius of 50 kilometers (31 miles) comprise the study area, until a lesser radius of significant impact from the proposed source is determined. No PSD Class I area is located within the study area. Everglades National Park is the closest PSD Class I area and is located about 120 km to the southwest. Therefore the study area has been limited to 50 km radius and visibility analysis is not required pursuant to PSD regulations.

1.4 Air Quality Standard Attainment Status in the Study Area

The study area includes Palm Beach and Martin Counties. Air quality monitoring in Palm Beach County is performed by the Palm Beach County Health Department.

Based on the most recent information available (Palm Beach County Health Department's Annual Report Dated 1983), Palm Beach County is in attainment with all NAAQS standards except for the pollutant ozone.

Palm Beach County has recently been designated as non-attainment with reference to the pollutant ozone.

Martin County is assumed to be in compliance pending FDER information to the contrary.

TABLE 1-1

PALM BEACH COUNTY SOLID WASTE COMPOSITION STUDY

ANALYSTS AND COMPOSITION OF MUNICIPAL SOLID WASTE (MSW)
PERCENT BY WEIGHT

COMPONENT	MOISTURE	INORGANIC	CARBON	HYDROGEN	OXYGEN	NITROGEN	CHLORINE	SULFUR	TOTAL	HHV BTU/LB
CORRUGATED BOARD	1.42	0.11	1.86	0.26	1.79	0.01	0.01	0.01	5.46	315.
NEWSPAPER	4.91	0.25	5.98	0.76	5.19	0.02	0.02	0.03	17.16	1017.
MAGAZINES	0.75	0.42	1.06	0.15	1.05	0.00	0.00	0.01	3.44	178.
OTHER PAPER	5.57	1.64	5.85	0.81	5.40	0.06	0.11	0.03	19.46	989.
PLASTICS	1.09	0.62	4.09	0.56	0.58	0.06	0.22	0.02	7.24	839.
RUBBER, LEATHER	0.19	0.44	0.84	0.10	0.22	0.03	0.10	0.02	1.94	164.
WOOD	0.13	0.02	0.34	0.04	0.29	0.00	0.00	0.00	0.83	58.
TEXTILES	0.40	0.07	1.35	0.18	0.97	0.11	0.01	0.01	3.07	235.
YARD WASTE	0.56	0.10	0.24	0.03	0.18	0.01	0.00	0.00	1.11	40.
FOOD WASTE	1.10	0.33	1.17	0.17	0.84	0.07	0.02	0.00	3.71	213.
MIXED COMBUSTIBLES	8.81	1.31	3.74	0.52	2.96	0.09	0.06	0.03	17.52	653.
FERROUS	0.11	5.15	0.08	0.01	0.08	0.00	0.00	0.00	5.43	14.
ALUMINUM	0.04	1.71	0.03	0.00	0.03	0.00	0.00	0.00	1.80	5.
OTHER NON-FERROUS	0.01	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.32	1.
GLASS	0.23	11.17	0.06	0.01	0.04	0.00	0.00	0.00	11.51	9.
TOTALS	25.30	23.64	26.65	3.61	19.61	0.46	0.55	0.17	100.00	4728.

HEAT VALUE AS RECEIVED (25.3% H₂O) = 4728; HEAT VALUE OF DRY SOLIDS = 6329; HEAT VALUE OF COMBUSTIBLES = 9261.

TABLE 1-2

PALM BEACH COUNTY SOLID WASTE COMPOSITION STUDY

TYPICAL ANALYSIS AND COMPOSITION OF REFUSE DERIVED FUEL (RDF)
PERCENT BY WEIGHT

COMPONENT	RECOVERY RATE (%)	MOISTURE	INORGANIC	CARBON	HYDROGEN	OXYGEN	NITROGEN	CHLORINE	SULFUR	TOTAL	HHV BTU/LB
CORRUGATED BOARD	99.0	1.48	0.17	2.72	0.38	2.62	0.01	0.01	0.02	7.39	461.
NEWSPAPER	99.0	5.10	0.37	8.76	1.11	7.60	0.03	0.03	0.04	23.03	1488.
MAGAZINES	99.0	0.78	0.62	1.55	0.22	1.54	0.01	0.01	0.01	4.72	260.
OTHER PAPER	99.0	5.78	2.39	8.56	1.19	7.90	0.08	0.16	0.05	26.12	1443.
PLASTICS	98.0	1.12	0.90	5.92	0.82	0.84	0.09	0.31	0.03	10.03	1215.
RUBBER, LEATHER	99.0	0.20	0.64	1.22	0.15	0.33	0.04	0.14	0.03	2.76	239.
WOOD	99.0	0.14	0.03	0.50	0.06	0.42	0.00	0.00	0.00	1.16	84.
TEXTILES	98.0	0.41	0.10	1.92	0.26	1.40	0.16	0.01	0.01	4.28	340.
YARD WASTE	85.0	0.50	0.13	0.30	0.04	0.22	0.01	0.00	0.00	1.19	51.
FOOD WASTE	60.0	0.69	0.29	1.04	0.15	0.74	0.07	0.02	0.00	3.01	199.
MIXED COMBUSTIBLES	40.0	3.70	0.77	2.21	0.31	1.75	0.05	0.04	0.02	8.85	386.
FERROUS	7.0	0.01	0.53	0.01	0.00	0.01	0.00	0.00	0.00	0.56	1.
ALUMINUM	35.0	0.01	0.88	0.01	0.00	0.01	0.00	0.00	0.00	0.93	2.
OTHER NON-FERROUS	10.0	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.
GLASS	35.0	0.08	5.78	0.03	0.00	0.02	0.00	0.00	0.00	5.92	5.
TOTALS		20.00	13.66	34.75	4.69	25.40	0.54	0.73	0.22	100.00	6171.

HEAT VALUE AS PRODUCED (20.0% H₂O) = 6171.
HEAT VALUE OF DRY SOLIDS = 7714.
HEAT VALUE OF COMBUSTIBLES = 9302.

ASH AS PRODUCED (20.0% H₂O) = 13.7%
DENSITY = 2.5 TO 3.5 POUNDS/CUBIC FOOT
SIZE = MINUS 2" X MINUS 2" X MINUS 2"

2.0 REGULATION APPLICABILITY

An air quality impact analysis begins with the determination of which regulations are applicable to the proposed source. The first step in the regulatory analysis is the determination of the applicability of PSD regulations. The issue of applicability involves determining whether the proposed source and its emissions are subject to PSD review and, if so, what analyses must be performed.

PSD regulations are only applicable in areas where National Ambient Air Quality Standards (NAAQS) for a given pollutant are met (or where monitoring is insufficient to determine compliance with NAAQS). In such areas, PSD regulations apply to the construction or modification of major air pollution sources. Although the general concept of an air pollution source is a stack, vent or other emission point, for PSD purposes a source is essentially defined as the aggregate of all such emission points that have the potential to emit a regulated pollutant at a given facility. A source's potential to emit is defined as its design capacity emission rate, after the application of any emission controls or other legally enforceable emission limitations. A proposed new source is considered major if it either falls within one of 28 specific source categories and has the potential to emit 100 tons per year of any regulated pollutant or if it falls in an unspecified source category and has the potential to emit 250 tons per year of any regulated pollutant.

The proposed Palm Beach County waste-to-energy facility falls within one of the 28 categories of sources subject to PSD review. As a municipal incinerator, it will be subject to review because it has the capability of charging more than 250 tons of RDF per day. Because the proposed Palm Beach County waste-to-energy facility will emit more than 100 tons per year of several regulated pollutants (see Section 4.0) it is subject to PSD review and related analyses for those pollutants. For each pollutant emitted at a rate in excess of 100 tons/year, three sets of analyses may be required: one for BACT; one for air quality impacts and one for additional types of impacts.

In some instances, ambient air quality monitoring may be required in support of the air quality impact analyses, but the Florida DER has determined that existing monitoring provides sufficient ambient air quality data for the study area. Air quality impact analyses and additional impacts analyses performed for the Palm Beach County waste-to-energy facility are discussed in subsequent sections of this report.

As noted above, PSD regulations are applicable only in areas where the NAAQS are met or indeterminate with relation to compliance. When an area is designated as non-attainment, a non-attainment review is required for each pollutant not in attainment when the net increase in emissions of that pollutant is more than 100 TPY. Such pollutants are exempt from PSD review. The source, however, must meet the requirements of New Source Review (NSR). The review requirements include:

- o Meet the Lowest Achievable Emission Rate (LAER) for the affected pollutant.
- o Demonstrate that the facility is in compliance with applicable emission limitations.

- o Obtain offsets, as necessary.
- o Demonstrate a net air quality improvement.

Palm Beach County has been declared non-attainment for ozone. The indicator for the non-attainment pollutant, ozone, is volatile organic hydrocarbons (VOC). As shown in Section 4.0, Table 4-1, projected emissions for hydrocarbons (VOC) are 65.6 tons per year. A non-attainment review is not required.

It will be shown, however, that the facility's increase in VOC emissions cannot make a significant contribution to the formation of oxidants (ozone) in and around Palm Beach County.

3.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

The BACT analysis, required by PSD review, addresses energy, economic and environmental impacts for alternative emission control strategies. BACT is defined in the 40 CFR 52.21 as "An emission limitation based on the maximum degree of reduction of each pollutant emitted which the Department, taking into account, energy, environmental and economic impacts and other costs, determines on a case by case basis, is achievable through application of production processes and available methods, systems, and techniques, for control of each pollutant".

Technical feasibility is the important first step in this analysis. A technically feasible control technology is one that has been demonstrated to function on identical or similar processes in the U.S.

Once technically feasible control alternatives have been established, they are ranked by their environmental, economic and energy consumption impacts. The starting point for this process is a "base case" control level which is specified by the standard and regulations that would apply in the absence of PSD. They typically include New Source Performance Standards (NSPS).

Table 3-1 lists the air emissions for which an evaluation for BACT was conducted and control alternatives which are considered for the control of each of the pollutants. The air pollutants and the emission levels for which BACT must be determined are shown in Table 3-2.

TABLE 3-1

BACT POLLUTANTS AND CONTROL ALTERNATIVES

Air Emission Parameter	Control Alternatives
Particulate, Lead, Beryllium & Particulate Mercury	Electrostatic Precipitator (ESP) Fabric Filter Dry Scrubber
Sulfur Dioxide, Hydrogen Fluoride, Hydrogen Chloride & Gaseous Mercury	Dry Scrubber
Nitrogen Oxide	Amonia Injection Catalytic Reduction Design and Operating Procedures
Carbon Monoxide	Design and Operating Procedures

This BACT evaluation of the above described control alternatives considered their technical feasibility, energy usage and certain environmental factors. The proposed units are projected to be on-line approximately 80-85% of the time. Air pollution control equipment must be reliable to minimize contribution to unit downtime. Installation of air pollution control equipment increases the facility cost, but results in benefits to the

surrounding area and pollution. At some point, the cost of air pollution control equipment is not outweighed by the resulting benefits. To this end, the capital, operational and energy costs, were compared to the benefits.

TABLE 3-2
BACT POLLUTANTS AND ANNUAL EMISSIONS

Air Emission Parameter	Tons/Year
Particulate	214
Sulfur Dioxide	2957.
Nitrogen Oxide	1314.
Carbon Monoxide	3942.
Lead	0.46
Beryllium	0.003
Mercury (particulate & gaseous)	0.98
Hydrogen Fluoride	13.2
Hydrogen Chloride	1150.

3.1 BACT for Particulate, Lead, Beryllium and Particulate Mercury

3.1.1 Alternatives Not Considered

A number of technologies have been used to control particulate emissions from incinerators in addition to those listed in Table 3-1. These include venturi scrubbers, cyclone collectors and wet spray chambers. Of these only venturi scrubbers have been remotely capable of controlling particulate emissions to the EPA NSPS mandated level of 0.08 gr/dscf corrected to 12% CO₂. The venturi scrubbers were not considered as a viable control alternative for two reasons:

1. Their performance has been sketchy at best and they have had overall difficulty in satisfying the NSPS control level; and
2. Wet scrubbers produce an aesthetically undesirable water vapor plume. Accordingly, wet scrubbing is considered unacceptable and has been eliminated as a control option.

3.1.2 Fabric Filters (Baghouses)

Baghouses remove particulate by filtering the flue gas stream through a fabric. Actually, most of the effectiveness is attributed to filtering through a mat of particulate which has built-up on the surface of the fabric. Characteristics of baghouses are as follows:

- ° Particulate removal efficiencies as high as 99.8% have been demonstrated on coal fired units.
- ° Variations in flue gas flow rate and particulate composition do not generally effect performance.
- ° Pressure drop through unit is significant resulting in relatively high energy usage by fans.
- ° Available filter materials limit operating temperatures to less than 500°F.
- ° Sparks in flue gas can cause pinhole leaks and even fires within the filter.
- ° Consideration must be given to prevention of corrosion caused by acid gas condensation.
- ° Blinding of filter media.
- ° Experience on resource recovery facilities is very limited.

Although the TSP emission rate would be guaranteed less than 0.01 gr/dscf corrected to 12% CO₂, a baghouse used above is not considered appropriate primarily due to the incidence of fires caused by sparks and the filter media blinding.

3.1.3 Dry Scrubbers

Dry scrubbers are devices which are designed to remove SO₂ and acid gases from the flue gas stream, in addition to particulates. Aqueous solutions of lime are sprayed into the gas stream, which react with the SO₂ and acid gases. Heat from the reaction, and from the flue gas, dry the resultant products, which are then collected in a baghouse. Characteristics of dry scrubbers are the same as those for baghouses, except as follows:

- ° SO₂, acid gases and other flue gas constituents, that may condense with lower exist gas temperatures are controlled.
- ° Sparks in the flue gas are eliminated.
- ° Acid gas corrosion may be less a problem.
- ° Approximately twice as much residue is produced.
- ° Experience on resource recovery facilities is very limited.

Table 3-3 shows estimated costs for a dry scrubber and baghouse system, guaranteed for a TSP emission limit of 0.01 gr/dscf, corrected to 12% CO₂, and guaranteed to remove 70% of the SO₂ and 90% of the HCL in the flue gas stream.

3.1.4 Electrostatic Precipitator

Electrostatic precipitation functions by imparting a negative charge to particulates in the flue gas stream. The particulates are then attracted to positively charged plates, where they are collected. Characteristics of electrostatic precipitators include the following:

- ° Generally capable of particulate removal efficiencies greater than 98% with efficiencies as high as 99.8%.
- ° Can handle high temperature gases of over 600°F in special applications.
- ° Low pressure drop through units resulting in lower energy usage by fans.
- ° Performance is sensitive to actual vs. design flue gas flow rates (actual gas flow must be less than design) and particle resistivity.
- ° Consideration must be given to prevent corrosion caused by acid condensation. Acid mist condensation begins about 250°F.
- ° Recognized as the most reliable and efficient technology on resource recovery systems.

Table 3-4 shows estimated costs for electrostatic precipitators investigated for this project.

TABLE 3-3

DRY SCRUBBER COSTS1. Capital Cost

Capital Cost = Construction Cost x Bonding Factor

= \$5,000,000 x 1.6

= \$8,000,000

Bond Amortized over 20 years @ 11% interest (CRF = 0.12256)

Annual Capital Cost = \$8,000,000 x 0.12256

= \$980,000

2. Operations and Maintenance

a.	Electricity (3.5 million Kwh @ 5 cents)	\$175,000
b.	Water (50 gpm @ 0.70/1000 gal)	18,000
c.	Labor (8 men; two per shift @30000)	240,000
d.	O&M (incl. bag replacement) @ 2% of construction cost	100,000
e.	Lime 2000 tpy @ \$150/ton	300,000
f.	Waste Handling & Disposal (5915 TPY TSP; + 2000 TPY Chemicals; + 863 TPY SO ₂ & HCl; @ \$10/ton)	88,000
g.	Reheat Steam (5 MMBTUH @ \$6/MMBTUH)	263,000

Subtotal

\$1,184,000

Total Annual Cost (1. + 2.)

\$2,164,000

TABLE 3-4

ELECTROSTATIC PRECIPITATOR COSTS1. Capital Cost

Capital Cost = \$2,300,000 x 1.6

= \$3,680,000

Annual Capital Cost = \$3,680,000 x 0.12256
(i = 11; n = 20) = \$462,000

2. Operations & Maintenance

a. Electricity (920,000 KWH @ 5¢/KWH)	\$46,000
b. O&M (@ 2% of construction cost)	46,000
c. Labor (1/2 man for 4 shifts @ 30,000)	60,000
d. Water	- 0 -
e. Chemicals	- 0 -
f. Waste Disposal (8366 TPY @ \$10/ton)	84,000

Subtotal

\$236,000

Total Annual Cost (1. + 2.).

\$698,000

3.1.5 Particulate Lead, Beryllium and Particulate Mercury BACT Selected

An electrostatic precipitator (ESP) with an outlet particulate loading of 0.03 gr/dscf corrected to 12% CO₂ is selected based on analysis of all the control alternatives reviewed.

This selection is based upon the criteria of technical feasibility and the minimization of environmental, economic and energy impacts. Based on the information developed herein the ESP emerges as the alternative which best meets the BACT selection criteria.

3.2 BACT for Sulfur Dioxide (SO₂), Hydrochloric Acid (HCl) and Hydrofluoric Acid (HF)

Because of the low sulfur content of municipal solid waste (approximately 0.2 percent sulfur by weight), there have been no federal standards or regulations (NSPS) promulgated for control of SO₂ emissions from municipal incinerators. Similarly, the State of Florida has not promulgated regulations for control of SO₂ emissions from municipal incinerators.

In regard to control alternatives, control techniques for large sources of SO₂ emissions have been developed for fossil fuel-fired combustion units. These include methods for neutralizing acidic sulfur oxides either in gas-liquid (wet scrubbing) or gas-solid (dry scrubbing) devices. Both techniques produce solid waste by-products: sludge from wet scrubbing and dry ash from dry scrubbing. These technologies, however, have not been applied to large municipal incinerators in the U.S. because of the low sulfur content of municipal solid waste.

In addition to refuse, auxiliary fuel will also contribute to SO₂ emissions. The auxiliary fuel is used during start-up and shut-down. It is expected that auxiliary fuel usage for start-up and shut-down will constitute about 1.25% of heat input to each furnace and that either No. 2 oil (0.25% S) or natural gas (negligible S) will be used as the auxiliary fuel.

3.2.1 Use of Low Sulfur Fuel

SO₂ emissions are a function of the sulfur content in the fuel being burned. Low sulfur fuel is generally considered to have a sulfur content of 2% or less. Historically, fossil fuel burning plants have switched from the firing of high sulfur fuel (3.5 - 7%) to a low sulfur fuel as a means of complying with acid gas source emissions regulations. Since the refuse fuel (and auxiliary fuel) will have a sulfur content of about 0.2%, it is inherently within any current definition for low sulfur fuel. As such, both the federal and state of Florida regulatory authorities have not promulgated air emissions standards for the control of SO₂ from municipal incinerators.

3.2.2 Wet Scrubber Systems

Another technically viable but aesthetically preclusive alternative for SO₂ control is a wet scrubber system for SO₂ and acid gas control. As was mentioned for the particulate BACT analysis, wet scrubbing has been eliminated from consideration due to the dense water vapor plume which is generated (see Section 3.1 A 2. above).

3.2.3 Dry Scrubbers

A control alternative which was previously evaluated for particulate control is the use of a dry scrubber system to control SO₂ and acid gas emissions.

Dry scrubbers operate by injecting droplets of alkali reagent into the flue gas. The resulting reactions remove the sulfur dioxide as sulfites and sulfates in particulate form. The heat generated during the reaction plus flue gas heat evaporates the water carrying the alkali reagent. A bag filter is located downstream to remove the sulfate and sulfite particulates.

Table 3-5 provides comparative costs of controlling particulate and acid gases utilizing an ESP versus a dry scrubber.

3.2.4 SO₂ and Acid Gas BACT Selection

The use of low sulfur auxiliary fuel in conjunction with the inherent low sulfur content of the waste fuel is selected as BACT based on analysis of the viable alternatives.

This choice of alternatives best meets the selection criteria as required by EPA and the State of Florida DER and is consistent with the most recent BACT determinations for resource recovery facilities in other areas of the country.

3.3 BACT for Nitrogen Dioxide

No add-on type controls have been demonstrated for nitrogen oxides (NO_x) emissions from municipal incinerators in the U.S. Good combustion design and practices are the only demonstrated control alternative in the U.S.

The furnace units planned for Palm Beach County will employ advanced combustion systems in which the primary combustion air is added through multiple compartments located underneath the stokers. Uniform mixing of air and burning RDF eliminates high oxygen concentration gradients that favor the formation of NO_x. Secondary combustion air is introduced at high velocity through specially designed nozzles, into the gas stream along the front and rear walls of the combustion chamber. The temperature at the end of combustion chamber can thus be maintained at about 1800-2000°F. Significant NO_x emissions typically occur at temperatures greater than 2000°F.

The environmental impact due to NO_x emissions from the incinerator will not result in a violation of NAAQS.

Good combustion design and practice is proposed as BACT for NO_x.

3.4 BACT for Carbon Monoxide and Volatile Organic Compounds

No add-on type controls have been demonstrated for CO emissions from municipal incinerators. Good boiler design and proper operating conditions are the only effective emission control methodology.

TABLE 3-5

**COST COMPARISON OF ELECTROSTATIC PRECIPITATORS VS DRY SCRUBBERS
750 TPD UNIT**

	ELECTROSTATIC PRECIPITATOR	DRY SCRUBBER
Emission Limit	0.03	.01
gr/dscf @ 12% CO₂		
Removal Efficiency, Percent	99.0	99.9
Capital Cost	\$3,680,000	\$8,000,000
Annual Cost:		
Net Debt Service	\$462,000	\$980,000
Operating and Maintenance Costs	<u>\$236,000</u>	<u>\$1,184,000</u>
Total	\$698,000	\$2,164,000
Unit Cost:		
Per Ton MSW (260,000 TPY)	\$2.69	\$8.32
Per Ton RDF (182,000 TPY)	\$3.84	\$11.89
Per Ton Particulate plus Acid	\$119.00	\$319.00
Incremental:		
Additional Tons Removed	base	917
Additional Annual Cost	base	\$1,508,000
Per Ton Removed		\$1,644
Per Ton MSW (260,000 TPY)		\$5.63
Per Ton RDF (182 000 TPY)		\$8.05

Notes:

- 1 - Particulate Removed annually by each precipitator =
 $21400 \text{ Total Uncontrolled TPY} \times 0.83 \text{ Availability} \times 1 \text{ Unit/3 units} \times .99 \text{ efficiency} = 5861 \text{ TPY removed.}$
- 2 - Particulate removed by dry scrubber =
 $21400 \times 0.83 \times 1/3 \times .999 = 5915 \text{ TPY removed.}$

Table 3-5 (continued)

Notes:

- 3 - Sulfur Dioxide Generated Annually per unit =
2957 Total - Uncontrolled TPY $\times 0.83 \times 1/3 = 818$ TPY
@ 70% control by dry scrubber SO_2 emission = $818 \times 0.3 =$
245 TPY Controlled and 573 TPY removed.
- 4 - HCl and HF Generated Annually per Unit =
 $(1150 + 13.2) \times 0.83 \times 1/3 = 322$ TPY uncontrolled
@ 90% control by dry scrubber = $322 \times 0.1 = 32.2$ TPY controlled
and 290 TPY removed.

The state-of-the-art design of the combustion chamber and the advance temperature control capability inherent in waterwall units will minimize formation of CO and volatile organic compounds (VOC). A continuous CO monitor will assist the plant operators maintain optimum combustion conditions, thereby further reducing CO and VOC formation.

Facility impacts will not cause a violation of NAAQS. Good equipment design and practice plus continuous CO monitors are therefore proposed as BACT for CO and VOC.

4.0 EMISSIONS DATA

The Florida DER requested emission estimates for sixteen pollutants. Six of these are criteria pollutants: 1) particulate; 2) sulfur dioxide (SO₂); 3) carbon monoxide (CO); 4) volatile organic compounds (VOC); 5) nitrogen oxides (NO_x); and 6) lead (Pb). The remaining 10 pollutants included: 7) chlorides (HCl); 8) ozone (O₃); 9) total reduced sulfur (including H₂S); 10) reduced sulfur compounds (including H₂S); 11) sulfuric acid mist; (12) fluorides (HF); 13) vinyl chloride; 14) mercury (Hg); 15) asbestos; and 16) beryllium (Be).

Most of the pollutants are emitted to a certain degree by the proposed Palm Beach County waste-to-energy facility. Ambient concentrations of the criteria pollutants are regulated through the implementation of NAAQS. The NAAQS have been incorporated in their entirety as part of the Florida State Implementation Plan (SIP).

Although no mention was made by the Florida DER of emissions of trace organic compounds, public attention has recently focused on dioxin emissions (2,3,7,8-TCDD) from waste to energy facilities. Therefore the County has voluntarily submitted available data on dioxin emissions.

Emission estimates of the aforementioned pollutants in conjunction with stack and facility operating parameters were then used as input data to an air quality dispersion models to predict facility impacts. These data are described in greater detail in Section 4.1.

Carbon monoxide (CO), as a pollutant, was considered only in terms of emissions potential from the facility itself. Mobile sources associated with the facility activity are negligible since there will be no significant increase in traffic beyond that which already exists in the area.

In order to adequately demonstrate compliance with the NAAQS and PSD increments, it is required that the applicant include in its modeling analysis the pollutant contributions from all existing and PSD sources having a significant impact within the modeling area of the applicant's source. Stack and emissions data for these other sources were developed in conjunction with FDER.

4.1 Emissions Data for the Palm Beach County Waste-to-Energy Facility

Table 4-1 lists the pollutants that will be emitted from the proposed facility. The table shows pollutant emission factors, design capacity emission rates on an annual basis, actual emission rates on an annual basis and design capacity emission rates on an hourly basis.

Emission factors are based on a higher heating value (HHV) of 6,200 Btu/lb for the RDF. Design capacity emission rates are derived from a waste throughput of 2100 tons/day or 766500 tons/year. Actual annual emission rates assume an availability factor of 0.8 and a resulting waste throughput of 613,200 tons/year. These values are totals for three units each rated at 700 tons/day.

Table 4-2 lists stack parameter data, including location coordinates adjacent building dimensions, height, diameter and volumetric flow rate and

temperature for the proposed waste-to-energy facility. For modeling purposes, the three flues in the one proposed stack were treated as a single stack with an inside diameter equal to that of one of the flues. The modeled emission rate for each pollutant was set equal to the sum from the three flues, and the modeled volume flow rates and temperatures were those of an individual flue. These actions ensured that the modeled plume rise was calculated correctly for the proposed stack.

The emission factors contained in Table 4-1 were derived from a detailed investigation of the literature. The criteria used for the emission factor selection included: similarity of the facility design, similarity of the chemical composition of the refuse, reliability of stack tests and availability of data from facilities incorporating state-of-the-art design and air pollution control technology. In the sections which follow, the rationale behind the selection of emission factors for each pollutant listed in Table 4-1 is provided.

4.1.1 Total Suspended Particulate (PM)

The emission factor is based upon the ability of the electrostatic precipitator manufacturer to not exceed a guaranteed grain loading of 0.03 grains/dscf at 12% CO₂. This emission level represents BACT for TSP.

4.1.2 Sulfur Dioxide (SO₂)

The SO₂ emission factor is based upon RDF fuel sulfur content which is assumed to be completely converted to SO₂.

4.1.3 Carbon Monoxide (CO)

Several data bases were investigated to develop an emission factor for CO. The value used was a median value between values cited by California Air Resources Board Report entitled "Air Pollution Control at Resource Recovery Facilities" and vendor information which indicated lower values. The principal reason for the difference is due to excess air design. Most of the spreader stoker furnaces cited by CARB were designed to fire RDF at about 40% excess air. Our investigations have indicated that a prudent operating point for RDF combustion to be at 50% excess air with a design point of 60% to accommodate variations in fuel moisture and heating value.

4.1.4 Volatile Organic Compounds (VOC)

The emission factor for VOC represents the non-methane portion of the total hydrocarbon emissions. Reference literature indicated a wide range of VOC emissions. This wide range is believed to be caused by the low excess air design cited for CO, inability to maintain sufficient temperature (especially those systems which fired pulped RDF which typically had a moisture content of 50% or above) and inadequate combustion controls. The proposed facility will utilize state-of-the-art combustion controls coupled with conservative furnace design in terms of excess air, gas temperature and dwell time to minimize VOC emissions. Accordingly, the VOC emission factor used was selected from mid-range data to provide sufficient conservatism and avoid understating possible facility emissions.

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TABLE 4-1

CONTROLLED EMISSION FACTORS DEVELOPMENT FOR RDF FIRED SPREADER STOKER FURNACES

(ANNUAL AVERAGE BASED ON 1800 TPD RDF FIRED)

POLLUTANT	LBS/TON RDF	LBS/HR (1800TPD)	TONS/YEAR (1800TPD)	GM/SEC @ 1800 TPD	GM/SEC @ 2100 TPD
CARBON MONOXIDE	12.0	900.	3742.	113.	132
NITROGEN DIOXIDE	4.0	300.	1314.	37.8	44.1
SULFUR DIOXIDE	9.0	675.	2957.	35.1	99.3
CHLORIDES	3.5	263.	1150.	33.1	38.6
VOLATILE ORGANIC COMPOUNDS	.20	15.0	65.6	1.89	2.21
PARTICULATE MATTER	.65	48.8	214.	6.14	7.16
SULFURIC ACID MIST	.0004	.030	.131	.0038	.0044
FLUORIDES	.04	3.00	13.2	.38	.44
LEAD	.014	1.05	4.6	.132	.154
MERCURY	.003	.225	.98	.0284	.0331
BERYLLIUM	9.0 E-06	6.8 E-04	3.0 E-03	8.5 E-05	9.9E-5
2,3,7,8-TCDD	8.5 E-08	6.4 E-06	2.8 E-05	8.0 E-07	9.3E-7

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TABLE 4-2

**STACK PARAMETERS FOR EACH OF THREE SPREADER STOKER FURNACES
(TWO INITIALLY INSTALLED PLUS ONE FUTURE)**

	ENGLISH	METRIC
LOCATION		UTM ZONE 17
X-COORDINATE		0585820 METERS EAST
Y-COORDINATE		2960474 METERS NORTH
BASE ELEVATION FOR MODEL INPUT	0.00 FEET	0.00 METERS
STACK DIAMETER	6.69 FEET	2.04 METERS
STACK HEIGHT	250 FEET	76.20 METERS
VOLUMETRIC FLOW		
100% CAPACITY	172377 ACFM	81.4 M3/SEC
75% CAPACITY	124311 ACFM	58.7 M3/SEC
50% CAPACITY	80033 ACFM	37.8 M3/SEC
EXIT VELOCITY		
100% CAPACITY	81.69 FEET/SECOND	24.90 METERS/SECOND
75% CAPACITY	58.91 FEET/SECOND	17.96 METERS/SECOND
50% CAPACITY	37.93 FEET/SECOND	11.56 METERS/SECOND
EXIT TEMPERATURE		
100% CAPACITY	450 FAHRENHEIT	505 KELVIN
75% CAPACITY	415 FAHRENHEIT	486 KELVIN
50% CAPACITY	385 FAHRENHEIT	469 KELVIN

4.1.5 Nitrogen Oxides (NO_x)

The NO_x emission factor was selected from the CARB report and is representative of the upper bound of the median values of the data bases used.

4.1.6 Lead (Pb)

The Pb emission factor was selected based upon detailed analyses conducted during facility permit work by Hayden-Wegman for North Santa Clara County, CA. Data bases provided only sparse information with median values which were either too low or too high to be considered representative of the proposed Palm Beach County project.

4.1.7 Beryllium (Be)

The Be emission factor is based on a weighted average of the values cited by CARB report and Hayden-Wegman for North Santa Clara.

4.1.8 Mercury (Hg)

Hg emission factor is based on the North Santa Clara Report which is higher than other data bases reviewed.

4.1.9 Chlorides (as HCl)

The HCl emission factor is based on North Santa Clara and data reported by Rinaldi, et al.

4.1.10 Fluorides (as HF)

The HF emission factor is based on the median value from the CARB Report.

4.1.11 Sulfuric Acid Mist (H₂SO₄)

H₂SO₄ emission factor is based on data from North Santa Clara, CA. Data bases are very sketchy. The controlled emission is based on 99% removal by the ESP.

4.1.12 Ozone (O₃), Total Reduced Sulfur, Reduced Sulfur Compounds, Vinyl Chloride and Asbestos

No emissions of ozone, total reduced sulfur, reduced sulfur compounds, vinyl chloride and asbestos are expected.

4.1.13 Dioxin (2,3,7,8 Tetra Chloro Dibenzo Dioxin)

The emission factor for 2,3,7,8-TCDD is derived from stack test data taken from Chicago, N.W. facility by the EPA and reported by Cleverly. The reason for using these data are as follows: (a) they represent a direct measurement of flue gas emission, (b) the data have been shown to be comparable to similar measurements made by the Swiss Environmental Agency and to measurements derived from independent analyses from fly ash collected from

U.S. and European waste-to-energy facilities; and (c) the data are conservative in that they show the highest emission rate (of the seven large scale waste to energy facilities for which data are available) for the tetra homologue which contains the isomer of greatest toxicity and concern. The emission factor was calculated from a conservative emission rate of 0.085×10^{-6} pounds/ton for the 3000 tons/day Brooklyn Navy Yard facility. It is expected that this emission level will not be encountered at the proposed facility due to excellent combustion controls and auxiliary fuel systems that are designed to maintain exit gas temperatures at a level above the critical threshold where dioxin could be formed.

5.0 AIR QUALITY MODELING ANALYSES

5.1 Model Requirements

5.1.1 Determination of Worst-Case Load Conditions

A pollutant source does not generally operate or emit pollutants at a constant rate. Most facilities, particularly waste-to-energy facilities, operate at variable rates depending on supply and demand, weekday versus weekend or day versus night work schedules or other factors. Changes in source operating rates produce different pollutant emission rates and exhaust gas flow rates and temperatures. When flow rates and temperatures vary, so does pollutant dispersion (plume rise) such that different points of maximum pollutant impact are produced. As a result, screening modeling was performed to determine the source operating load that produces the worst-case impacts. Such screening modeling was performed for 100, 75 and 50 percent load. Model results indicated that 100% load produced worst case conditions.

5.1.2 Determination of the Modeling Area

The next required modeling analysis determined the territorial extent of significant impact of the proposed source. Significant impact levels have been defined for various averaging periods for specific pollutants as shown in Table 5-1. Significant monitored concentrations (De Minimus Values) have also been defined for other pollutants as shown in Table 5-2.

As screening analysis was performed first, using a screening-type model and a limited set of hypothetical meteorological data to define appropriate receptor locations (i.e., points where impacts are calculated). Once receptors were selected, other refined models and historical meteorological data could then be used to calculate source impacts for all averaging periods of concern.

TABLE 5-1
SIGNIFICANCE LEVELS FOR AIR QUALITY IMPACTS

<u>POLLUTANT</u>	<u>AVERAGING TIME</u>	<u>SIGN. LEVEL CONC. (ug/m³)</u>	<u>DISTANCE (KM) FROM SOURCE ## TO SIGNIFICANCE LEVEL</u>	
			<u>HIGHEST</u>	<u>HIGH SECOND HIGH</u>
Sulfur Dioxide	3 Hour	25	25.0	15.0
	24 Hour	5	25.0	20.0
	Annual	1	15.0	NA
Total Suspended Particulate	24 Hour	5	#	#
	Annual	1	#	NA
Nitrogen Dioxide	Annual	1	5.0	NA
Carbon Monoxide	8 Hour	2000	#	#
	Annual	500	#	NA

NA Not applicable

Less than significant levels at all distances. Minimum boundary line distance from RDF Source: 0.73 km.

Facility UTM Coordinates: 2960474N; 0585820E; UTM Zone 17

TABLE 5-2
COMPARISON OF IMPACT OF PALM BEACH COUNTY RDF FIRED
SPREADER STOKER FURNACES TO DE-MINIMUS LEVELS (ISC MODEL)
(FACILITY UMT COORDINATES: 2960474N; 0585820E; UMT ZONE 17)
SIGNIFICANT MONITORING CONCENTRATIONS

<u>POLLUTANT</u>	<u>AVERAGING TIME</u>	<u>DE-MINIMUS GUIDELINES ug/m³</u>	<u>HIGHEST 2ND HIGHEST# CONCENTRATION ug/m³</u>	<u>DISTANCE (KM) FROM SOURCE TO DE-MINIMUS LEVEL</u>	
				<u>HIGH</u>	<u>H2NDH</u>
TSP	24 Hour	10	2.0	##	##
SO ₂	24 Hour	13	27.4	10.0	10.0
CO	8 Hour	575	78.6	##	##
NO _x	24 Hour	14	12.2	##	##
Ozone (VOC)	1 Hour	*	3.0**	##	##
Mercury	24 Hour	0.25	9.1E-3	##	##
Fluorides	24 Hour	0.25	0.17	##	##
Lead	24 Hour	0.1	4.3E- 2	##	##
Beryllium	24 Hour	5.0E-4	2.7E-5	##	##

* No value established. Ambient air standard: 235 ug/m³ not to be exceeded on more than an average of one day per year over a three year period.

Model analyses for SO₂ based on 2100 TPD and 9% lb/ton. Concentrations for other pollutants based on their emissions ratio to SO₂.

** Assumes VOC is equivalent to Ozone

Less than de-minimus values at all distances equal to or greater than 0.73 Km. from the Source. 0.73 Km. is the minimum distance of the source from its boundry line.

The circle enclosing the furthest radial distance to which significant impacts are found defines the "modeling area" for the applicant's source. Subsequent modeling analyses included all sources located within this area that have significant emissions of the criteria pollutants emitted (in significant amounts) by the applicant's source. Model results indicated that only SO₂ produced significant impacts in both short-term and long-term averaging periods.

5.1.3 Determination of the Screening Area

An additional "screening area" was defined for additional sources to be considered for inclusion in subsequent modeling analyses. This screening area was contained in the annular ring that extends 50 kilometers (31 miles) beyond the applicant's source's modeling area. Sources located in the screening area were included in subsequent modeling along with the applicant's source, if their impact within the applicant's source modeling area was as much as 1 ug/m³ on an annual basis and 5 ug/m³ on a 24-hour basis.

5.1.4 PSD Increment Consumption and NAAQS Analysis

The PSD regulations have established limits for increases in concentrations of two pollutants, PM on a 24-hour and annual basis, and SO₂ on a 3-hour, 24-hour and annual basis. These limits of concentration increases have been defined as increments which are shown in Table 5-3. The starting point for PSD increment consumption is January 6, 1975. In a given area, the starting point for tracking PSD increment consumption is the date thereafter on which the first PSD source permit application is submitted for regulatory review. The first PSD permit application date is defined as the baseline date for the given area. No major PSD increment consuming source has triggered the baseline date in the study area.

TABLE 5-3

ALLOWABLE PSD INCREMENTS (ug/m³)

	Class I Area	Class II Area	Class III Area
Sulfur Dioxide			
• Annual	2	20	40
• 24-hour	5*	91*	182*
• 3-hour	25*	512*	700*
Total Suspended Particulate Matter			
• Annual	5	19	37
• 24-hour	10*	37*	75*

* Not to be exceeded more than once a year.

No multisource modeling for PSD increment consumption is required since no major source has been constructed since January 6, 1975 within the modeling area.

The sum of the impacts of the proposed PSD source emissions and all existing source emissions must also not produce concentrations that violate NAAQS. The NAAQS concentrations are shown in Table 5-4. Modeling for compliance with NAAQS must include: 1) all source emissions from the proposed PSD source, 2) actual emissions from all operating sources and all allowable emissions from permitted (but not operating) sources within the modeling area, and 3) actual emissions from all operating sources and all allowable emissions from permitted (but not operating) sources within the screening area, if such sources have significant impacts ($>1 \text{ ug/m}^3$, annual and $>5 \text{ ug/m}^3$, 24-hour) within the modeling area. Modeling impacts must be added to appropriate background levels to determine compliance with NAAQS.

5.1.5 Soils and Vegetation Impacts

The emission of pollutants listed in Table 5-1 are not expected to cause any harm to the vegetation or soils within the study area. For these pollutants, either all applicable NAAQS and state standards will be met, emissions will be less than de minimus values, or ambient impacts will be insignificant.

The potential impact to soil and vegetation resulting from emission from the proposed facility are discussed for the following specific compounds and materials: total suspended particulates (TSP); carbon monoxide (CO); sulfuric acid (H_2SO_4); sulfur dioxide (SO_2); nitrogen dioxide (NO_2).

Total Suspended Particulates. Particulate matter can interfere with plant metabolism when large enough quantities coat leaf surfaces causing the blockage of gas and light exchange mechanisms. The specific sensitivity of plants to particulate matter produced by resource recovery facilities is not known, nor have levels which produce plant injuries from other sources been documented.

The proposed facility will contribute a maximum annual average of 0.28 ug/m^3 of TSP. The maximum observed level in 1983 was 134 ug/m^3 , to which the facilities emissions will add an insignificant amount of 0.2 ug/m^3 .

Carbon Monoxide. Plants appear to be resistant to high levels of CO. In most species tested, exposure to 115 mg/m^3 for up to three weeks did not produce visible injury (Zimmerman, et al., 1983). More recently, exposure to less than 27 ug/m^3 (Chakrabarti, 1976) also produce no visible injury.

The proposed facility will contribute a maximum annual concentration of 5.1 ug/m^3 . Total concentrations, as a result of the operation of the proposed facility, will thus be considerably below concentrations causing visible injury to vegetation.

Sulfuric Acid. H_2SO_4 is formed when gaseous SO_3 produced by the facility reacts with water droplets. the acidified water vapor can

result in acidic precipitation. It is difficult to predict the extent that H_2SO_4 produced by the facility will impact vegetation because (1) H_2SO_4 aerosols are neutralized by the presence of ammonia in the atmosphere (Huntzicher, et al., 1980); (2) when effects of acid precipitation on plants are observed they may be positive due to fertilization impacts of sulfur or negative due to the leaching of leaf surfaces; and (3) the impact of emissions of H_2SO_4 from a single facility on vegetation may be difficult to differentiate from the overall impacts of acid rain on vegetation.

Although evaluation of data relative to acidic precipitation impacts on vegetation is complex, the majority of crop species studied to date indicates the exposure to simulated acid rain has little or no adverse impact on vegetative growth and yield.

The proposed facility will add an annual average of $1.7\text{E}-4$ ug/m^3 of H_2SO_4 . It is not anticipated that this concentration will contribute significantly to acidic precipitation when compared to existing concentrations and other major producers, such as fossil fuel power plants.

Sulfur Dioxide. Sensitivity of plant species to SO_2 appears to vary not only with climate of an area, but with the duration of exposure. Garsed and Rutter (1982) reported that various species of conifer (*Pinus* sp.) had markedly differing sensitivities to levels of SO_2 ranging from 200 ug/m^3 for 11 months to 8000 ug/m^3 for 6 hours. A 14% reduction in relative growth rate was seen in one pine species at the 200 ug/m^3 dosage level. A number of oak and pine species (black and red oak, white pine) have been reported to develop visible injury when exposed to concentrations of SO_2 between 786 and 1,572 ug/m^3 for three hours (Jones, et al. 1979), have reported a threshold value for foliar injury to certain species (blackberry winged sumac, other herbaceous species) at 340 ug/m^3 for 3 hours under environmental conditions which maximized plant sensitivity.

A maximum annual ground level concentration for SO_2 of 3.8 ug/m^3 is predicted for the authority facility. This value, when added to a background level of 10 ug/m^3 is considerably below the concentration causing a reduction in relative growth rate of a pine species. The maximum background level of SO_2 over a three hour averaging period, is 140 ug/m^3 to which the facility will add a maximum of 75 ug/m^3 . This maximum level does not exceed threshold value for certain sensitive species under worst-case conditions.

Nitrogen Dioxide. Nitrogen dioxide can be beneficial to vegetation in specific amounts. Uptake of NO_2 varies with a number of factors such as nutrient supply in the soil, fertilization, and rainfall. NO_2 can also be converted to nitric acid and contribute to acid precipitation. Natural biological cycling of nitrogen compounds produces greater acidity than does atmospheric decomposition (Frink, et al., 1976).

Short-term injury threshold for NO_2 -tolerant species, such as corn and sorghum, has been found to be 24,400 ug/m^3 NO_2 for a one-hour exposure when grown in a controlled environment (Heck and Tiggey, 1970). Continuous exposure throughout the growth period to 470 ug/m^3 reduced size and productivity and increased senescence in tomatoes and navel oranges (Taylor, et al. 1975; Spierings, 1971). The concentration of NO_2 has been found to be a greater influence on the extent of injury than the length of exposure.

The additive effect of NO_2 and SO_2 in combination on crops has been shown to vary between crop species and varieties. In a recent study of yield reduction in soybeans, no adverse effect was observed at atmospheric concentrations of 481 ug/m^3 SO_2 in combination with 155 ug/m^3 of NO_2 (Admunson, 1983). The results of these investigations indicate that the presence of elevated levels of NO_2 in the atmosphere in combination with SO_2 above a threshold level can lead to adverse crop response. NO_2 concentrations below 120 ug/m^3 have not been reported to produce injury in the absence of other pollutants (Thompson, et al., 1974).

The proposed facility will produce a maximum annual NO_2 concentration of 1.70 ug/m^3 . The maximum annual ambient NO_2 concentration recorded on the county was 20 ug/m^3 . Total concentration will thus be well below the estimated threshold level (120 ug/m^3) of injury to certain plants.

Hydrogen Chloride. Gaseous HCl will be emitted from the proposed facility as a result of the combustion of certain materials contained in the refuse, especially plastics. HCl fallout onto soil does not pose a serious risk to vegetation. HCl dissociates in soil, and the Cl which occurs in a dissolved form is generally leached from the soil with precipitation. Since HCl is therefore unavailable for uptake through plant roots, indirect injury to vegetation through the soil is unlikely.

Studies of the plant growth in an environment containing gaseous HCl show that exposure of $10,000 \text{ ug/m}^3$ for 1 to 2 hours will produce plant injury. Intermittant exposure to concentrations of approximately 50 ug/m^3 posed minimal risk to sensitive vegetation. Concentrations ranging from approximately $6,000 \text{ ug/m}^3$ for 120 hours or below provide adequate protection from HCl injury.

The proposed facility will increase HCl concentrations by a 1-hour maximum of 53 ug/m^3 and an annual average of 1.5 ug/m^3 . Peak- and long-term concentrations are well below levels specifically documented to cause injury and those proposed as adequate for vegetation protection. Therefore, HCl emissions are not expected to adversely impact local vegetation.

5.2 Model Selection Criteria

5.2.1. Number of Emission Points

A number of models are available for the screening modeling analyses needed for selecting receptor locations and determining worst-case load impacts. Models PTMAX and PTPLU are applicable to individual sources, and PMPTP and Valley are applicable to individual-multiple sources. A number of models are also available for the more comprehensive modeling analysis needed to define the modeling area, compute PSD increment consumption, and assess compliance with NAAQS. The CRSTER model is only applicable to single or collocated sources. The MTPER, RAM, ISCST, ISCLT, Complex 1, SHORTZ, LONGZ, and CDMQC models are applicable to multiple sources.

Since it was anticipated that the modeling and screening areas would contain sources which emit the same pollutants (in significant

amounts*) as will be emitted by the proposed facility (in significant amounts*) Hayden-Wegman planned, at the outset of this study, to use multiple source models for the refined modeling analyses. Upon consideration of the topography and demography of the study area and the type and number of sources to be modeled, the following dispersion models are utilized: PTPLU, PTDIS, ISCST and ISCLT.

These models are used with downwash option and in rural mode pursuant to FDER instructions.

* As defined in Table 5-1

TABLE S-4

AMBIENT AIR QUALITY STANDARDS

POLLUTANT	FEDERAL PRIMARY	FEDERAL SECONDARY	STATE	MAXIMUM CONCENTRATION MEASURED IN 1983 (SITE #)	MAXIMUM 2ND MAX CONCENTRATION (3) MEASURED IN 1983 (SITE #)
SULFUR DIOXIDE					
MAX 3-HOUR CONCENTRATION (2)	NO STANDARD	1300 UG/M3 (0.5 PPM)	1300 UG/M3 (0.5 PPM)	65 UG/M3 (11) (0.025 PPM)	63 UG/M3 (11) (0.024 PPM)
MAX 24-HOUR CONCENTRATION	365 UG/M3 (0.14 PPM)	NO STANDARD	260 UG/M3 (0.1 PPM)	39 UG/M3 (11) (0.015 PPM)	29 UG/M3 (11) (0.011 PPM)
ANNUAL ARITHMETIC MEAN	80 UG/M3 (0.03 PPM)	NO STANDARD	60 UG/M3 (0.02 PPM)	7 UG/M3 (11) (0.0027 PPM)	
PARTICULATE MATTER					
MAX 24-HOUR CONCENTRATION (2)	260 UG/M3	150 UG/M3	150 UG/M3	134 UG/M3 (5)	107 UG/M3 (4)
ANNUAL GEOMETRIC MEAN	75 UG/M3	60 UG/M3	60 UG/M3	43 UG/M3 (12)	
NITROGEN DIOXIDE					
ANNUAL ARITHMETIC MEAN	100 UG/M3 (.05 PPM)	100 UG/M3 (.05 PPM)	100 UG/M3 (.05 PPM)	20 UG/M3 (1) (0.01 PPM)	
OZONE					
DAILY MAX 1-HOUR CONCENTRATION (1)	235 UG/M3 (0.12 PPM)	235 UG/M3 (0.12 PPM)	235 UG/M3 (0.12 PPM)	180 UG/M3 (10) (0.092 PPM)	172 UG/M3 (10) (0.088 PPM)
LEAD					
QUARTERLY ARITHMETIC MEAN	NO STANDARD	NO STANDARD	1.5 UG/M3	NOT MONITORED	
CARBON MONOXIDE					
MAX 1-HOUR CONCENTRATION	40000 UG/M3 (35 PPM)	40000 UG/M3 (35 PPM)	40000 UG/M3 (35 PPM)	10171 UG/M3 (1) (8.9 PPM)	9943 UG/M3 (1) (8.7 PPM)
MAX 8-HOUR CONCENTRATION (2)	10000 UG/M3 (10 PPM)	10000 UG/M3 (10 PPM)	10000 UG/M3 (10 PPM)	6600 UG/M3 (1) (6.6 PPM)	4500 UG/M3 (1) (4.5 PPM)

1. THE STANDARD IS ATTAINED WHEN THE EXPECTED NUMBER OF DAYS PER CALENDAR YEAR WITH MAXIMUM HOURLY AVERAGE AVERAGE CONCENTRATIONS ABOVE 0.12 PPM IS EQUAL TO OR LESS THAN 1.
2. CONCENTRATION LIMITS NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.
3. SINCE SHORT TERM CONCENTRATION LIMITS ARE NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR, THE VALUES PRESENTED IN COLUMN (5) FOR SHORT TERM CONCENTRATIONS REFLECT THE HIGHEST VALUES OF THE SECOND HIGHEST CONCENTRATION MEASURED AT THE MONITORING STATION.

5.2.2 Pollutant Averaging Periods

As discussed earlier, pollutant concentrations must be predicted on the basis of several averaging periods for PM (24-hour and annual) and SO₂ (3-hour, 24-hour and annual). Pollutant impacts must also be predicted on the basis of 1-hour and 8-hour averaging periods for CO and on a calendar quarter basis for lead.

The PTPLU, and PTDIS screening models can be used with hypothetical meteorological data to predict worst-case 1-hour impacts which can be converted to worst-case 3-hour, 8-hour and 24-hour impacts using scaling factors provided in EPA's Volume 10.

5.2.3 GEP Determination and Potential for Downwash

The relationship between a source's stack height and the dimensions of adjacent structures and terrain determine whether plume downwash will occur. EPA has developed criteria for constructing stacks with heights defined according to good engineering practice (GEP) criteria in order to minimize plume downwash. The ISC models are the only ones capable of calculating impacts caused by plume downwash. Modeling for downwash is required only if the applicant's stack is not constructed according to GEP criteria.

Hayden-Wegman performed a GEP analysis for the proposed source's stack. The analysis was performed in accordance with EPA regulations. Building dimensions are 233 ft long by 110 ft wide by 120 ft high. GEP stack height was determined to be 300 ft. Accordingly, the results of this analysis indicated that the proposed source stack was below GEP height so downwash modeling was performed.

5.3 Modeling Considerations

5.3.1 Highest, Second-Highest Concentrations

For the short term averaging periods, compliance with PSD increments and NAAQS is based on the highest, second-highest modeled (modeled plus background for NAAQS) concentrations. Such concentrations are determined by first obtaining the highest and second-highest concentrations at all the receptors within the study area. The highest, second highest concentration is defined as being the highest value from among the set of second highest concentrations for all the receptors. In this report, highest, second-highest concentrations are presented for all short-term averaging periods for the pollutants for which short-term NAAQS or PSD increments have been established.

5.3.2 Block Averaging Times

Compliance with short-term PSD increments and NAAQS is based on block averages. Block averages are those that start at midnight for all non-overlapping averaging periods until the following midnight. Thus, each day produces a single 24-hour block average, three 8-hour block averages, and eight 3-hour block averages. In this report all modeled short-term concentrations are presented as block averages.

5.3.3 Dispersion Coefficients

Dispersion coefficients are constants that are built into dispersion models for use in calculating the amount of horizontal and vertical plume spread depending on downwind atmospheric stability and distance. All of the models used contain Pasquill/Gifford coefficients. The Pasquill/Gifford coefficients are applicable to rural areas. In long term-models, the Pasquill/Gifford coefficients are applicable to rural areas. In long-term models, the Pasquill/Gifford coefficients are used to calculate pollutant dispersion in the vertical, but pollutant dispersion is calculated to be evenly distributed within a wind direction sector in the horizontal.

5.3.4 Stability Categories

There are several models available for determining stability categories. All the models discussed herein use stability classifications developed by the Pasquill/Turner method. The Pasquill/Turner method is based on measurements of cloud cover, isolation (solar heat) and wind speed. The stability classifications used for this study were developed using the CRSTER preprocessor which converts standard National Weather Service observations into the format required for model input.

5.3.5 Plume Rise

The standard algorithms for determining plume rise are those of Briggs and these algorithms are used in all the models that were used in this study. The Briggs algorithms calculate plume rise based on thermal buoyancy (exhaust gas temperature) and momentum (exhaust gas volume flow).

a. Buoyancy Induced Dispersion

If a large source has a thermally buoyant plume, dispersion will begin immediately upon its exit from the stack. This phenomenon is accounted for in algorithms for buoyance induced dispersion, which are available as an option in several of the models discussed herein. This option was employed in this study because the proposed source has a hot plume.

b. Stack Tip Downwash

Downwash of a plume can be induced by a stack if it is poorly constructed, or if the exhaust gas velocity is low. This option was employed for this study as a measure of conservatism although the proposed stack will be properly constructed and have adequate exhaust gas velocity.

c. Final Versus Transitional Plume Rise

Upon entering the atmosphere, a plume will rise as a function of its thermal buoyancy and momentum, as discussed above. The plume will rise until it loses its buoyancy and momentum. As the plume rises, it travels downwind until it reaches its equilibrium, or final height. Algorithms have been developed to account for this period of transitional plume rise and were utilized for model runs.

5.3.6 Chemical Transformation

Some pollutants undergo chemical transformations after their release into the atmosphere. Various methods can be used to account for these transformations, the most common of which makes use of an exponential decay or "half-life" term, that is dependent on travel time. Of the pollutants that will be emitted by the proposed facility, those most subject to chemical transformations in the atmosphere are sulfur oxides (SO_x), and NO_x . After entering the atmosphere, the amount of SO_2 in the SO_x emissions is slowly depleted. During the short travel times involved in the study area, this depletion is of minimal significance and was not considered. The conversion of NO_x to NO_2 is rapid so all NO_x emissions were treated as NO_2 . Therefore, although several of the models selected for this study contain "half-life" equations for calculating pollutant decay, this option was not used.

5.3.7 Particle Deposition

Large particles settle out of the atmosphere while smaller particles remain suspended. Modeled concentrations will be underpredictions if particle deposition is not calculated and source emissions do include particles that settle out before reaching the receptor. In air permitting analyses, the latter situation is allowed to occur, especially if particulate size distributions are not available, to ensure that ambient air quality standards are met. For this study, all particulate emissions were considered to be non-settleable.

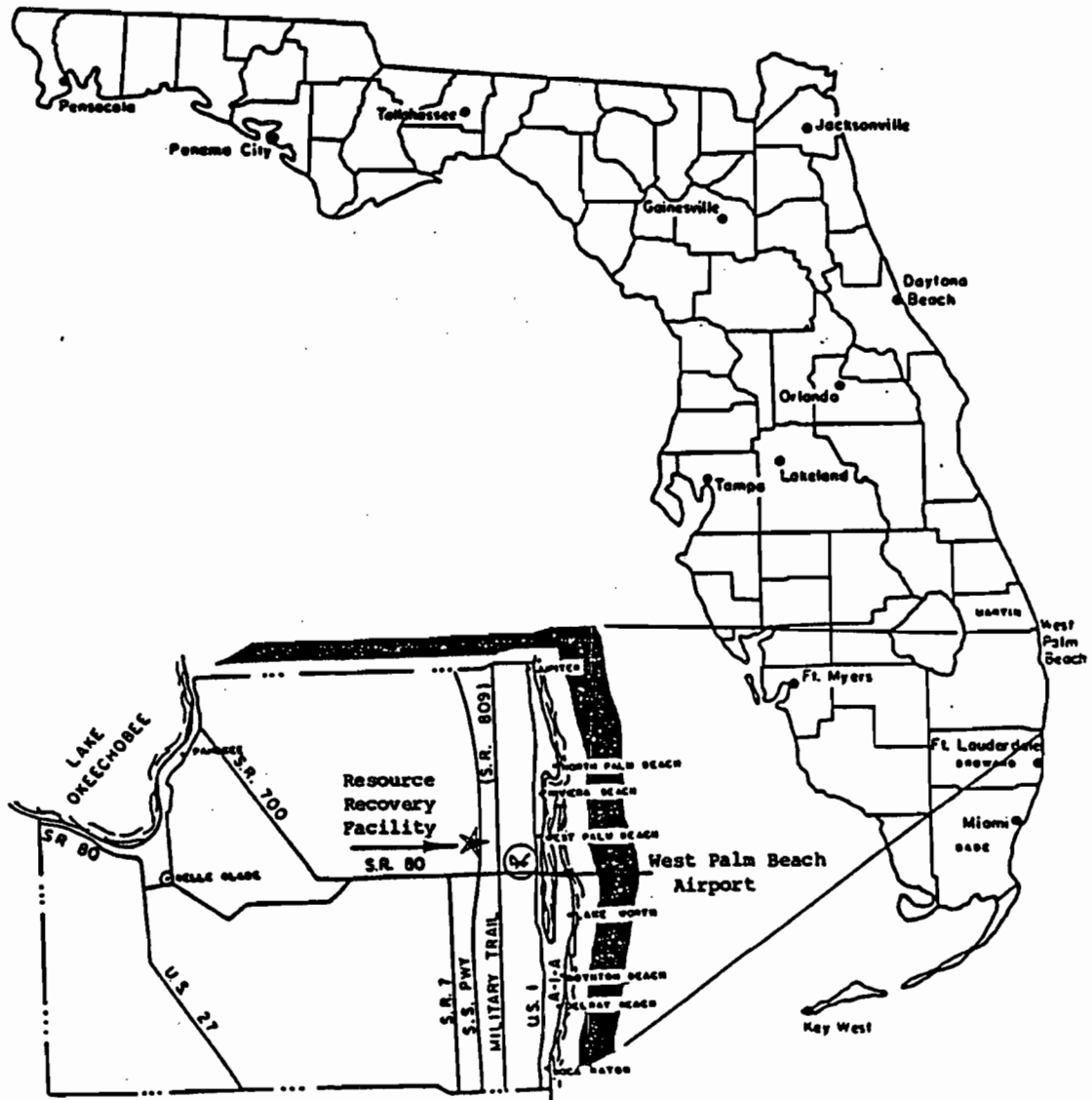
5.4 Meteorological and Climatology

5.4.1 Climatology

The proposed waste-to-energy facility is to be located in Palm Beach County in the lower east coast climatological regime of Florida (Figure 5.1). The site is approximately 10 kilometers west of the Intercoastal Waterway and 11.5 kilometers from the Atlantic Ocean shoreline. There is no significant terrain in the vicinity (Figure 5.2). Summer temperatures are warm and humid while the winter temperatures are moderated slightly by an occasional influx of cool air from the north. The region is dominated by the effect of the Gulf Stream which flows northward following the contours of the lower east coast and a dominant trade wind that blows from east to west. This water trajectory is a moderating influence that cools the region in the summer and gives warmth in the winter. Average mean winter (January) and summer (July) maximum temperatures for Florida are shown in Figure 5.3 and 5.4. The primary rainy season occurs during the six month period from May through October. Most of the precipitation is associated with thunderstorms. The maximum average rainfalls are during the months of September and October. These rains may be associated with tropical storms. The frequency of tropical storms, by year, for Florida is shown in Exhibit Table 5.1. The chances of hurricane force winds at West Palm Beach are 1 in 7. Meteorological conditions that aggravate air pollution are least likely to occur in the lower east coast region due to the prevailing easterly trade winds and the overall prevailing instability of the air. The trade winds are sufficiently pervasive so as to minimize any true sea breeze effect.

LOCATION MAP

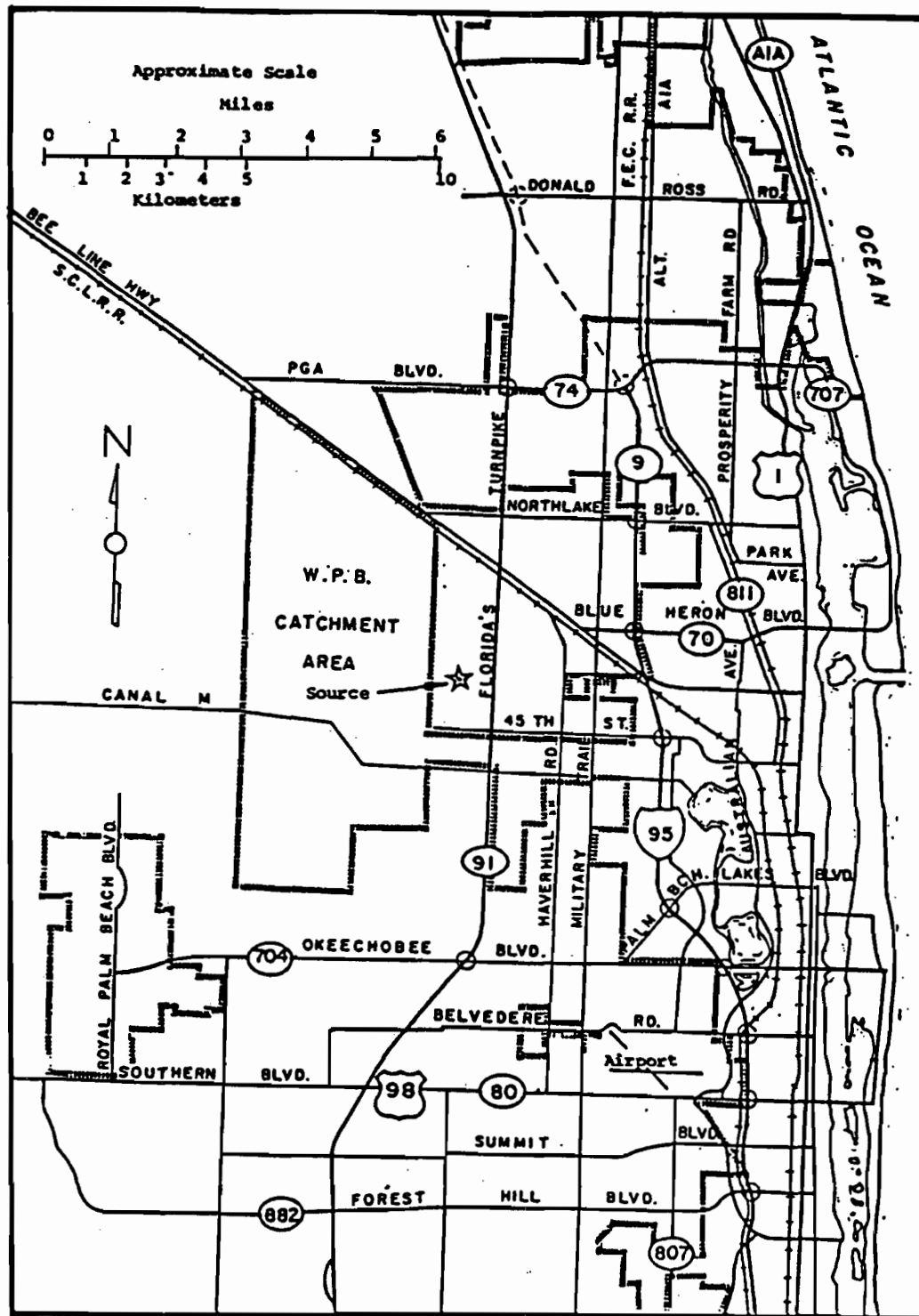
PALM BEACH COUNTY, FLORIDA



**PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY**



FIGURE 5.1



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



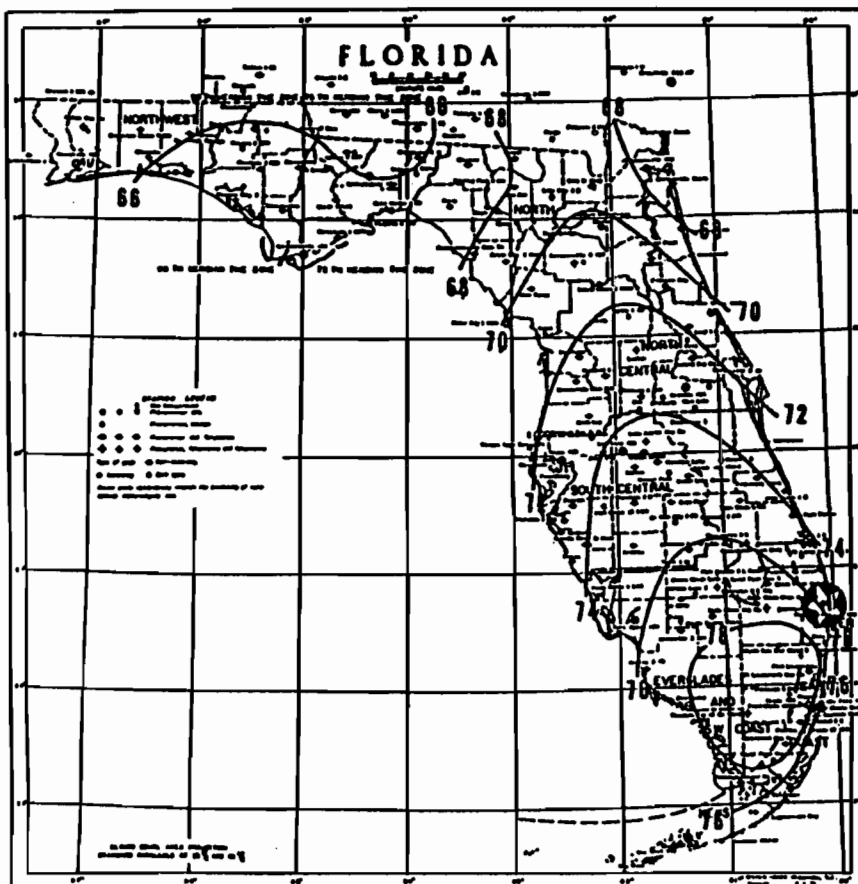
FIGURE 5.2



FIGURE 5.3

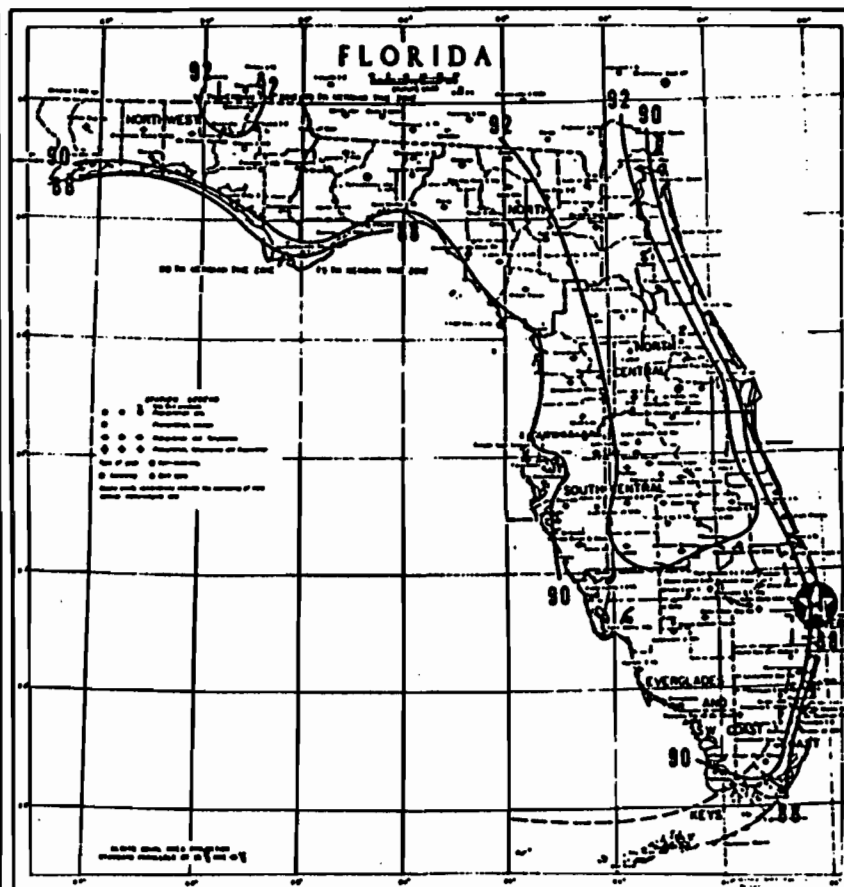
Data Source: CLIMATE OF THE STATES, Vol. 1, Water Information Center, Inc., 1974

MEAN MAXIMUM TEMPERATURE (°F.), JANUARY



Data are based on the period 1931-52. Isotherms are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

MEAN MAXIMUM TEMPERATURE (°F.), JULY



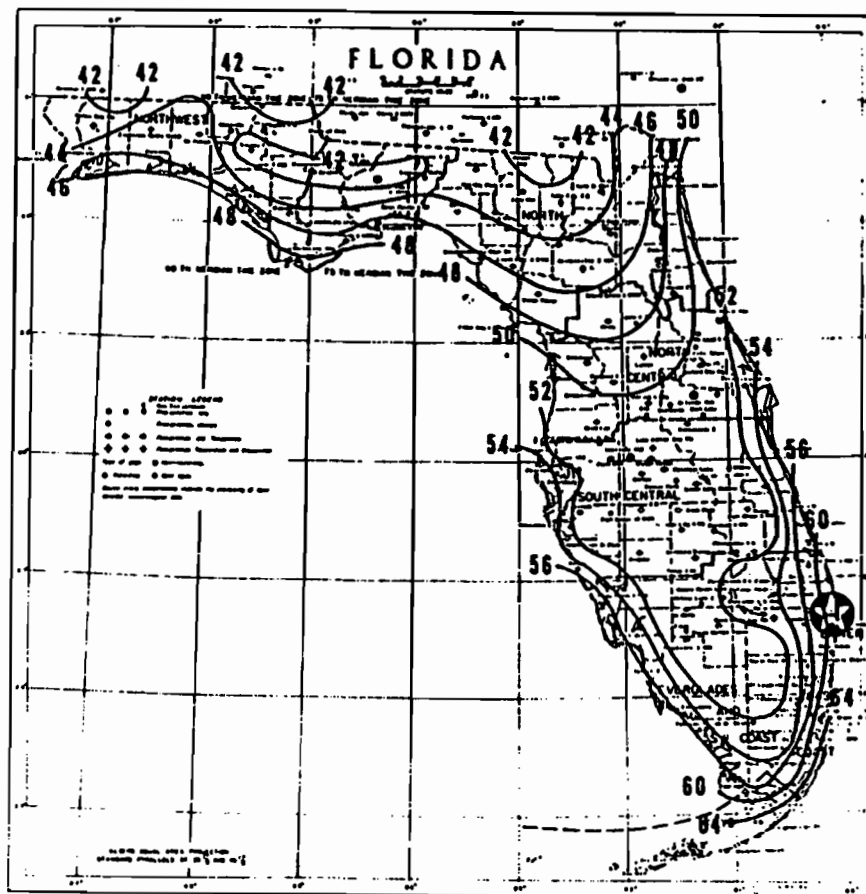
Data are based on the period 1931-52. Isotherms are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

Data Source: CLIMATE OF THE STATES, VOL. 1, Water Information Center, Inc., 1974



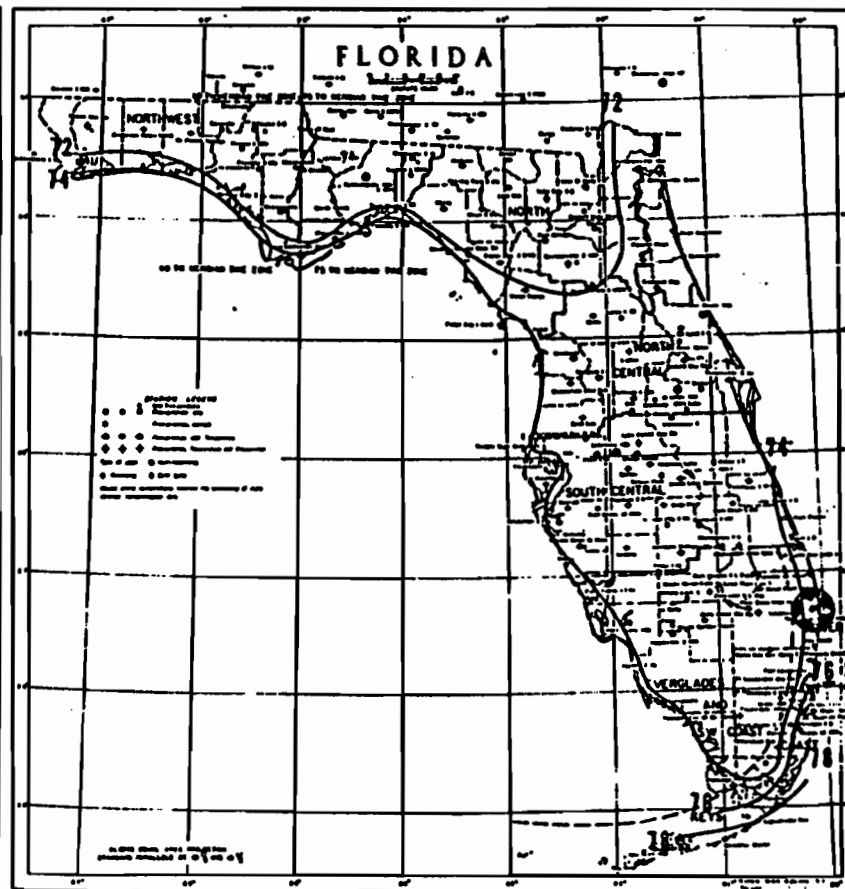
FIGURE 5.4

MEAN MINIMUM TEMPERATURE (°F.), JANUARY



Data are based on the period 1931-52. Isotherms are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

MEAN MINIMUM TEMPERATURE (°F.), JULY



Data are based on the period 1931-52. Isotherms are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

FREQUENCY OF TROPICAL STORMS BY YEARS IN FLORIDA

Year	Of Known Hurricane Intensity	Not or Of Doubtful Hurricane Intensity	Total	Year	Of Known Hurricane Intensity	Not or Of Doubtful Hurricane Intensity	Total
1885	3	1	4	1930	0	1	1
1886	3	1	4	1931	0	0	0
1887	1	1	2	1932	1	1	2
1888	2	1	3	1933	2	2	4
1889	1	2	3	1934	0	0	0
1890	0	0	0	1935	3	0	3
1891	1	1	2	1936	1	2	3
1892	0	2	2	1937	0	3	3
1893	3	2	5	1938	0	1	1
1894	2	1	3	1939	1	1	2
1895	1	3	4	1940	0	0	0
1896	3	0	3	1941	1	1	2
1897	0	1	1	1942	0	0	0
1898	2	0	2	1943	0	0	0
1899	1	2	3	1944	1	0	1
1900	0	1	1	1945	2	1	3
1901	0	2	2	1946	1	1	2
1902	0	1	1	1947	2	1	3
1903	1	0	1	1948	2	0	2
1904	1	0	1	1949	1	0	1
1905	0	0	0	1950	2	2	4
1906	3	1	4	1951	0	1	1
1907	0	1	1	1952	0	1	1
1908	0	0	0	1953	1	2	3
1909	1	1	2	1954	0	0	0
1910	1	0	1	1955	0	0	0
1911	1	1	2	1956	1	0	1
1912	1	0	1	1957	0	3	3
1913	0	0	0	1958	0	1	1
1914	0	0	0	1959	0	2	2
1915	1	1	2	1960	1	2	3
1916	3	0	3	1961	0	0	0
1917	1	0	1	1962	0	0	0
1918	0	0	0	1963	0	1	1
1919	1	1	2	1964	3	2	5
1920	0	1	1	1965	1	1	2
1921	1	0	1	1966	2	0	2
1922	0	0	0	1967	0	0	0
1923	0	1	1	1968	4	0	4
1924	2	1	3	1969	1	1	2
1925	1	0	1	1970	1	1	2
1926	3	0	3	1971	0	0	0
1927	0	0	0				
1928	3	0	3				
1929	1	0	1	Total	84	66	150

CHANCES OF HURRICANE FORCE WINDS IN ANY GIVEN YEAR

City	Chances	City	Chances
Jacksonville	1 in 100	Key West	1 in 8
Daytona Beach	1 in 50	Fort Myers	1 in 11
Melbourne-Vero Beach	1 in 20	Tampa-St. Petersburg	1 in 25
Palm Beach	1 in 7	Apalachicola-St. Marks	1 in 17
Miami	1 in 6	Pensacola	1 in 8

Data Source: CLIMATE OF THE STATES, Vol. 1, Water Information Center, Inc., 1974

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



EXHIBIT TABLE 5.1

Regional Climatology

There are two full time, full service weather stations within 100 km of the proposed facility:

- ° Palm Beach International Airport
- ° Miami International Airport

The Palm Beach International Airport is approximately 9.5 kilometer (5.9 miles) southeast of the proposed facility. The Miami International Airport is approximately 100 kilometers (62 miles) south of the proposed facility. Both stations lie within the Florida lower east coast climatological regime.

Meteorological normals for these two stations are shown in Exhibit Tables 5.2 and 5.3. The meteorological data from the Palm Beach International Airport can be considered representative of the site location for the purpose for air quality modeling analyses. While surface weather data are available from the Palm Beach International Airport, Miami International Airport is the closest available station with recorded upper air data that can be considered as representative for modeling purposes.

A wind frequency distribution summarized for the data collection period from 1970-1974 is available for the Palm Beach International. The joint distribution of these data as a function of wind speed and direction are shown in Figure 5.5. A directional summary of these data in wind rose format is shown in Figure 5.6, along with the average speed for each direction.

The annual average wind speed derived from the 1970-1974 summary wind frequency distribution is approximately 4.27 m/s (9.6 mph). The highest average speed as a function of wind direction is approximately 5.83 m/s (13.0 mph) for winds from the ENE. The winds with the highest frequency of occurrence are from the E (17.2%). Winds from the E and ESE account for 27.3% of all occurrences and winds from an expanded sector ENE through SE account for 44.2% of all occurrences. The summary joint distributions of the wind directions and stability classes are shown in Figure 5.7 and 5.8. The proportion stable stability classes: 5 & 6 per total frequency for each wind direction exceeds 50% for the directions SSW through NW. These two classes are 62% of all the winds from the west (W). These two classes represent less than 20% of the observations for winds from the NNE through E.

The wind distribution, average speeds and stability category data are based on USDEP, COMM. NOAA, EDS, NCC STAR Program results. These data were used to generate annual impact concentrations.

The Summary by Hour analyses given in the monthly Local Climatological Data (LCD) for West Palm Beach for the period 1970 -1974 were used to generate seasonal diurnal distributions for the resultant wind directions and average wind speeds. Winter consists of all available data for the months of December, January and February. Spring consisted of all available data for the months of March, April and May, etc. The derived seasonal diurnal variations for wind direction are shown in Figure 5.9.

The diurnal variations of the wind directions for the spring and summer seasons are almost identical and uniquely different from the diurnal curve for

NORMALS, MEANS, AND EXTREMES

MIAMI, FL

INTERNATIONAL AIRPORT

EASTERN

25° 48' N

20° 16' W

7 FT

1978

[illegible]

Means and extremes above are from sailing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Airport locations: Highest temperature 100 in July 1942; lowest temperature 26 in October 1914, 210 in January 1940; minimum precipitation in 24 hours 12.50 in April 1942. City locations: Lowest temperature 27 in February 1937; maximum precipitation in 24 hours 15.00 in March 1913; fastest mile of wind 172 from the South in October 1950. Miami Beach (Allison Hospital): Fastest mile of wind 132 from the East, September 10, 1924.

WEST PALM BEACH, FL

PALM BEACH INTL AP

EASTERN

26° 41' N

80° 06' W

13 FT

1975

[illegible]

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows:
Highest temperature 101° in July 1942.

Data Source:

CLIMATOGRAPHY OF THE UNITED STATES NO. 60

Climate of Florida

NOAA, EDS, NCC, October, 1976

(a) Length of record, years, through the current year unless otherwise noted, based on January date.

(b) 70° and above at station stations.
* less than one half.
: trace.

NORMAL 1 - Based on record for the 1961-1970 period.

DATE OF AN EXTALME - The most recent, in cases of multiple occurrence.

PREVAILING WIND DIRECTION - Record through 1962.

WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.

FASTEST WIND - Speed is fastest observed 1-minute value
when the direction is in tenths of degrees



* NORMALS BY CLIMATOLOGICAL DIVISIONS

Taken from "Climatology of the United States No. 81-4, Decennial Census of U. S. Climate"

STATIONS (By Division)	TEMPERATURE (°F)												PRECIPITATION (In.)													
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANNU	
LOWER EAST COAST																										
FORT LAUDERDALE	67.8	68.4	70.7	74.3	77.3	80.4	81.0	82.4	81.3	77.9	72.4	69.0	75.4	2.20	2.06	2.06	4.19	3.29	7.42	5.96	6.88	8.98	8.39	3.18	2.90	60.29
WHESTEAD EXP STA	65.6	66.9	69.2	72.8	75.9	79.2	80.2	80.7	80.0	76.3	70.7	66.9	73.7	1.79	1.71	2.38	3.69	4.44	6.77	8.81	8.29	6.61	8.72	2.28	1.22	66.69
MIAMI BEACH	69.1	69.6	71.6	76.9	78.2	81.1	82.3	82.9	81.7	78.4	73.8	70.3	76.2	1.68	1.65	1.99	2.92	4.54	5.63	6.63	5.06	7.34	6.71	2.53	1.78	66.26
MIAMI WSO	66.9	67.9	70.3	74.2	77.4	80.0	81.0	82.3	81.3	77.8	72.4	68.1	75.1	2.03	1.87	2.27	3.88	4.44	7.37	6.73	6.97	9.47	8.21	2.83	1.67	59.76
MIAMI 12 SW	66.3	67.4	70.4	74.2	77.3	80.4	81.0	82.0	81.0	77.2	71.4	67.7	74.6	2.05	1.80	2.44	3.75	4.13	7.00	6.58	6.25	9.03	8.23	2.59	1.63	57.68
WEST PALM BEACH WSO	66.9	67.6	69.9	73.9	77.6	81.0	82.0	83.0	82.1	78.2	72.5	68.2	75.2	2.48	2.39	3.44	4.34	5.11	7.53	6.46	6.74	9.66	7.96	2.86	2.57	61.70
DIVISION	66.9	67.6	70.0	73.6	77.0	80.2	81.3	82.0	81.0	77.4	72.0	68.2	74.6	2.16	2.02	2.82	3.90	3.49	7.44	6.65	6.82	9.47	8.19	2.84	2.17	60.00
KEYS																										
KEY WEST WSO	69.6	70.4	72.5	75.8	79.0	81.0	83.3	83.4	82.3	79.0	74.1	70.4	76.6	1.53	1.98	1.77	2.48	2.73	3.97	4.16	4.33	6.73	5.82	2.80	1.69	39.99
KEY WEST	70.4	71.3	73.6	77.1	80.2	82.0	84.0	84.3	83.0	79.6	74.9	71.4	77.7	1.49	2.00	1.73	2.51	2.77	4.01	4.16	4.25	6.53	5.87	2.81	1.71	39.84
DIVISION	70.2	71.0	73.3	76.6	79.8	82.4	83.5	83.0	82.5	79.2	74.5	71.2	77.2	1.71	1.88	1.92	2.29	3.10	4.33	4.54	4.68	7.05	6.73	2.43	1.88	42.55

* Normals for the period 1931-1960. Divisional normals may not be the arithmetical average of individual stations published, since additional data for shorter period stations are used to obtain better areal representation.

CONFIDENCE - LIMITS

In absence of trend or record changes, the chances are 9 out of 10 that the true mean will lie in the interval formed by adding and subtracting the values in the following table from the means for any station in the State. Because of the wider variation in mean precipitation, the corresponding monthly means and annual mean must be substituted for "p" in the precipitation table below to obtain mean precipitation confidence limits.

1.3	1.3	1.1	.8	.5	.4	.4	.3	.4	.5	.8	1.2	.4	39/p	37/p	44/p	46/p	47/p	48/p	38/p	43/p	33/p	38/p	44/p	35/p	44/p

COMPARATIVE DATA

Data in the following table are the mean temperature and average precipitation for St. Leo's Abbey, Florida, for the period 1901-1930 and are included in this publication for comparative purposes.

66.3	61.7	66.3	70.6	73.8	79.2	80.8	80.7	79.2	73.2	65.4	60.3	71.1	2.87	2.54	2.90	2.20	4.44	8.19	8.22	8.46	6.91	3.70	2.20	2.51	55.16

Data Source: CLIMATE OF THE STATES, Vol. 1, Water Information Center, Inc., 1974

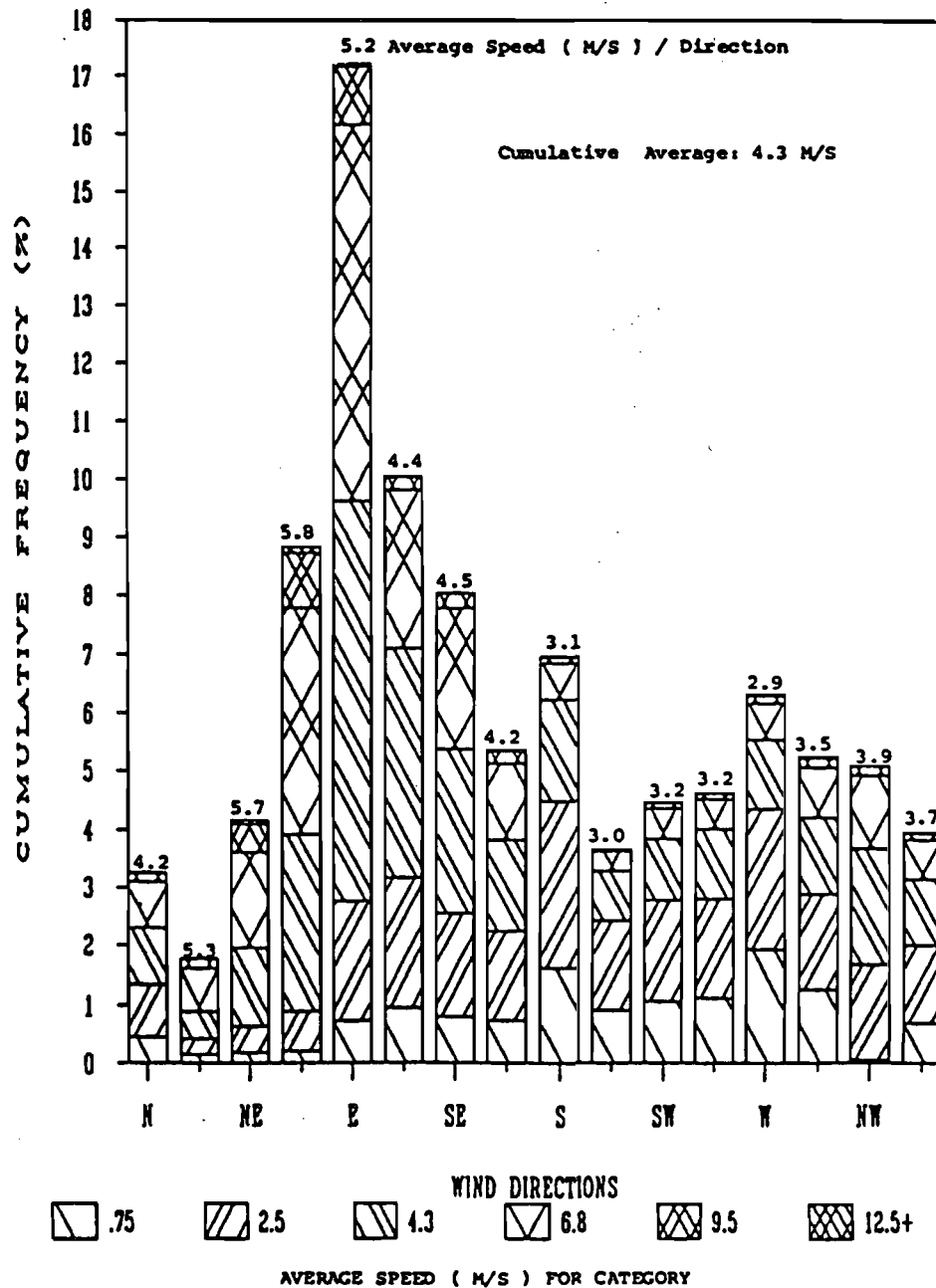
PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



EXHIBIT TABLE 5.3

WIND SPEED FREQUENCY DISTRIBUTIONS

WEST PALM BEACH, FL. (1970-1974)



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY

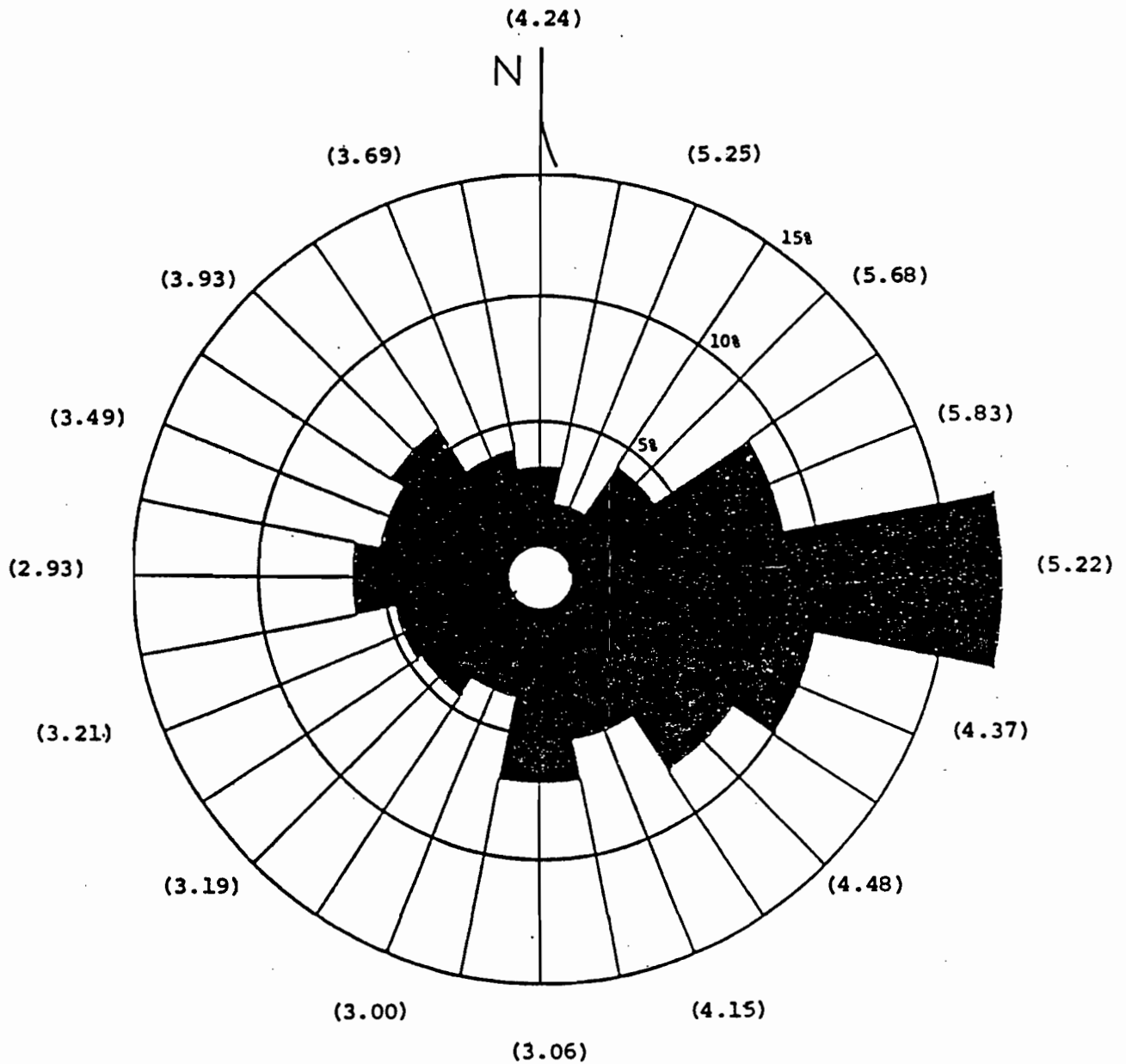


FIGURE 5.5

WIND DIRECTION FREQUENCY DISTRIBUTION

WEST PALM BEACH: 1970-1974

(Annual Average Wind Speed: 4.3 M/S)



Average Wind Speed: (m/s)

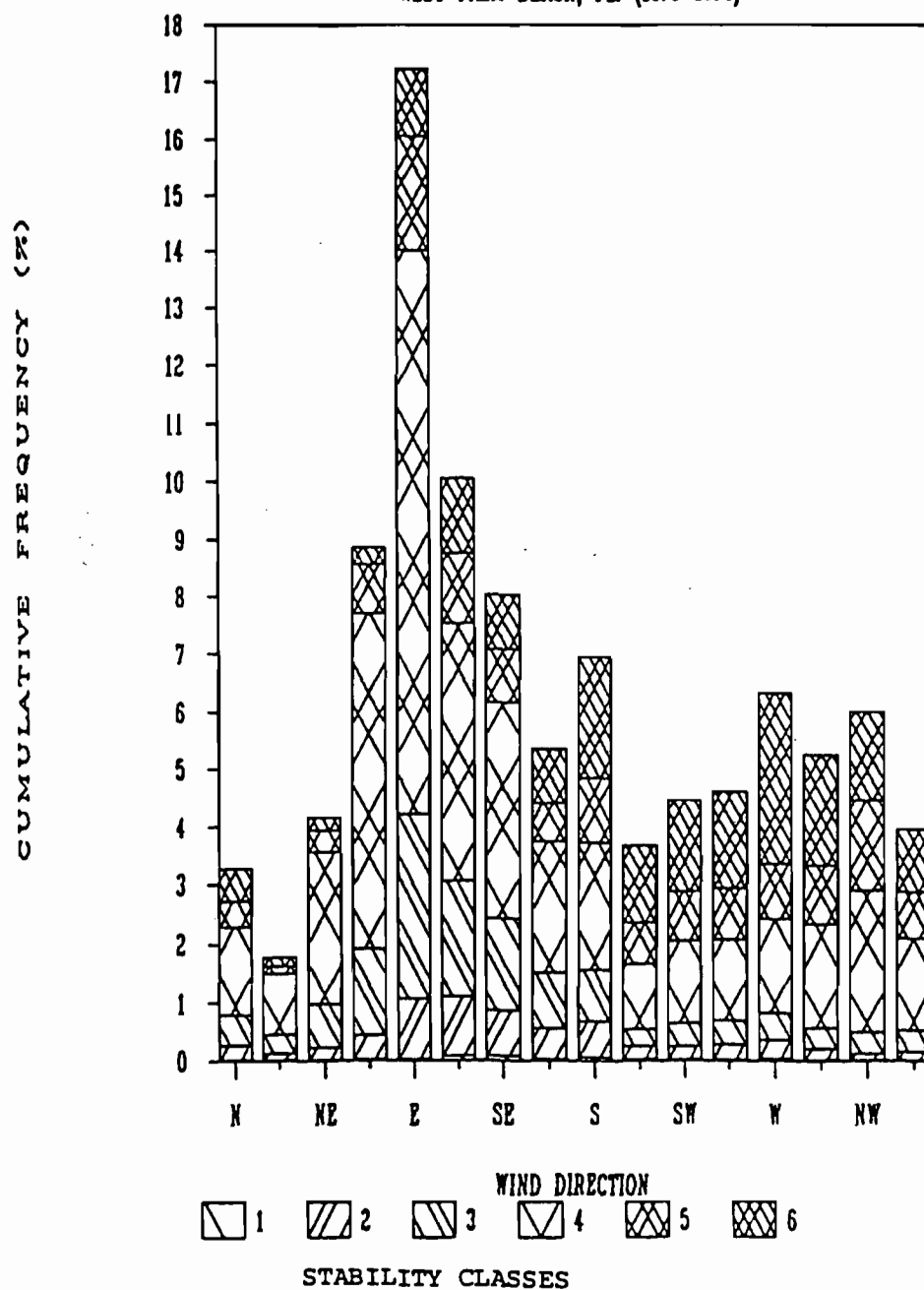
PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



FIGURE 5.6

STABILITY CLASS FREQUENCY DISTRIBUTIONS

WEST PALM BEACH, FL. (1970-1974)



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY

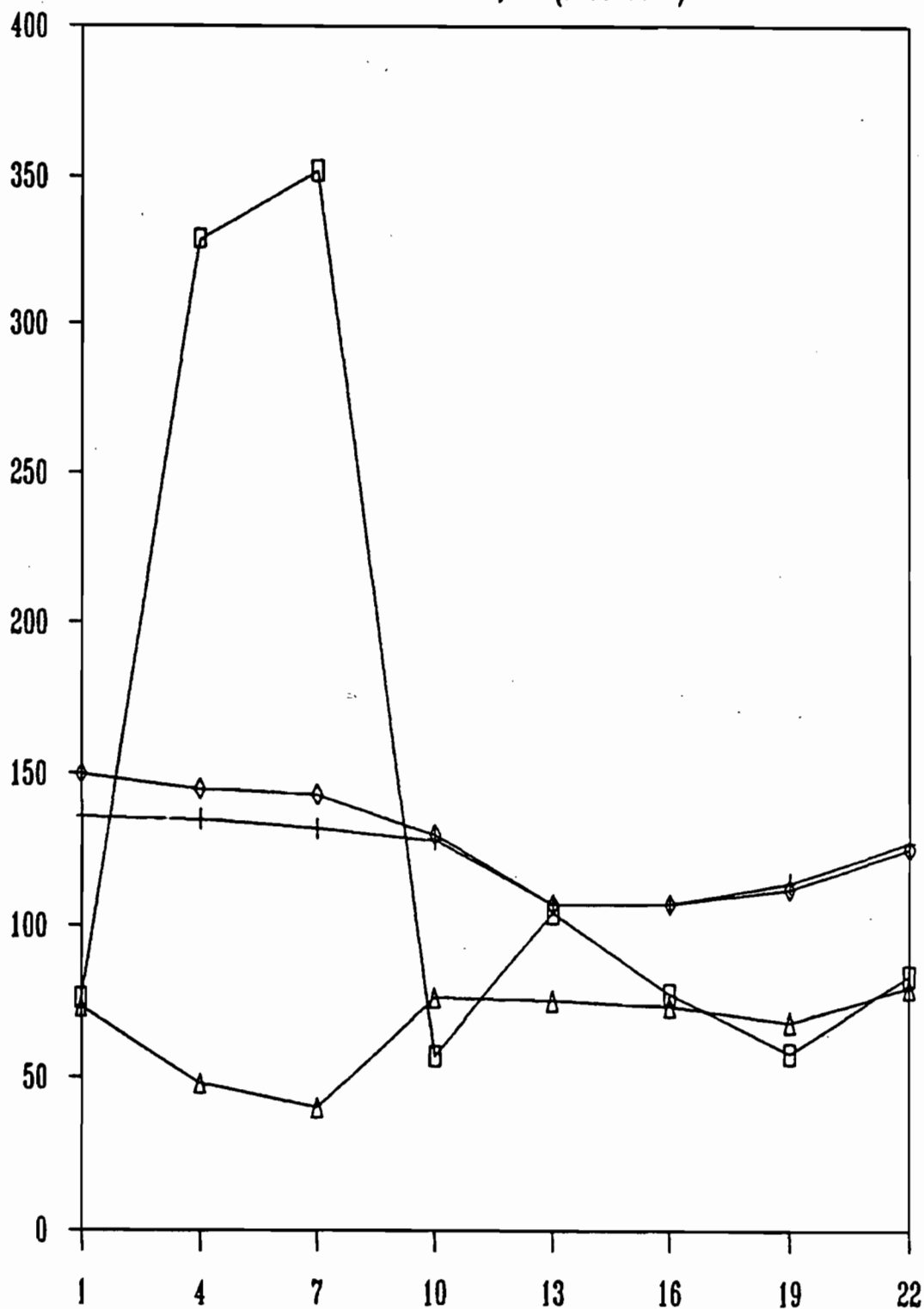


FIGURE 5.7

SEASONAL DIURNAL WIND DIRECTIONS

WEST PALM BEACH, FL. (1970-1974)

AVERAGE RESULTANT WIND DIRECTION



HOUR OF DAY (EST)

□ WINTER

+ SPRING

◇ SUMMER

Δ FALL

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



FIGURE 5.8

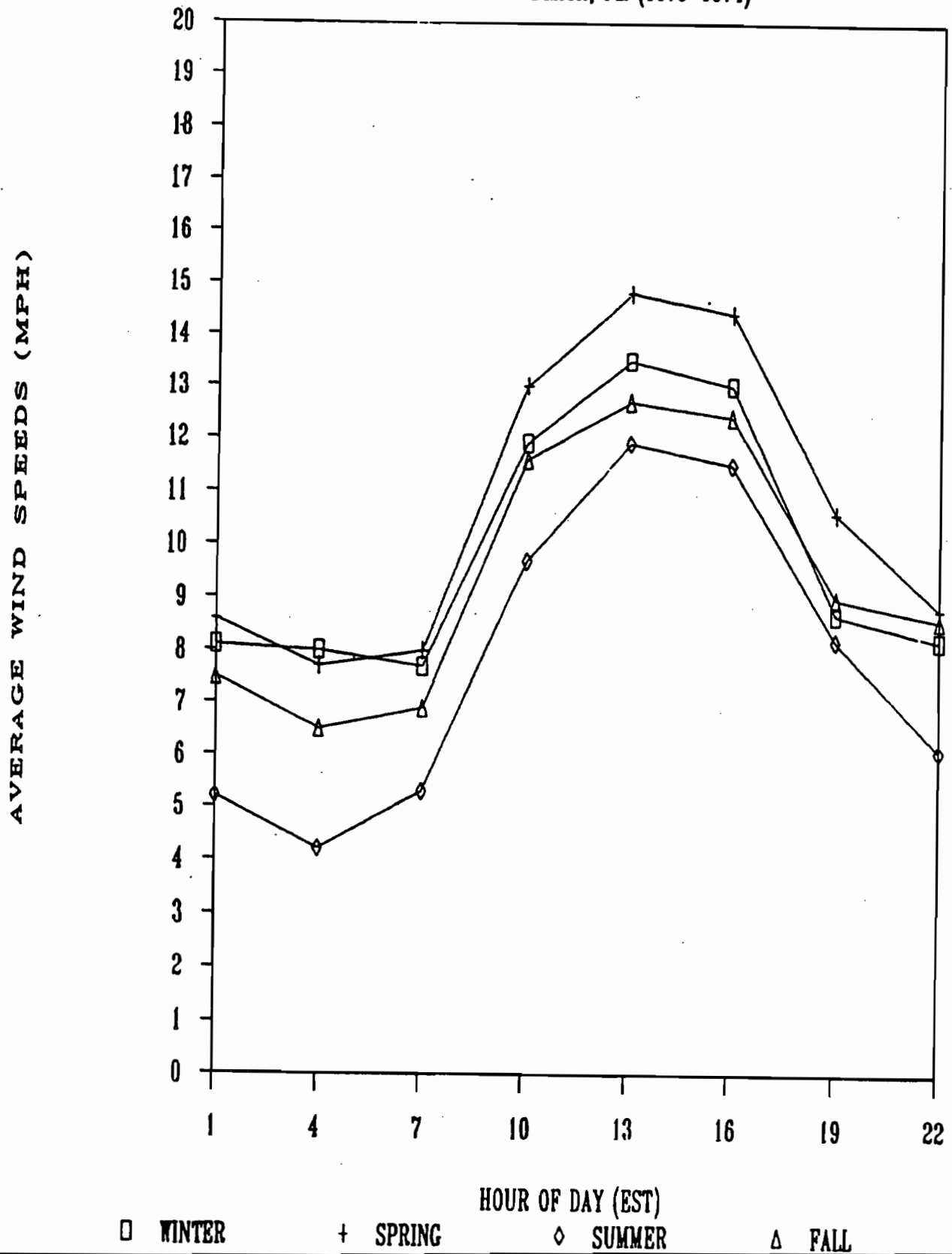
the fall season. The winter season curve is erratic particularly during the early morning hours, but tends to correspond with that of the fall season during the daylight and early evening hours.

The diurnal wind direction patterns give no indication of a diurnal shift that would be consistent with an ocean sea breeze. They, instead confirm the dominant easterly trade winds that were observed in the annual wind direction frequency roses. The seasonal diurnal wind speed distributions shown in Figure 5.9 all have the same general form. The minimum wind speeds occurred at or between 0400-0700. The minimum average speed was 1.9 m/s (4.3 mph) at 0400 during the summer season. The maximum wind speeds occurred at 1300. The highest average speed was 6.6 m/s (14.8 mph) during the spring season. The spring season (except at 0400) has the highest diurnal average wind speeds and the summer season (without exception) has the lowest diurnal average wind speed.

Seasonal mixing heights for the West Palm Beach, based on G.C. Holtzworth, differ slightly from those of Miami when they are extracted from Holtzworth's isopheth maps. These values are given in Exhibit Table 5.4.

SEASONAL DIURNAL WIND SPEEDS

WEST PALM BEACH, FL (1970-1974)



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



FIGURE 5.9

EXHIBIT TABLE 5.4

HOLTZWORTH* MIXING HEIGHTS FOR WEST PALM BEACH AND MIAMI

<u>PERIOD</u>	<u>MORNING</u>		<u>AFTERNOON</u>	
	<u>WEST PALM</u>	<u>MIAMI#</u>	<u>WEST PALM</u>	<u>MIAMI#</u>
ANNUAL	800	923	1375	1351
SPRING	800	980	1400	1457
SUMMER	900	1071	1400	1383
FALL	800	933	1350	1341
WINTER	700	707	1175	1221

*G.C. Holtzworth, Mixing Heights, Winds Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States: USEPA AP-101, January, 1972.

#APPENDIX B, Table B-1; all cases, Holtzworth, 1972.

5.4.2 Available Sources of Meteorological Data

When refined dispersion modeling analyses are performed, a full year (or more) of meteorological data is required. The short-term dispersion models require hour-by-hour meteorological data and the long-term models require seasonal or annual average data. The meteorological parameters needed include wind direction, wind speed, temperature, cloud cover, solar insolation, and mixing height. Mixing height is calculated using the CRSTER preprocessor program from surface temperature and upper air soundings of the rate of temperature change with height, the latter of which are usually obtained by balloon measurements.

The nearest NWS station to the proposed waste-to-energy facility is West Palm Beach Airport which is located 9.5 kilometers (5.9 miles) to the southeast. The nearest NWS station for upper air data is Miami Airport located 100 kilometers (62 miles) to the south. The Florida DER provided the most recent five-year surface and upper air meteorological data for the years 1970 thru 1974 inclusive and these data were used for the ISCST model runs.

5.4.3 Procedures for Using the Meteorological Data

Each of the five years of hourly meteorological data are used in separate refined modeling analyses to determine the maximum impacts of the proposed source by itself. The meteorological days which produced the 50 maximum 1, 3, 8 and 24-hour impacts for each of the 5 years were used in subsequent refined multisource modeling analyses to determine compliance with NAAQS consumption. Tables 5-5A thru E list these days for each of the years 1970 thru 1974. These results have been replaced by refined multisource modeling based all hourly meteorological data available.

5.5 Receptor Selection

5.5.1 Procedures for Receptor Selection

Receptor selection is an important part of the modeling analysis. Receptors must be selected in such a manner as to ensure that all possible locations of maximum impact are included in the analysis. This can be accomplished by developing receptor grids, supplemented by discrete receptors at critical locations, if necessary. Two types of receptor grids can be used, rectangular or polar.

With a rectangular grid, receptors are placed at the intersections of a selected set of equally spaced map coordinate lines, where the lines are oriented north/south and east/west. The selected set of receptors is usually centered on the proposed source and extends outward a prescribed distance. Available map coordinate systems include latitude/longitude, Universal Transverse Mercator (UTM) meters, and State grid feet. With a polar grid, receptors are placed at the intersections of radials that extend out from the proposed source. In order to develop a polar receptor grid, the PTPLU and PTDIS models were first used to predict maximum hourly impacts of the proposed source, based on PTPLU's built-in set of hypothetical meteorological data. For this analysis, the receptor elevation in PTPLU is set equal to the highest terrain elevation found within 1 kilometer of the proposed source's stack. The proposed source is modeled using PTPLU to determine the distances (without regard to direction) at which

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TABLE 5-5A

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1970

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
49	20	60	33	20	215
155	32	61	60	32	216
161	33	73	61	33	218
164	60	76	121	49	224
175	73	121	129	60	226
176	121	152	242	61	228
180	139	194	269	73	231
187	218	211	270	76	239
190	224	215	279	121	241
216	226	226	280	129	242
306	228	231	292	139	269
318	231	241	328	152	270
	239	270	342	161	274
	241	291		164	279
	270	342		175	280
	274			176	291
	342			180	292
				187	306
				190	318
				194	328
				211	342

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TABLE 5-5B

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1971

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
104	19	33	19	19	196
148	34	58	33	33	207
157	58	114	34	34	211
162	85	186	58	58	214
166	111	214	101	85	215
168	114	268	268	101	220
171	168	309	310	104	256
172	172	319	319	111	268
176	191	320	320	114	309
195	193	321	321	148	319
196	207	327	327	157	320
211	220	336	335	162	321
215	309	353	357	166	327
220	319	357		168	335
256	320	358		171	336
319	353	359		172	353
	356			176	356
	357			186	357
	359			191	358
				193	359
				195	

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TABLE 5-5C

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1972

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
40	16	71	71	16	183
75	17	81	101	17	193
88	62	95	119	40	195
103	71	100	120	62	206
170	94	101	127	71	209
172	95	126	168	75	212
183	100	127	170	81	215
193	101	170	174	88	218
195	119	209	285	94	225
206	126	280	295	95	228
215	127	285	296	100	232
218	133	286	306	101	233
225	169	287		103	280
228	170	294		119	285
232	171	295		120	286
233	193			126	287
	209			127	294
	212			133	295
	233			168	296
	280			169	306
	294			170	351
	295			171	353
	296			172	356
	351			174	
	353				
	356				

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TABLE 5-5D

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1973

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
119	17	17	17	17	177
132	29	29	32	29	179
142	33	32	74	32	182
143	64	33	84	33	186
167	94	74	105	64	189
177	97	84	106	74	191
182	104	97	107	84	209
186	105	104	108	94	217
187	107	106	110	97	221
189	108	107	111	104	234
191	110	108	284	105	258
209	111	111	285	106	259
217	112	121	294	107	261
221	132	122	295	108	262
234	179	123		110	266
258	186	179		111	267
262	259	287		112	284
266	261	294		119	285
267	266	314		121	287
	284	315		122	294
	285			123	295
	296			132	296
	314			142	314
	315			143	315
	355			167	355

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TABLE 5-5E

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1974

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
80	39	65	74	39	197
90	47	73	101	47	201
127	73	74	110	65	204
133	74	101	111	73	205
155	83	102	277	74	208
158	92	103	278	80	211
173	101	110	285	83	222
197	102	111	294	90	229
201	111	115	295	92	231
204	115	137	357	101	234
205	130	184		102	247
208	161	278		103	256
211	170	279		110	265
222	184	294		111	267
229	265	295		115	277
231	277	296		127	278
234	278	330		130	279
247	284	357		133	284
256	295			137	285
267	306			155	294
				158	295
				161	296
				170	306
				173	330
				184	357

maximum impacts occur. All maximum distances were approximated as rings in the ISCST modeling with additional rings at prudent intervals.

A polar grid was used in the screening model analyses to determine the size of the modeling area. A polar grid was also used on the refined RDF source and multisource modeling analyses. Discrete receptors were placed at ambient air quality monitoring stations within the study area. Table 5-6 lists the monitoring stations together with the pollutions that are monitored at each site. When additional refined modeling was performed, these discrete receptors were supplimented by the location of the specific sources and the nearest point of impact of the Class I area: Everglades National Park. The UMT coordinates for all the discrete receptors are shown in Table 5-6A.

5.6 Modeling Procedures and Preliminary Analysis Results

5.6.1 PTPLU and PTDIS Screening Modeling Analyses

The initial screening modeling analyses were performed to determine the critical downward distances using PTPLU and PTDIS models. All receptors and the proposed facility were assumed to be at zero elevations. Maximum impacts depending on stability class were identified at 571, 926, 1046 and 1615 meters. 571 meters is within the facility boundaries.

5.6.2 ISCST Modeling Analyses

Initial modeled impacts were calculated at 27 concentric rings of receptors centered on the proposed waste to energy facility stack and spaced at every 6° azimuth. The ring distances from the stack were selected based on the results of the earlier screening modeling analyses performed using the PTPLU model with the source located at UMT coordinate 2960180 N. Supplemental model impacts were generated when the location of the source was moved due north from UMT coordinate 2960180 N to 2960474 N. These SO₂ impacts were calculated on a 1-hour, 3-hour, 8-hour, 24-hour and annual average basis using ISCST. SO₂ impacts were calculated for each of the five years (1970 through 1974) of available meteorological data. The impacts of each of the other pollutants emitted by the facility were determined based on the ratio of the emission rate of the other pollutant versus the appropriate SO₂ emission rate.

Refined multisource runs were performed for the existing sources in Table 5-7 to determine the maximum combined SO₂ impacts of all sources. Also included in Table 5-7 are the stack parameters and UTM coordinates for each source. Since single source ISCST modeling determined that the proposed source did not produce significant short-term SO₂ impacts upon the existing sources (see Tables 5-8 and 5-8A) only the impacts of the existing sources in combination with the proposed source downwind of the proposed source were evaluated by ISCST. Downwind radials were located at the angle

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TABLE 5-6

**MONITORING STATION LOCAL ADDRESSES, UTM COORDINATES AND LOCATION (DISTANCE & ANGLE)
RELATIVE TO THE PROPOSED PALM BEACH COUNTY RDF FIRED WATERWALL FURNACE FACILITY**

(FACILITY UTM COORDINATES: 2960474N; 585820E; UTM ZONE 17)

SITE NO.	ADDRESS (MONITORING CAPABILITY)	UTM COORDINATES ZONE 17	DISTANCE FROM PROPOSED FACILITY (METERS)	DIRECTION RELATIVE TO PROPOSED FACILITY (NORTH = 0 (360) DEGREES) (DEGREES)
1 (4760-001)	WEST PALM BEACH WATER TREATMENT PLANT FIRST STREET & TAMARIND AVENUE WEST PALM BEACH, FLORIDA (CO, NO2, METEOROLOGY)	2955030N 0593232E	9197	126
1 A (4760-003)	PALM BEACH COUNTY HEALTH DEPARTMENT 901 EVERNIA STREET WEST PALM BEACH, FLORIDA (SUSPENDED PARTICULATE)	2955030N 0593232E	9197	126
2 (3060-001)	NORTH PALM BEACH WATER TREATMENT PLANT 603 ANCHORAGE DRIVE NORTH PALM BEACH, FLORIDA (SUSPENDED PARTICULATE)	2965817N 0592780E	8774	053
3 (2220-001)	LAKE WORTH WATER TREATMENT PLANT 301-303 COLLEGE STREET LAKE WORTH, FLORIDA (SUSPENDED PARTICULATE)	2943537N 0592793E	18316	158
4 (1000-002)	DELRAY BEACH WATER TREATMENT PLANT 202 NW FIRST STREET DELRAY BEACH, FLORIDA (SUSPENDED PARTICULATE)	2927488N 0592195E	33596	169
5 (0280-001)	POCA RATON FIRE STATION #1 1151 NORTH FEDERAL HIGHWAY POCA RATON, FLORIDA (SUSPENDED PARTICULATE)	2915768N 0591313E	45042	173

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TABLE 5.6 Cont'd

MONITORING STATION LOCAL ADDRESSES, UTM COORDINATES AND LOCATION (DISTANCE & ANGLE)
RELATIVE TO THE PROPOSED PALM BEACH COUNTY RMF FIRED WATERFALL FURNACE FACILITY

(FACILITY UTM COORDINATES: 2960474N; 585820E; UTM ZONE 17)

SITE NO.	ADDRESS (MONITORING CAPABILITY)	UTM COORDINATES ZONE 17	DISTANCE FROM PROPOSED FACILITY (METERS)	DIRECTION RELATIVE TO PROPOSED FACILITY (NORTH = 0 (360) DEGREES) (DEGREES)
6 (3420-005)	SOUTHWEST FIRE DEPARTMENT 1108 SOUTH MILITARY TRAIL WEST PALM BEACH, FLORIDA (SUSPENDED PARTICULATE)	2949018N 0588207E	11702	168
7 (0280-002)	COLLEGE OF BOCA RATON SOUTH MILITARY TRAIL BOCA RATON, FLORIDA (SUSPENDED PARTICULATE)	2918354N 0587320E	42147	178
8 (3420-006)	SOUTH FLORIDA WATER MANAGEMENT PUMP STATION TWENTY MILE BEND STATE ROAD 80 (SUSPENDED PARTICULATE, OZONE, METEOROLOGY)	2951402N 0562879E	24669	248
9 (3340-001)	PAHOKEE SEWAGE TREATMENT PLANT 1050 McCLURE ROAD PAHOKEE, FLORIDA (SUSPENDED PARTICULATE)	2964200N 0532300E	53650	274
10 (3420-007)	ROYAL PALM BEACH R.V. AREA 10999 OKEECHOBEE BOULEVARD ROYAL PALM BEACH, FLORIDA (OZONE, METEOROLOGY)	2954150N 0578100E	9980	231
11 (3840-003)	PALM BEACH COUNTY HEALTH DEPARTMENT WAREHOUSE 2030 AVENUE "L" RIVIERA BEACH, FLORIDA (SULFUR DIOXIDE)	2962350N 0592480E	6919	074
12 (0240-003)	BELLE GLADE HEALTH DEPARTMENT 1024 NW AVENUE "D" BELLE GLADE, FLORIDA (SUSPENDED PARTICULATE)	2953082N 0533160E	53176	262

TABLE 5-6A

DISCRETE RECEPTOR SEQUENCE
 RFD FACILITY UMT COORDINATES: 2960474 N; 585820 E
 UMT ZONE 17

<u>STATION</u> <u>SAROAD NO.</u>	<u>SITE NO.</u>	<u>UNIT COORD.</u> <u>(ZONE 17)</u>	<u>STATION</u> <u>SAROAD NO.</u>	<u>SITE NO.</u>	<u>UNIT COORD.</u> <u>(ZONE 17)</u>
4760-001	1 & 1A	2955030 N	3060-001	2	2965817 N
4760-003		0593232 E			0592780 E
2220-001	3	2943537 N 0592793 E	1000-002	4	2927488 N 0592195 E
0280-001	5	2915768 N 05913137 E	3420-005	6	2949018 N 0588207 E
0280-002	7	2918354 N 0587320 E	3420-006	8	2951402 N 0562879 E
3340-001	9	2964200 N 0532300 E	3420-007	10	2951402 N 0578100 E
3840-003	11	2962350 N 0592480 E	0240-003	12	2953082 N 0533160 E

ADDITIONAL RECEPTORS

EVERGLADES NATIONAL PARK	2848635 N 0533619 E	PRATT & WHITNEY	2974400 N 0565500 E
FLORIDA POWER & LIGHT	2960600 N 0594200 E	LAKE WORTH UTILITIES	2943700 N 0592800 E

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TABLE 5-8

SO₂ IMPACT OF THE PROPOSED FACILITY ON EXISTING MAJOR SO₂ SOURCES
WITHIN THE MODELING AND SCREENING AREA

(FACILITY UTM COORDINATES: 2960474N; 585820E; UTM ZONE 17)

SOURCE NO.	NAME & ADDRESS	DISTANCE (METERS)/ DIRECTION (DEGREES) (NORTH = 0 (360) DEGREES) RELATIVE TO PROPOSED FACILITY	MET YEAR	MAXIMUM IMPACT OF PROPOSED FACILITY ON THE EXISTING SOURCE (UG/M ³)		
				3-HOUR ⁽¹⁾	24-HOUR ⁽¹⁾	ANNUAL MEAN
1	PRATT & WHITNEY 301-303 COLLEGE STREET LAKE WORTH, FLORIDA UTM ZONE 17; 2974400N; 0565500E	24634/304	1970	14.7	3.1	0.22
			1971	17.9	3.1	0.27
			1972	14.2	3.1	0.26
			1973	12.6	3.7	0.34
			1974	12.1	3.1	0.28
2	FLORIDA POWER & LIGHT RIVIERA BEACH, FLORIDA UTM ZONE 17; 2960600N; 0594200E	8381/089	1970	25.3	4.7	0.29
			1971	15.6	3.7	0.24
			1972	15.8	4.0	0.21
			1973	20.1	4.6	0.21
			1974	19.2	3.7	0.23
3	LAKE WORTH UTILITIES AUTHORITY TOM G. SMITH MUNICIPAL POWER PLANT 127 COLLEGE STREET LAKE WORTH, FLORIDA 33460 UTM ZONE 17; 2943700N; 0592800E	18168/157	1970	9.3	2.5	0.16
			1971	15.1	2.9	0.15
			1972	14.9	2.1	0.16
			1973	13.6	3.6	0.20
			1974	12.7	2.3	0.15

Note 1: Highest Second Highest Concentration (2100 TPD; 99.2 GMS⁻¹; 29.9 MS⁻¹)

Note 2: Average of N Days (1800 TPD; 85.1 GMS⁻¹; 21.3 MS⁻¹)

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ENGINEERS - PLANNERS

TABLE 5-8A

SO₂ IMPACTS OF COMBINED SOURCES ON EXISTING MAJOR SOURCES

(FACILITY UTM COORDINATES: 2960474N; 585820E; UTM ZONE 17)

SOURCE NO.	NAME & ADDRESS	DISTANCE (METERS)/ DIRECTION (DEGREES) (NORTH = 0 (360) DEGREES) RELATIVE TO PROPOSED FACILITY	MET YEAR	COMBINED SOURCES IMPACTS ON THE EXISTING SOURCES		
				3-HOUR (1)	24-HOUR (1)	ANNUAL MEAN (2)
1	PRATT & WHITNEY 301-303 COLLEGE STREET LAKE WORTH, FLORIDA UTM ZONE 17; 2974400N; 0565500E	24634/304	1970	273	69	3.2
			1971	163	32	3.0
			1972	195	36	3.2
			1973	163	35	3.4
			1974	179	41	3.4
2	FLORIDA POWER & LIGHT RIVIERA BEACH, FLORIDA UTM ZONE 17; 2960600N; 0594200E	8381/089	1970	329	42	3.2
			1971	483	73	4.8
			1972	306	61	4.3
			1973	283	61	4.5
			1974	359	61	4.7
3	LAKE WORTH UTILITIES AUTHORITY TOM G. SMITH MUNICIPAL POWER PLANT 127 COLLEGE STREET LAKE WORTH, FLORIDA 33460 UTM ZONE 17; 2943700N; 0592800E	18168/157	1970	156	26	1.8
			1971	80	17	1.8
			1972	349	55	2.7
			1973	163	23	1.9
			1974	153	26	2.1

NOTE 1: Highest Second Highest (RDF: 2100TPD; 99.2 GMS⁻¹; 29.9 MS⁻¹)

NOTE 2: Average of N Days (RDF: 1800TPD; 85.1 GMS⁻¹; 21.3 MS⁻¹)

from each existing source to the proposed source and at 1° increments and decrements to + 5° or an 11° sector downwind of the proposed source. Rings were selected from the minimum fence line distance of 730 meters and for every 100 meters starting at 800 meters thru 2000 meters inclusive. This procedure yielded a total of 33 radials and 14 rings which were used for all the refined multisource ISCST model runs.

5.6.3 Modeling Results

The results of the five years of single source ISCST modeling analysis are summarized by year in Tables 5-9A thru E. Cumulative 5-year results are presented in Table 5-9F. The data in Table 5-9F show that the proposed facility will not produce any impacts that exceed ambient air quality standards or PSD requirements.

The results of five years of ISCST multisource modeling analysis are summarized in Table 5-10.

Table 5-11 provides an overall summary of both single and multisource impacts as well as background levels and the Air Quality and PSD standards and demonstrates that the proposed facility's air quality impact together with other sources will not exceed ambient air quality or PSD requirements. These results are portrayed in Figures 5-10 and 5-11.

TABLE 5-9A

**IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1970**

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES (1)

	1-HOUR (2) (1000M; 108D) (D175; P12)	3-HOUR (2) (1400M; 268D) (D218; P5)	8-HOUR (2) (1300M; 264D) (D231; P2)	24-HOUR (2) (1200M; 252D) (D121)	ARITHMETIC MEAN (3) (1400M; 268D)
CARBON MONOXIDE	152.0	100.0	78.6	34.6	5.1
NITROGEN DIOXIDE	50.8	33.5	26.3	11.6	1.7
SULFUR DIOXIDE	114.0	75.4 (76.7)*	59.1	26.0	3.8
CHLORIDES	44.5	29.3	23.0	10.1	1.5
VOLATILE ORGANIC COMPOUNDS	2.5	1.7	1.3 E-1	5.8 E-1	8.5 E-2
PARTICULATE MATTER	8.3	5.5	4.3	1.9	2.8 E-1
SULFURIC ACID MIST	5.1 E-3	3.3 E-3	2.6 E-3	1.2 E-3	1.7 E-4
FLUORIDES	5.1 E-1	3.4 E-1	2.6 E-1	1.2 E-1	1.7 E-2
LEAD	1.8 E-1	1.2 E-1	9.2 E-2	4.0 E-2	5.9 E-3
MERCURY	3.8 E-2	2.5 E-2	2.0 E-2	8.7 E-3	1.3 E-3
BERYLLIUM	1.1 E-4	7.5 E-5	5.9 E-5	2.6 E-5	3.8 E-6
2,3,7,8-TCDD	1.1 E-6	7.1 E-7	5.6 E-7	2.5 E-7	3.6 E-8

NOTES

1. Data developed by ISCST modeling the impacts of the SO₂ emission then multiplying The ratio of the component emission to the SO₂ emission by the maximum SO₂ impact to determine the component's impact.
 2. Based on 2100 TPD-fired; 99.2 gmsec⁻¹ SO₂; vs = 24.9 ms⁻¹
 3. Based on 1800 TPD-fired; 85.1 gmsec⁻¹ SO₂; vs = 21.3 ms⁻¹; 365 days
- * Value of 76.7 ug/m³ at 1200M; 267D (D226; P4)

TABLE 5-9B

**IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1971**

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES (1)

	1-HOUR (2) (730M; 096D) (D104; P12)	3-HOUR (2) (1200M; 324D) (D206; P5)	8-HOUR (2) (1300M; 268D) (D168; P2)	24-HOUR (2) (730M; 258D) (D327)	ARITHMETIC MEAN (3) (1400M; 269D)
CARBON MONOXIDE	176.0	89.8	58.8	29.9	3.3
NITROGEN DIOXIDE	58.7	30.0	19.6	10.0	1.1
SULFUR DIOXIDE	132.0	67.5 (71.3)*	44.2	22.5	2.5
CHLORIDES	51.3	26.3	17.2	8.8	9.6 E-1
VOLATILE ORGANIC COMPOUNDS	2.9	1.5	9.8 E-1	5.0 E-1	5.5 E-2
PARTICULATE MATTER	9.6	4.9	3.2	1.6	1.8 E-1
SULFURIC ACID MIST	5.8 E-3	3.0 E-3	2.0 E-3	1.0 E-3	1.1 E-4
FLUORIDES	5.9 E-1	3.0 E-1	2.0 E-1	1.0 E-1	1.1 E-2
LEAD	2.1 E-1	1.1 E-1	6.9 E-2	3.5 E-2	3.9 E-3
MERCURY	4.4 E-2	2.2 E-2	1.5 E-2	7.5 E-3	8.3 E-4
BERYLLIUM	1.3 E-4	6.8 E-5	4.4 E-5	2.3 E-5	2.5 E-6
2,3,7,8-TCDD	1.2 E-6	6.4 E-7	4.2 E-7	2.1 E-7	2.4 E-8

NOTES

1. Data developed by ISCST modeling the impacts of the SO₂ emission then multiplying The ratio of the component emission to the SO₂ emission by the maximum SO₂ impact to determine the component's impact.
 2. Based on 2100 TPD-fired; 99.2 gmsec⁻¹ SO₂; vs = 24.9 ms⁻¹
 3. Based on 1800 TPD-fired; 85.1 gmsec⁻¹ SO₂; vs = 21.3 ms⁻¹; 365 days
- * Value of 71.3 ug/m³ at 1300M; 273D (D168; P5)

TABLE 5-9C

**IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1972**

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES (1)

	1-HOUR (2) (730M; 264D) (D225; P12)	3-HOUR (2) (1300M; 060D) (D233; P4)	8-HOUR (2) (1400M; 300D) (D222; P2)	24-HOUR (2) (730M; 246D) (D295)	ARITHMETIC MEAN (3) (1500M; 268D)
CARBON MONOXIDE	180.0	93.1	55.3	27.4	3.4
NITROGEN DIOXIDE	60.3	31.1	18.5	9.2	1.2
SULFUR DIOXIDE	136.0	70.0	41.6	20.6	2.6
CHLORIDES	52.7	27.2	16.2	8.0	1.0
VOLATILE ORGANIC COMPOUNDS	3.0	1.6	9.2 E-1	4.6 E-1	5.7 E-2
PARTICULATE MATTER	9.8	5.1	3.0	1.5	1.9 E-1
SULFURIC ACID MIST	6.0 E-3	3.1 E-3	1.8 E-3	9.1 E-4	1.1 E-4
FLUORIDES	6.0 E-1	3.1 E-1	1.8 E-1	9.2 E-2	1.2 E-2
LEAD	2.1 E-1	1.1 E-1	6.5 E-2	3.2 E-2	4.0 E-3
MERCURY	4.5 E-2	2.3 E-2	1.4 E-2	6.9 E-3	8.6 E-4
BERYLLIUM	1.4 E-4	7.0 E-5	4.2 E-5	2.1 E-5	2.6 E-6
2,3,7,8-TCDD	1.3 E-6	6.6 E-7	3.9 E-7	2.0 E-7	2.5 E-8

NOTES

1. Data developed by ISCST modeling the impacts of the SO₂ emission then multiplying the ratio of the component emission to the SO₂ emission by the maximum SO₂ impact to determine the component's impact.
2. Based on 2100 TPD-fired; 99.2 gmsec⁻¹ SO₂; vs = 24.9 ms⁻¹
3. Based on 1800 TPD-fired; 85.1 gmsec⁻¹ SO₂; vs = 21.3 ms⁻¹; 366 days

TABLE 5-9D

**IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1973**

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES (1)

	1-HOUR (2) (730M; 054D) (D187; P11)	3-HOUR (2) (1300M; 274D) (D123; P5)	8-HOUR (2) (1300M; 294D) (D247; P2)	24-HOUR (2) (730M; 269D) (D107)	ARITHMETIC MEAN (3) (1500M; 270D)
CARBON MONOXIDE	182.0	88.6	56.4	31.3	3.6
NITROGEN DIOXIDE	60.8	29.6	18.8	10.4	1.2
SULFUR DIOXIDE	137.0	66.6	42.4	23.5	2.7
CHLORIDES	53.2	25.9	16.5	9.1	1.1
VOLATILE ORGANIC COMPOUNDS	3.0	1.5	9.4 E-1	5.2 E-1	6.0 E-2
PARTICULATE MATTER	9.9	4.8	3.1	1.7	2.0 E-1
SULFURIC ACID MIST	6.1 E-3	3.0 E-3	1.9 E-3	1.0 E-3	1.2 E-4
FLUORIDES	6.1 E-1	3.0 E-1	1.9 E-1	1.0 E-1	1.2 E-2
LEAD	2.1 E-1	1.0 E-1	6.6 E-2	3.7 E-2	4.2 E-3
MERCURY	4.6 E-2	2.2 E-2	1.4 E-2	7.8 E-3	9.0 E-4
BERYLLIUM	1.4 E-4	6.7 E-5	4.2 E-5	2.4 E-5	2.7 E-6
2,3,7,8-TCDD	1.3 E-6	6.3 E-7	4.0 E-7	2.2 E-7	2.6 E-8

NOTES

1. Data developed by ISCST modeling the impacts of the SO₂ emission then multiplying The ratio of the component emission to the SO₂ emission by the maximum SO₂ impact to determine the component's impact.
2. Based on 2100 TPD-fired; 99.2 gmsec⁻¹ SO₂; vs = 24.9 ms⁻¹
3. Based on 1800 TPD-fired; 85.1 gmsec⁻¹ SO₂; vs = 21.3 ms⁻¹; 365 days

TABLE 5-9E

**IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1974**

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES (1)

	1-HOUR (2) (730M; 078D) (D127; P11)	3-HOUR (2) (1500M; 276D) (D184; P5)	8-HOUR (2) (730M; 258D) (D101; P2)	24-HOUR (2) (1300M; 246D) (D110)	ARITHMETIC MEAN (3) (1400M; 270D)
CARBON MONOXIDE	176.0	91.6	59.6	36.4	3.6
NITROGEN DIOXIDE	58.9	30.6	19.9	12.2	1.2
SULFUR DIOXIDE	133.0	68.9	44.8	27.4	2.7
CHLORIDES	51.6	26.8	17.4	10.7	1.1
VOLATILE ORGANIC COMPOUNDS	2.9	1.5	9.9 E-1	6.1 E-1	6.1 E-2
PARTICULATE MATTER	9.6	5.0	3.2	2.0	2.0 E-1
SULFURIC ACID MIST	5.9 E-3	3.1 E-3	2.0 E-3	1.2 E-3	1.2 E-4
FLUORIDES	5.9 E-1	3.1 E-1	2.0 E-1	1.2 E-1	1.2 E-2
LEAD	2.1 E-1	1.1 E-1	7.0 E-2	4.3 E-2	4.3 E-3
MERCURY	4.4 E-2	2.3 E-2	1.5 E-2	9.1 E-3	9.1 E-4
BERYLLIUM	1.3 E-4	6.9 E-5	4.5 E-5	2.7 E-5	2.7 E-6
2,3,7,8-TCDD	1.3 E-6	6.5 E-7	4.2 E-7	2.6 E-7	2.6 E-8

NOTES

1. Data developed by ISCST modeling the impacts of the SO₂ emission then multiplying The ratio of the component emission to the SO₂ emission by the maximum SO₂ impact to determine the component's impact.
2. Based on 2100 TPD-fired; 99.2 gmsec⁻¹ SO₂; vs = 24.9 ms⁻¹
3. Based on 1800 TPD-fired; 85.1 gmsec⁻¹ SO₂; vs = 21.3 ms⁻¹; 365 days

TABLE 5-9F

**IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEARS 1970-1974**

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES (1)

	1973 1-HOUR (2) (730M; 054D) (D187; P11)	1970 3-HOUR (2) (1400M; 268D) (D218; P5)	1970 8-HOUR (2) (1300M; 246D) (D231; P2)	1974 24-HOUR (2) (1300M; 246D) (D110)	1970 ANNUAL ARITHMETIC MEAN (3) (1400M; 268D)
CARBON MONOXIDE	182.0	100.0	78.6	36.4	5.1
NITROGEN DIOXIDE	60.8	33.5	26.3	12.2	1.7
SULFUR DIOXIDE	137.0	75.4 (76.7)*	59.1	27.4	3.8
CHLORIDES	53.2	29.3	23.0	10.7	1.5
VOLATILE ORGANIC COMPOUNDS	3.0	1.7	1.3	6.1 E-1	8.5 E-2
PARTICULATE MATTER	9.9	5.5	4.3	2.0	2.8 E-1
SULFURIC ACID MIST	6.1 E-3	3.3 E-3	2.6 E-3	1.2 E-3	1.7 E-4
FLUORIDES	6.1 E-1	3.4 E-1	2.6 E-1	1.2 E-1	1.7 E-1
LEAD	2.1 E-1	1.2 E-1	9.2 E-2	4.3 E-2	5.9 E-3
MERCURY	4.6 E-2	2.5 E-2	2.0 E-2	9.1 E-3	1.3 E-3
BERYLLIUM	1.4 E-4	7.5 E-5	5.9 E-5	2.7 E-5	3.8 E-6
2,3,7,8-TCDD	1.3 E-6	7.1 E-7	5.6 E-7	2.6 E-7	3.6 E-8

NOTES

1. Data developed by ISCST modeling the impacts of the SO₂ emission then multiplying The ratio of the component emission to the SO₂ emission by the maximum SO₂ impact to determine the component's impact.
2. Based on 2100 TPD-fired; 99.2 gmsec⁻¹ SO₂; vs = 24.9 ms⁻¹
3. Based on 1800 TPD-fired; 85.1 gmsec⁻¹ SO₂; vs = 21.3 ms⁻¹; 365/366 days
- * Value of 76.7 ug/m³ at 1200M; 267D (D228; P4)

TABLE 5-10

CUMULATIVE IMPACTS OF PALM BEACH COUNTY RDF-FIRED
SPREADER STOKER FURNACES AND OTHER MAJOR
SOURCES OF SO₂ ON AIR QUALITY
(BASIS: RDF @ 2100 TPD, 9 LB S/TON RDF)

YEAR	AVERAGING TIME	MAX. ALL SOURCES PEAK CONCENTRATION		RDF SOURCE CONTRIBUTION		LOCATION	
		ug/m ³	MET. DAY	ug/m ³	MET. DAY	METERS	DEGREE
1970	3 HR*	495	118/1	45	289/4#	2000	129
	24 HR*	85	118/1	9	41/1#	2000	120
	ANNUAL##	13		4		1200	267
1971	3 HR*	459	133/8	41	58/4#	800	332
	24 HR*	78	133/1	10	218/1#	1300	334
	ANNUAL##	10		2		1100	268
1972	3 HR*	347	25/1	47	189/3#	2000	264
	24 HR*	68	24/1	15	347/1#	1100	268
	ANNUAL##	10		2		1100	268
1973	3 HR*	482	213/2	45	343/4#	1800	129
	24 HR*	81	212/1	11	93/1#	730	342
	ANNUAL##	10		3		1000	270
1974	3 HR*	395	240/8	58	165/5#	1700	266
	24 HR*	77	170/1	8	40/1#	730	129
	ANNUAL##	11		3		1000	270

5 YEAR MAXIMUMS

1970	3 HR*	495	118/1	45	289/4#	2000	129
1970	24 HR*	85	118/1	9	41/1#	2000	120
1970	ANNUAL##	13		4		1200	267

* Maximum 2nd high impact for all sources

Concentration for same location, not concurrent occurrences

Based on 1800 TPD, 9 lb s/ton RDF - 365/366 days

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TABLE 5-11

SUMMARY OF MAXIMUM AIR QUALITY IMPACTS OF THE PROPOSED PALM BEACH COUNTY WASTE TO ENERGY FACILITY

POLLUTANT	AMBIENT AIR QUALITY STANDARD (UG/M3)	PREVENTION OF SIGNIFICANT DETERIORATION (PSD) INCREMENT (UG/M3)	BACKGROUND CONCENTRATION (UG/M3) (2)	PALM BEACH COUNTY WASTE TO ENERGY FACILITY IMPACT (UG/M3) (3)	TOTAL POINT SOURCE IMPACT (UG/M3) (5) (3)	
SULFUR DIOXIDE					TOTAL IMPACT	RDF CONTRIB.
MAX 3-HOUR CONCENTRATION	1300 (1)	512	63	76.7*	495	45
MAX 24-HOUR CONCENTRATION	260 (1)	91	29	27.4	86	9
ANNUAL ARITHMETIC MEAN	60	20	7	4	13	4
PARTICULATE MATTER						
MAX 24-HOUR CONCENTRATION	150 (1)	37	107	2		NC
ANNUAL GEOMETRIC MEAN	60	19	43	0.3		NC
NITROGEN DIOXIDE						
ANNUAL ARITHMETIC MEAN	100	NO STANDARD	20	2	5.6(6)	
OZONE						
DAILY MAX 1-HOUR CONCENTRATION	235 (1)	NO STANDARD	172	NE		NA
LEAD						
QUARTERLY ARITHMETIC MEAN	1.5	NO STANDARD	NH	4.3E-2 (4)	0.11(6)	
CARBON MONOXIDE						
MAX 1-HOUR CONCENTRATION	40000 (1)	NO STANDARD	9943	182		NC
MAX 8-HOUR CONCENTRATION	10000 (1)	NO STANDARD	4500	79		NC

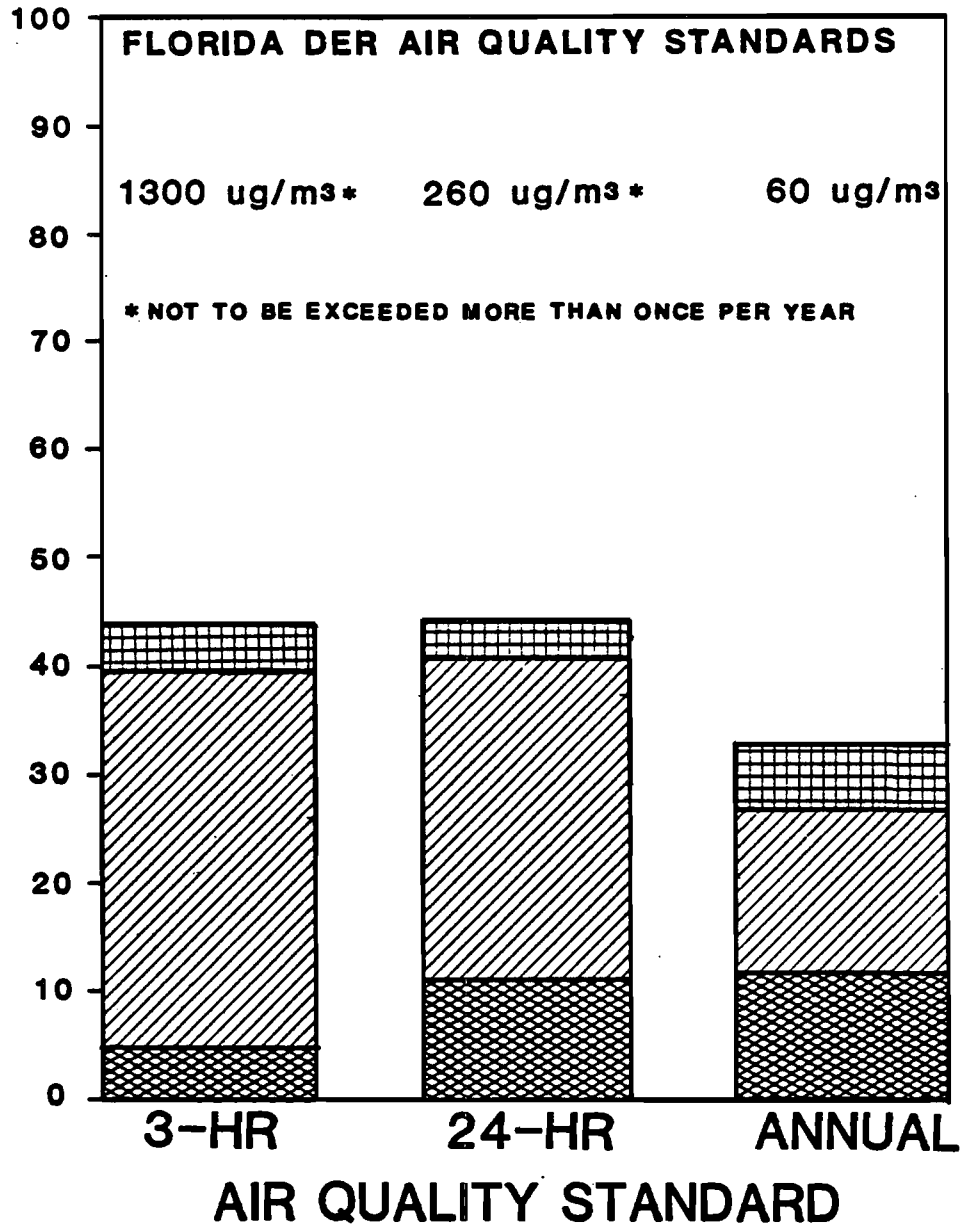
NA = NOT APPLICABLE; NC = NOT CALCULATED SINCE PROPOSED FACILITY'S IMPACT IS BELOW SIGNIFICANCE LEVEL;
NE = NOT EMITTED; NH = NOT MONITORED.

1. CONCENTRATION LIMITS NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.
 2. BACKGROUND INFORMATION IS BASED UPON DATA COMPILED BY THE PALM BEACH COUNTY ANNUAL REPORT DATED 1983.
 3. DETAILED MODELING RESULTS FOR THE PROPOSED SOURCE COVERING 5 YEARS OF HOURLY METEOROLOGICAL DATA IS INCLUDED IN TABLES 5-9A THRU 9F. (EXIT VELOCITY = 24.9 M/S)
 4. QUARTERLY MEAN NOT GENERATED. VALUE CITED IS 24-HOUR MAXIMUM 2ND-HIGH.
 5. TOTAL IMPACTS ARE INCLUSIVE OF THE PROPOSED SOURCE.
 6. TOTAL IMPACTS assume same emission factor for all sources applied to annual averages.
- * Maximum impact from combined sources model results. Value at 1200M; 267D (D226;P4).

CONTRIBUTIONS TO AQSTD

SULFUR DIOXIDE IMPACT

PERCENT AQSTDs



 BACKGROUND
  OTHER SOURCES
  RDF

% CONSUMED	3-HR	4.85	34.6	3.45
	24-HR	11.15	29.6	3.3
	ANNUAL	11.7	14.8	6.3

UPDATED: DEC. 2, 1985

PALM BEACH COUNTY
 SOLID WASTE AUTHORITY
 RESOURCE RECOVERY FACILITY

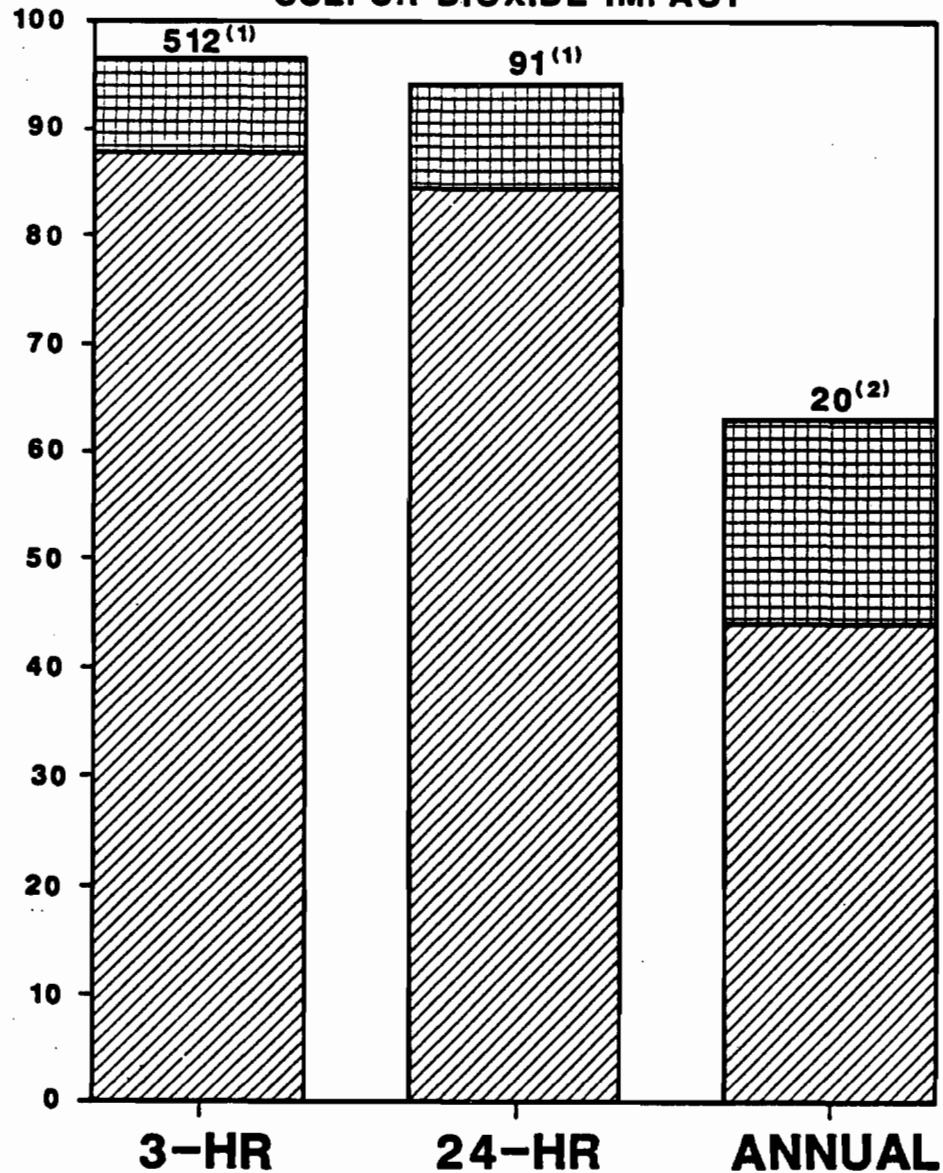


FIGURE 5.10

PSD INCREMENT (ug/m³)

SULFUR DIOXIDE IMPACT

PERCENT CONSUMED



AIR QUALITY STANDARD



OTHER
SOURCES



RDF

%
CONSUMED

3-HR	87.9	8.8
24-HR	84.6	9.5
ANNUAL	44.5	18.9

NOTE 1: AVAILABLE PSD INCREMENT NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR

NOTE 2: AVAILABLE PSD INCREMENT NOT TO BE EXCEEDED

UPDATED: DEC. 2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



FIGURE 5.11

6.0 SUMMARY AND CONCLUSIONS

An analysis of best available control technology and an evaluation of ambient impacts have been presented herein for the proposed Palm Beach County waste-to-energy facility. It has been determined that the proposed facility is subject to PSD review.

The results of the BACT analysis indicate that the only recommended add-on control device is an electrostatic precipitator for the control of particulate matter. Sulfur dioxide emissions will be minimized through the use of refuse derived fuel which inherently has a low sulfur content and by utilizing No. 2 fuel oil or natural gas as available as an auxiliary fuel. Good combustion design and practice is proposed as BACT for nitrogen oxides, carbon monoxide and volatile organic compounds.

Predicted concentrations of the acid gas pollutants are calculated to be well below state standards. Trace metal emissions will be controlled as particulate matter in the electrostatic precipitator.

An extensive air quality impact analyses has been performed. This analysis demonstrates that all applicable PSD increments, federal and state air quality standards will not be exceeded as a result of the proposed Palm Beach County waste-to-energy facility acting alone or in concert with other existing sources.

Assuming that all VOC emissions are converted to ozone, the maximum 1 hour source impact in any year would be 3 ug/m^3 . Based on local 1982-83 ambient air quality data as background, this maximum impact would not exceed the ozone standard. The maximum 3-hour average VOC impact is only 1.3 ug/m^3 . This is less than 1% of the 160 ug/m^3 that had been used as a guideline standard for ozone.

There are no existing legal ambient air quality standards for the compound 2,3,7,8-TCDD. The New York State Department of Environmental Conservation in its Air Guide No. 1 (revised 12/15/83) has recommended an acceptable ambient air level (AAL) on an annual average basis of $9.2 \times 10^{-8} \text{ ug/m}^3$. The maximum annual impact generated by the conservative assumptions of this report is $3.6 \times 10^{-8} \text{ ug/m}^3$.

On an annual basis, all impacts in the West Palm Beach Water Catchment Area will be less than any established de-minus levels. In making this determination, a variety of conservative assumptions were employed in the analysis. For example, maximum design capacity operations were assumed for all 8,760 hours of the year; other major sources were assumed to fire oil continuously when in fact natural gas which contain virtually no sulfur is predominantly used; and the other source category includes Florida Power and Light whose operations will be offset by the electrical output of the proposed facility. Because of these and other conservative assumptions, it can be stated with confidence that public health will be protected with an adequate margin of safety.

7.0 REFERENCES

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INSERT SECTION
CLASS I IMPACT ANALYSES

CLASS I IMPACT ANALYSES

Computer analyses have been executed using the EPA ISCST Model for the meteorological years 1970-1974. The proposed RDF source will be located at the UTM coordinates 2960474N, 0585820E, Zone 17. The nearest Class I area, Everglades National Park, at its closest point, is located at UTM coordinates 2848635N, 0533619E, Zone 17. This site was included in the modeling as a discrete receptor. The modeling was based on hourly meteorological data from the Palm Beach International Airport, West Palm Beach, FL. It was assumed that these meteorological conditions did not change between the RDF source and the Everglades National Park receptor point. The receptor is on a bearing of 205° and at a distance of approximately 123 km (76 miles) from the proposed facility. This distance is substantially greater than the 50 km range that is normally considered as the range of validity for most models. For additional conservatism, no decay of pollutants was considered.

SULFUR DIOXIDE IMPACTION

The SO₂ maximum impaction values [highest second highest (HSH) for 3-hour and 24-hour averaging periods and highest annual] are tabulated in Exhibit I for the proposed RDF facility and for the RDF combined with existing local sources.

Based on the modeling and its assumptions, Exhibit I indicates that the combined-source impactions exceeded the significant 3-hour impact levels in 1970, 1971 and 1973. The significant impact for the 24-hour averaging period with the combined sources was exceeded in 1970. The combined sources did not exceed the annual average. In instances where the impact was exceeded, the proposed RDF source was not a contributing factor. The impact of the RDF is at less than significant levels for all averaging periods in pollutant parameters.

The proposed RDF facility will not cause existing sources to exceed levels of significant impact and PSD increments applicable to the Everglades National Park Class I, nor will the proposed RDF facility significantly exacerbate those instances where the impact would be exceeded as projected from existing sources.

Exhibit 1

RDF AND COMBINED SOURCES MAXIMUM PROJECTED HIGHEST SECOND HIGHEST (HSH) SO₂ IMPACT CONCENTRATIONS (μgm^{-3}) ON EVERGLADES NATIONAL PARK (BEARING 205° FROM RDF AT 123 KM)

<u>YEAR</u>		<u>FDER</u> <u>AAQS</u>	<u>SIGNIF</u> <u>IMPACT</u> (2)	<u>MAX</u> <u>PSD</u> (2)	<u>PROPOSED</u> <u>RDF</u>	<u>PERCENT</u> <u>SIGNIF.</u>	<u>COMBINED</u> <u>SOURCES</u>	<u>PERCENT RDF</u> <u>CONTRIBUTION</u> (3)
1970	HSH 3 HR	1300(1)	25	25	4.16	16.6	44.7	9.3
	HSH 24 HR	260(1)	5	5	0.57	11.4	6.3	9.0
	ANNUAL	60	1	2	0.014	1.4	2.3E-1	6.0
1971	HSH 3 HR	1300(1)	25	25	1.53	6.1	35.6	4.3
	HSH 24 HR	260(1)	5	5	0.19	3.8	4.4	4.3
	ANNUAL	60	1	2	0.005	0.5	1.7E-1	3.0
1972	HSH 3 HR	1300(1)	25	25	3.87	15.5	19.9	19.4
	HSH 24 HR	260(1)	5	5	0.60	12.0	3.7	16.4
	ANNUAL	60	1	2	0.016	1.6	1.8E-1	8.7
1973	HSH 3 HR	1300(1)	25	25	2.71	10.8	75.9	3.6
	HSH 24 HR	260(1)	5	5	0.34	6.8	3.0	11.3
	ANNUAL	60	1	2	0.009	0.9	1.7E-1	5.4
1974	HSH 3 HR	1300(1)	25	25	2.57	10.3	19.8	13.0
	HSH 24 HR	260(1)	5	5	0.32	6.4	2.5	13.0
	ANNUAL	60	1	2	0.008	0.8	1.4E-1	5.8

NOTE 1: Not to be exceeded more than once per year

NOTE 2: Class I

NOTE 3: The percentages are based on the highest second high values (HSH) as tabulated. The maximum HSH impact values for the RDF and the combined sources were not generated on the same meteorological day. It is assumed, therefore, that the RDF impact concentration contribution to the maximum HSH impact of the combined sources will always be less than the maximum HSH impact concentration shown for the RDF source itself.

OTHER POLLUTANTS

The emission ratios of the pollutants nitrogen dioxide and total volatile organics relative to sulfur dioxide can be used to generate the maximum RDF facility impact of these pollutants at its closest receptor point in the Everglades National Park. These results are summarized below:

<u>Average Interval</u>	<u>Pollution Concentrations ($\mu\text{g m}^{-3}$)</u>	
	<u>Nitrogen Dioxide</u>	<u>Total Volatile Organics</u>
3 hour*	1.8	9.2E-2
24 hour*	0.3	1.3E-2
Annual	7.0E-3	3.5E-4

A significant impact level exists only for the nitrogen dioxide annual average. This value is $1.0 \mu\text{g m}^{-3}$. The projected impact from the proposed RDF source is only 0.7% of this value and negligible relative to the FDER AAQS of $100 \mu\text{g m}^{-3}$.

The projected impacts shown above are negligible with respect to ozone formation in the Park.

* Highest second highest value

VISIBILITY SCREENING

A visibility screening analysis has been performed based on the instructions for Level-1 Screening Analysis as available in Latimer and Ireson, Workbook for Estimating Visibility Impairment, Draft, July, 1980.

Emission factors for this analysis have been derived from Section 2.3.7.2, Table 2.3-12.

The absolute factors of the contrast parameters obtained were significantly less than the critical level of 0.1 at a distance of 120 km from the proposed facility (see Exhibit 2).

EXHIBIT 2

SCREENING ANALYSIS
VISIBILITY LEVEL ONE

DIST. TO LVL. I AREA	BCKGND VISUAL RANGE	SIGMA Z AT STBL :F
120. KM	40. KM	100. M

MASS EMISSIONS: MTPD	OPTICAL THICKNESS:	CONTRAST PARAMETER
0.531 QPAR	0.00885 PART	-0.000883 CSJY
3.265 QNOX	0.00925 NO2	-0.000008 CTER
7.348 QS02	0.00431 ASOL	0.001581 CS/T

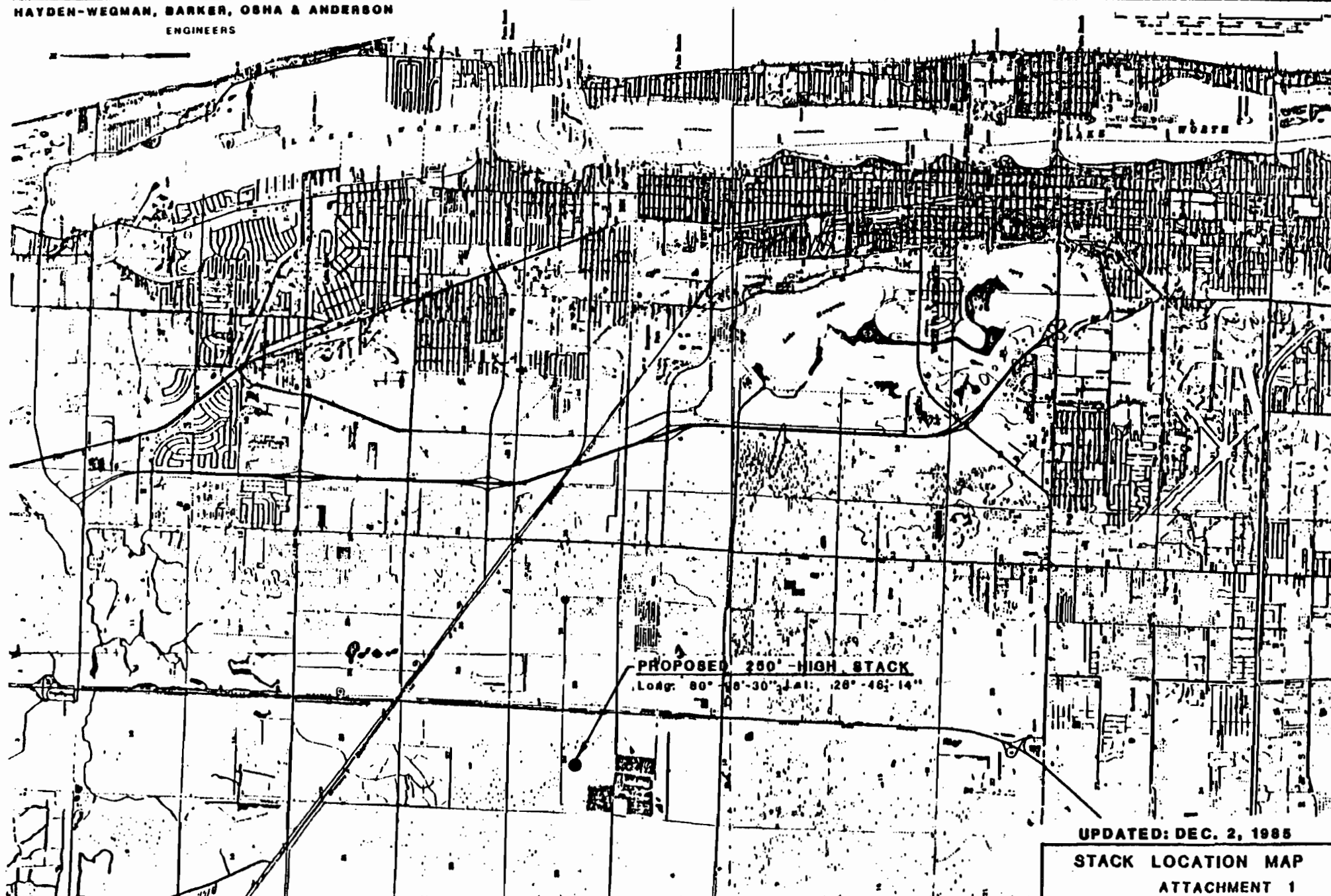
DER FORM 17 - 1.202(1)

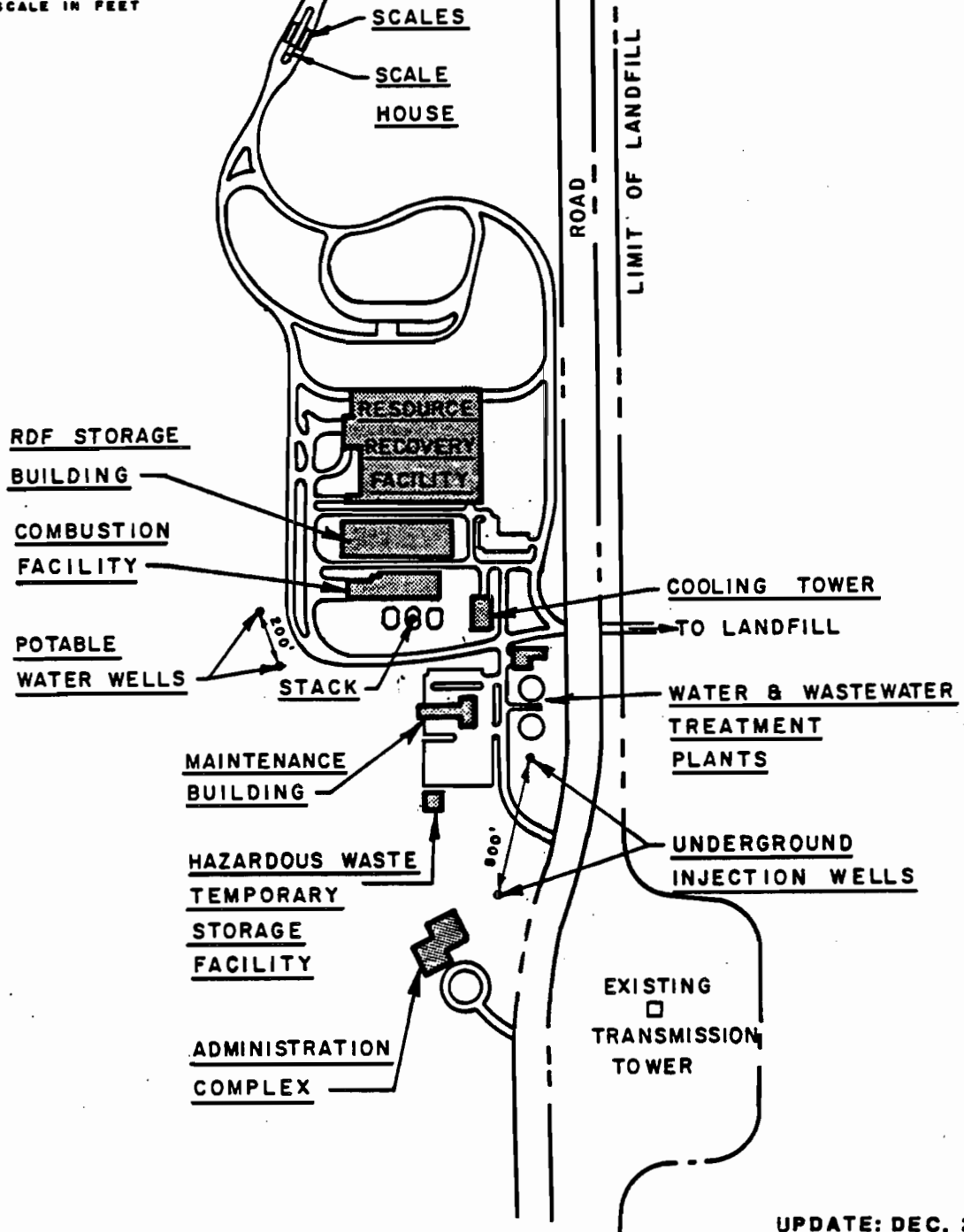
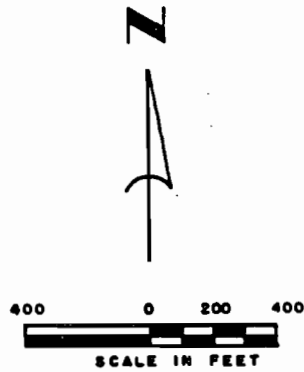
STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
APPLICATION TO CONSTRUCT/OPERATE AIR POLLUTANT EMISSION SOURCE

APIS
[]

1. Type of Application					2. Source Identification/Jurisdiction				
Construction Init. Modif.	Operation Init. Renewal	Site Cert.	Amend- ment		District	Office	County	Facility	Source
☒	☐	☒	☐	☐	[]	[]	[]	[]	[]
3. Facility Owner (Company Name) PALM BEACH COUNTY SOLID WASTE AUTH.					4. Facility Owner-ship Code U		5. Facility Name/Location 2900 FT. WEST FLORIDA TURNPIKE 3500 FT. NORTH 45th STREET		
6. City N/A		Code	7. County PALM BEACH		8. Facility Zip 33412		9. Facility Type CDS VDC		
10. Facility Zone UTM Coordi- 17 : 585.8			East North 2690.474		11. Facility Latitude Lat./Long. 26° 46' 14 "		Longitude 80° 08' 30"		
12. Authorized Agent (Address and Telephone) S. G. TIMMERMAN					Name ASSOCIATE		Organization/Firm HAYDEN-WEGMAN, INC.		
Street or P.O. Box 5114 OKEECHOBEE BLVD. 2-B					City W. PALM BEACH		St. FL	Zip 33409	Telephone 305-471-0444
13. STATEMENT BY OWNER OR AUTHORIZED AGENT I, the undersigned, as the owner or authorized representative* of the facility described above. I certify that the statements made in this application for a permit are true, correct, and complete to the best of my knowledge and belief. Further, I agree to operate and maintain the air pollution source and pollution control equipment described in this application so as to comply with all provisions of Chapter 403, Florida Statutes, and all applicable rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable, and I will promptly notify the department upon sale or legal transfer of the permitted source. *Attach letter of authorization *Signed: <u>George E. Cranston</u> *Date: <u>April 25, 1985</u>									
14. Prof. Engineer (Address and Telephone) GEORGE E. CRANSTON					Name 21733		Fla. Regis. No. HAYDEN-WEGMAN, INC.		
Street or P.O. Box 330 W. 42nd STREET					City NEW YORK		St. NY	Zip 10036	Telephone 212-563-6900
15. STATEMENT BY PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.) I, the undersigned, certify that the engineering features of this project have been designed or examined by me and found to be in conformity with modern engineering principles applicable to the control of emissions of the air pollutants characterized in this permit application. There is reasonable assurance, in my professional judgment, that the air pollution source and the pollution control equipment, when properly operated and maintained, will comply with all applicable statutes of the State of Florida and all applicable rules and regulations of the department. Signed: <u>George E. Cranston</u> Date: <u>4-24-85</u> (Affix Seal)									
16. Facility Comment									

HAYDEN-WEGMAN, BARKER, OSHA & ANDERSON
ENGINEERS



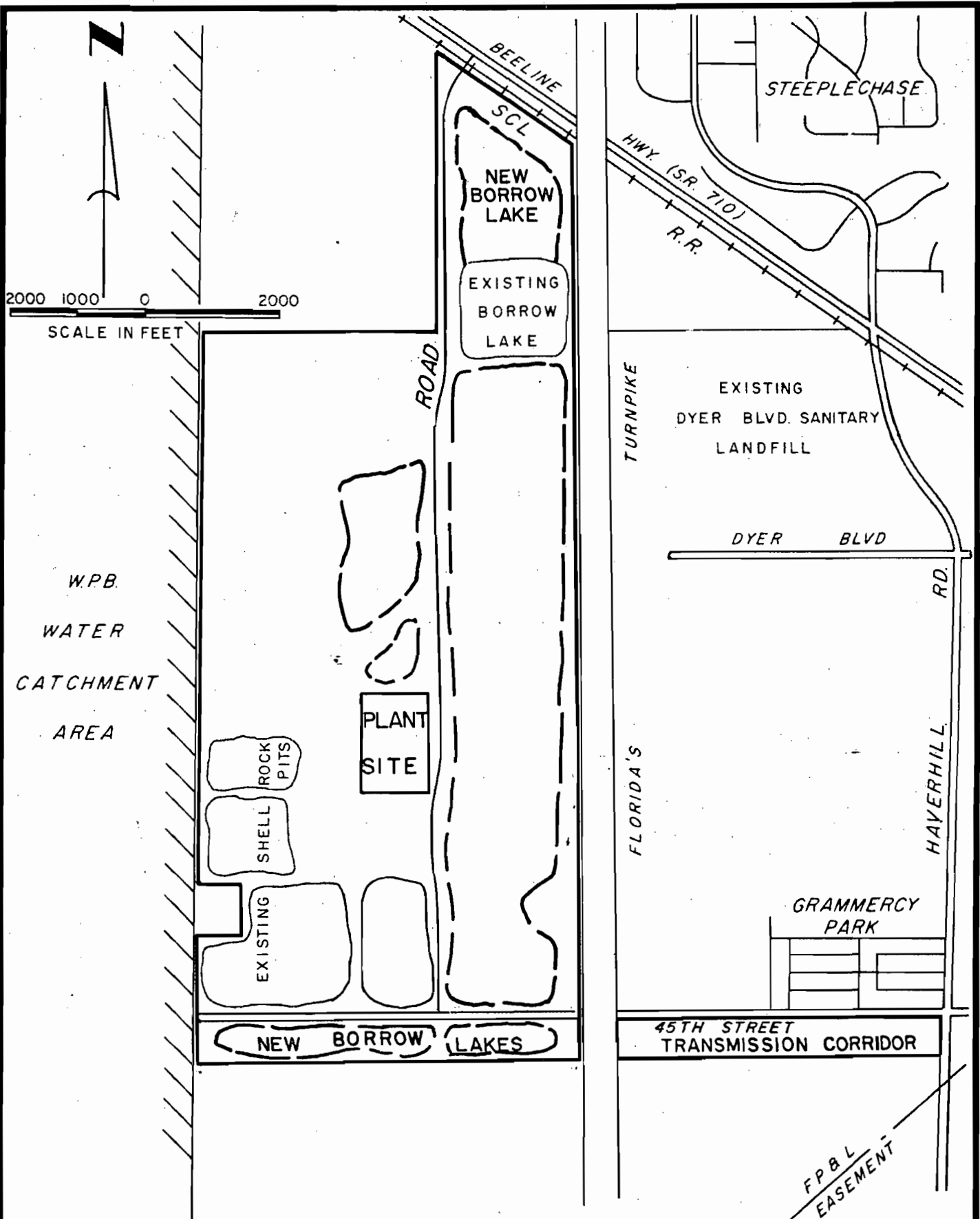


UPDATE: DEC. 2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



ATTACHMENT 2



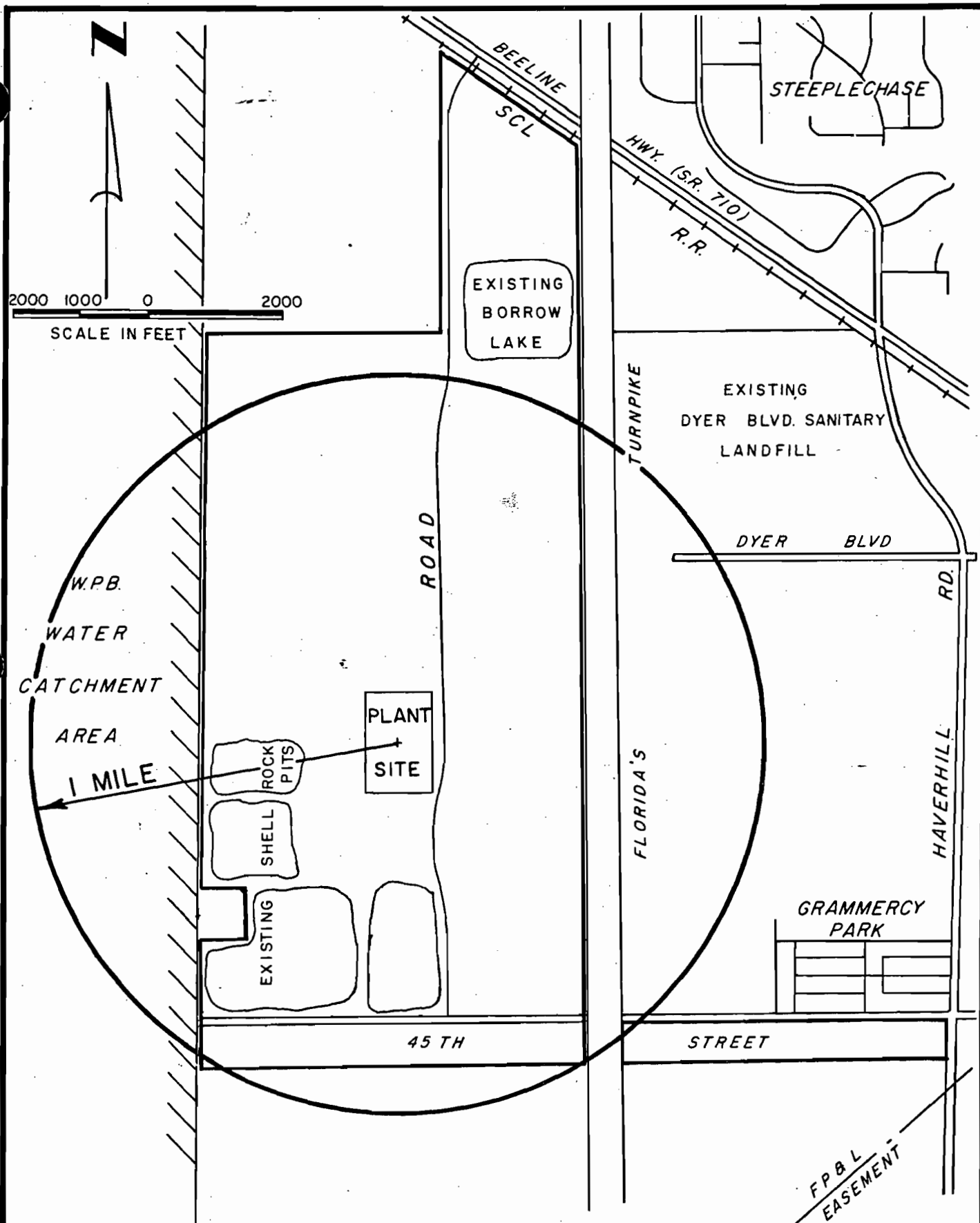
UPDATED: DEC.2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



RESOURCE RECOVERY FACILITY
AND ADJACENT PROPERTIES

FIG. 2.1-2



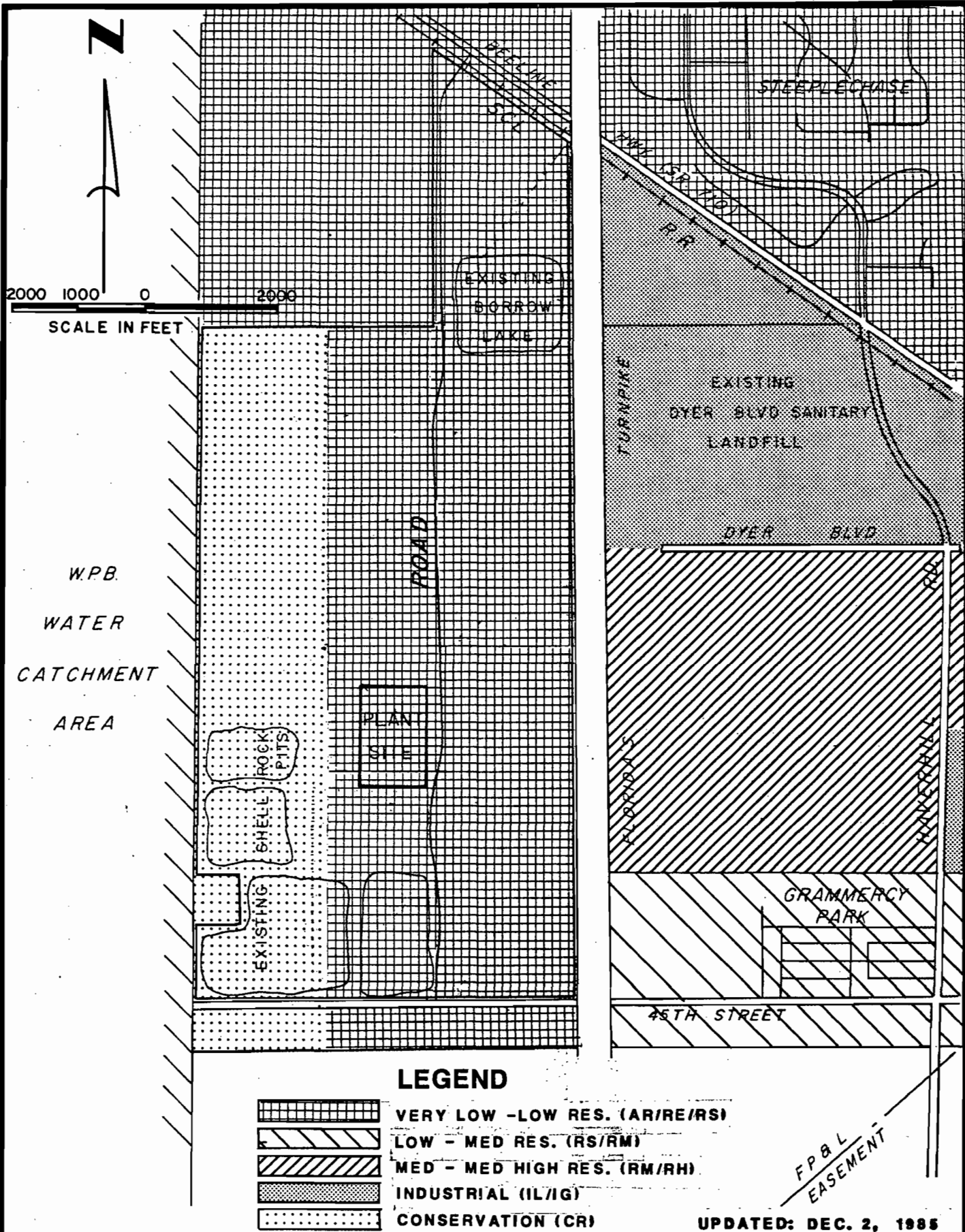
UPDATED: DEC.2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



SPECIAL CATEGORY AREAS WITHIN
1 MILE OF PLANT

FIG. 2.2 - 2



**PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY**



**INTERACTION OF
RESOURCE RECOVERY FACILITY
WITH COMPREHENSIVE PLAN** FIG.2.2-3

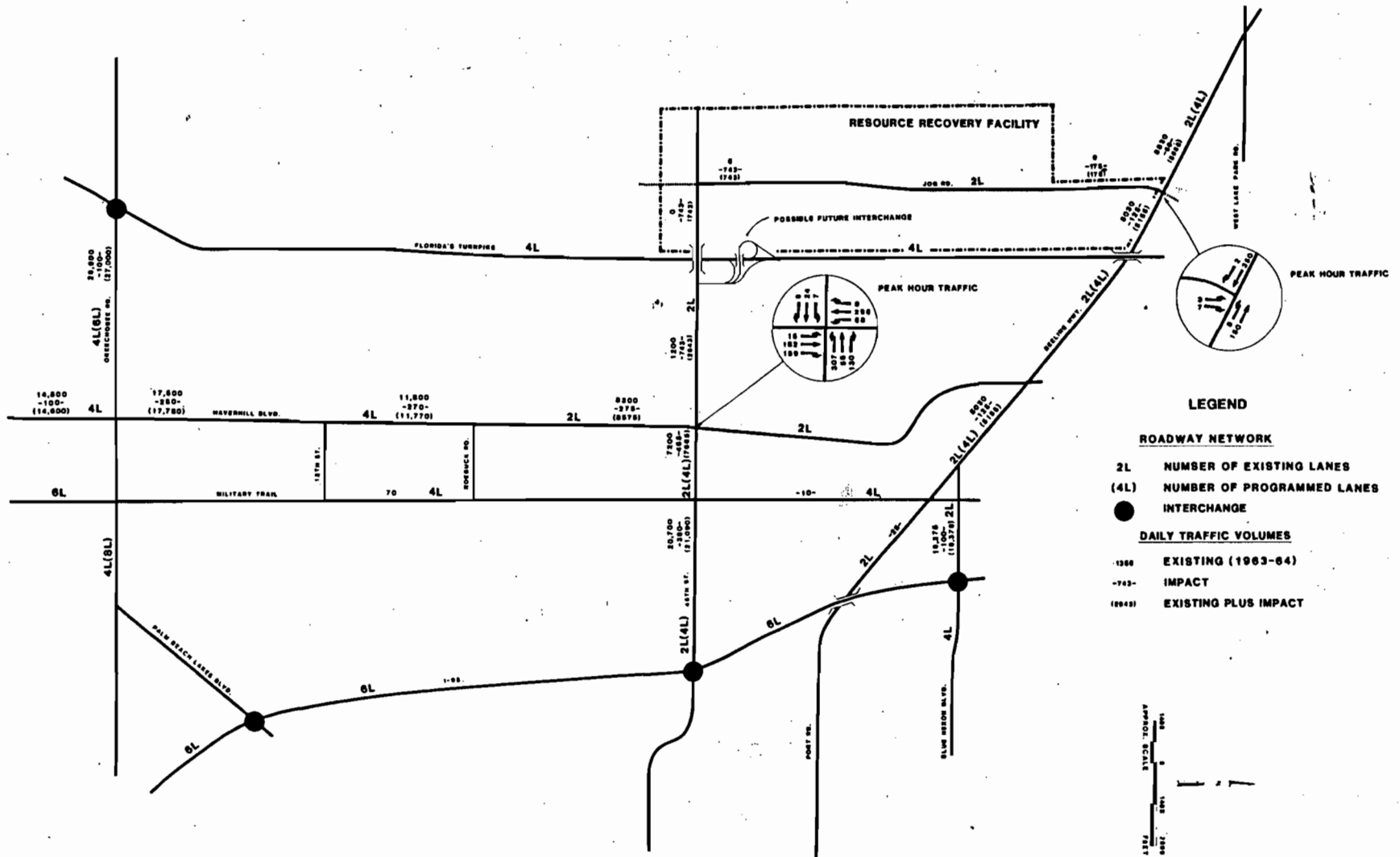
PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



TRAFFIC ASSIGNMENT

UPDATED: DEC. 2, 1985

FIG. 2.3-31

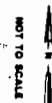
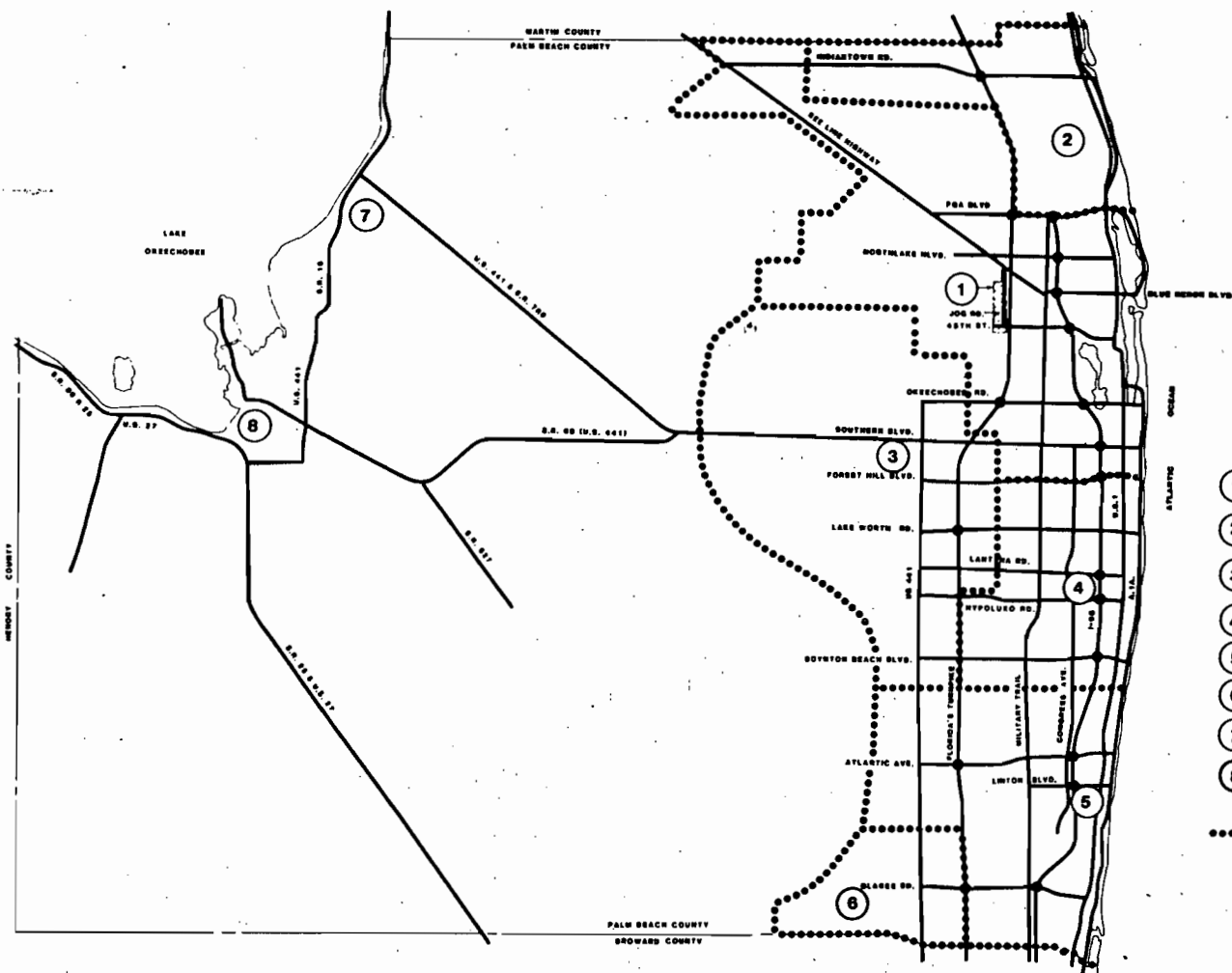


**PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY**



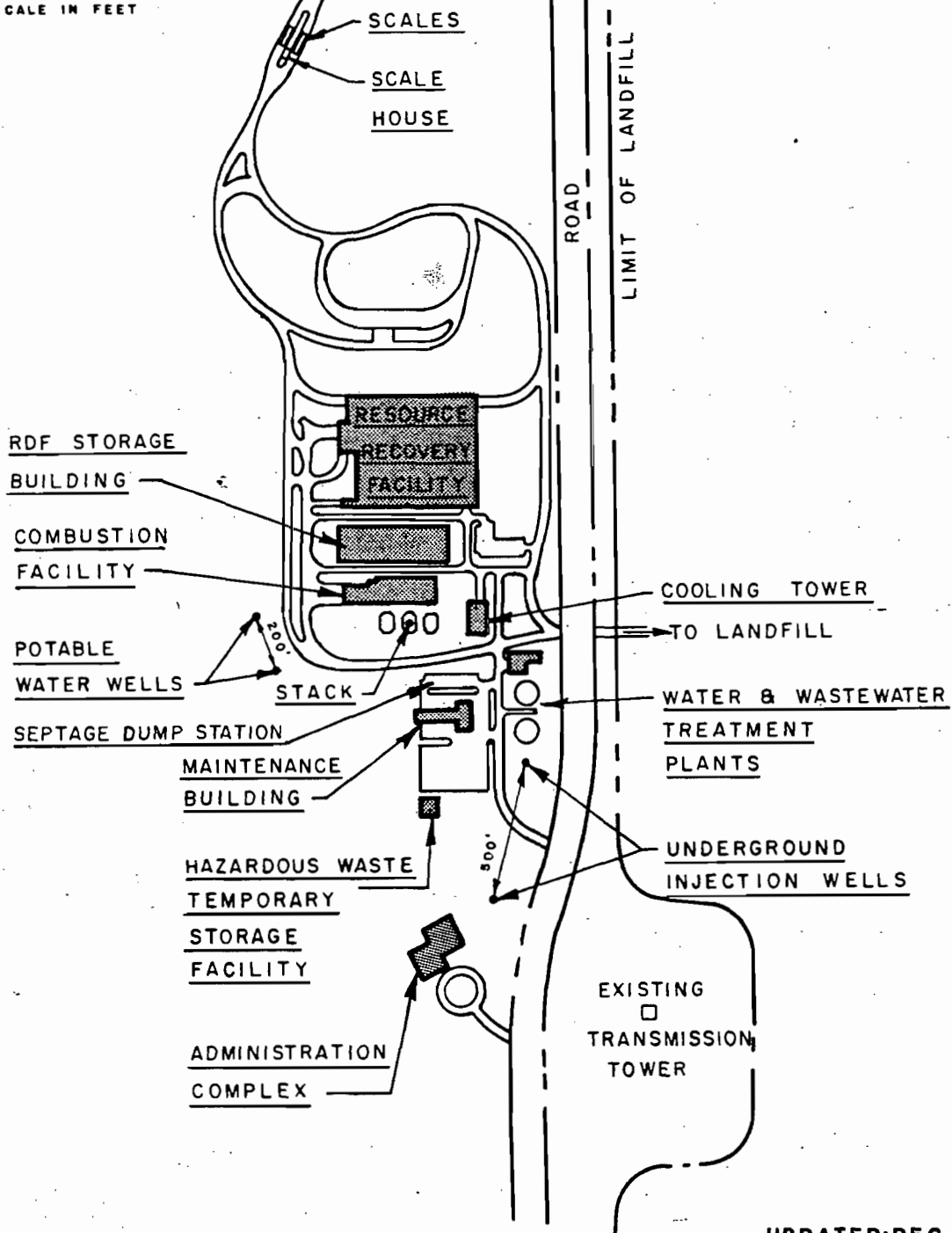
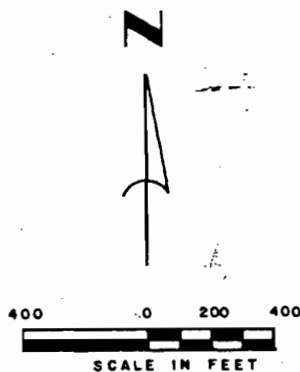
**SOLID WASTE MANAGEMENT
FACILITIES LOCATIONS**

UPDATED: DEC. 2, 1985



LEGEND

- ① RESOURCE RECOVERY FACILITY
- ② NORTH COUNTY TRANSFER FACILITY
- ③ WEST CENTRAL COUNTY TRANSFER FACILITY
- ④ SOUTH CENTRAL TRANSFER FACILITY
- ⑤ SOUTH COUNTY TRANSFER FACILITY
- ⑥ SOUTHWEST COUNTY TRANSFER FACILITY & CLASS III LANDFILL
- ⑦ PAHOKEE LANDFILL FACILITY
- ⑧ BELLE GLADE LANDFILL & TRANSFER FACILITY
- AREAS SERVED BY FACILITIES



UPDATED: DEC. 2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY

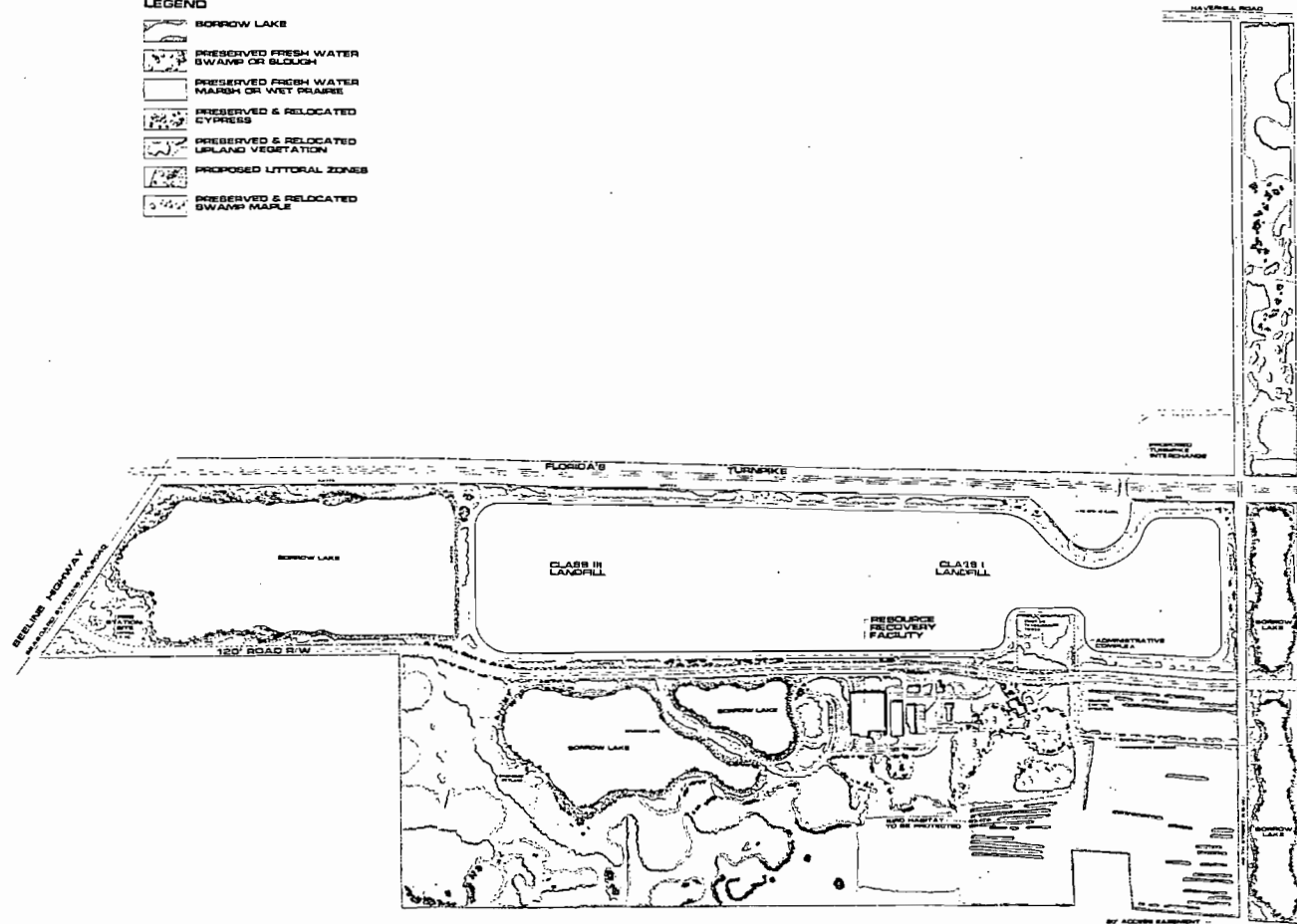


RESOURCE RECOVERY FACILITY
SITE PLAN

FIG. 3.2-1

LEGEND

-  BORROW LAKE
-  PRESERVED FRESH WATER SWAMP OR SLOUGH
-  PRESERVED FRESH WATER MARSH OR WET PRAIRIE
-  PRESERVED & RELOCATED CYPRESS
-  PRESERVED & RELOCATED UPLAND VEGETATION
-  PROPOSED LITTORAL ZONES
-  PRESERVED & RELOCATED SWAMP MAPLE

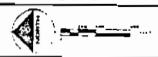


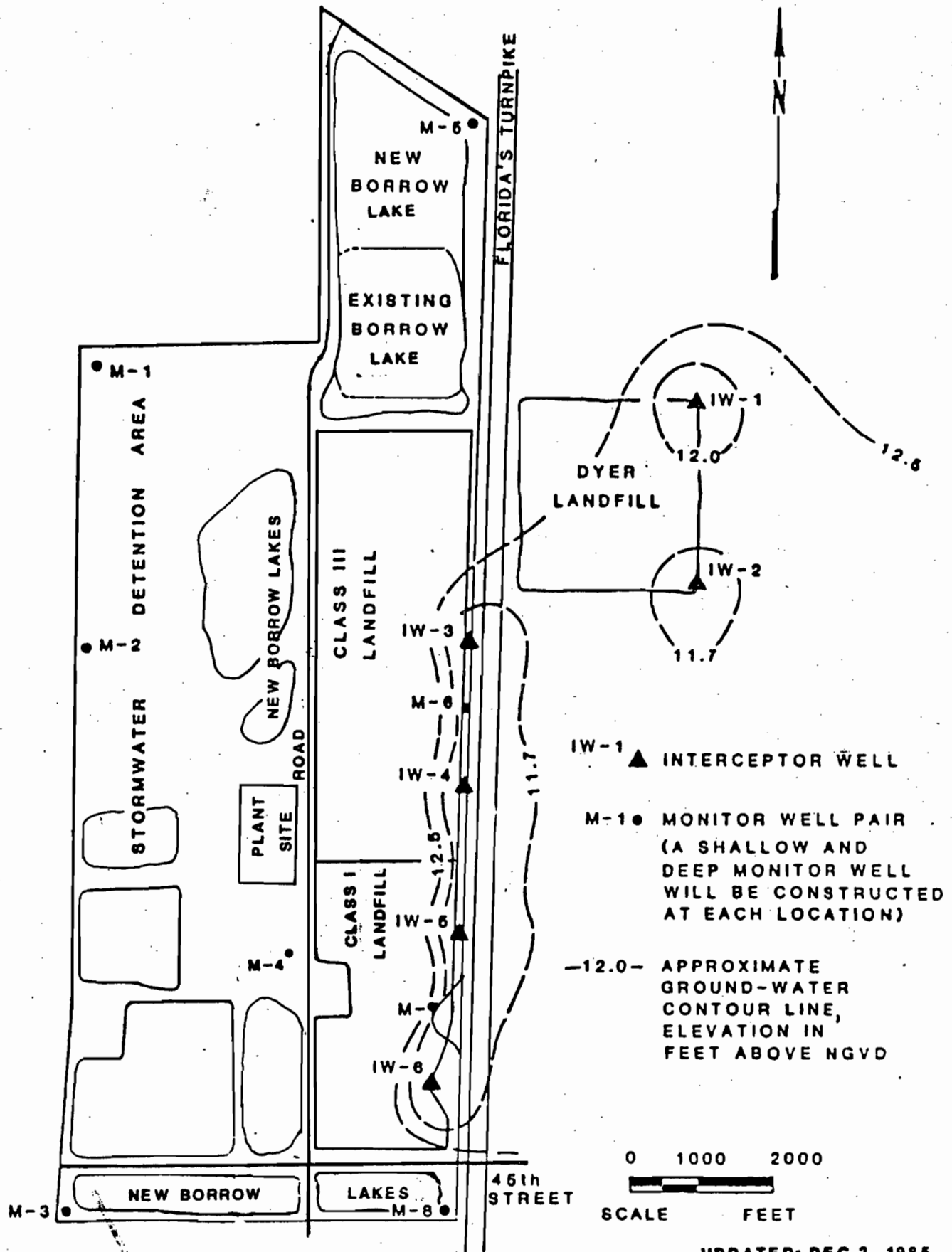
UPDATED: DEC. 2, 1985 FIG. 3.2-3

PALM BEACH COUNTY SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



MASTER SITE PLAN





PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



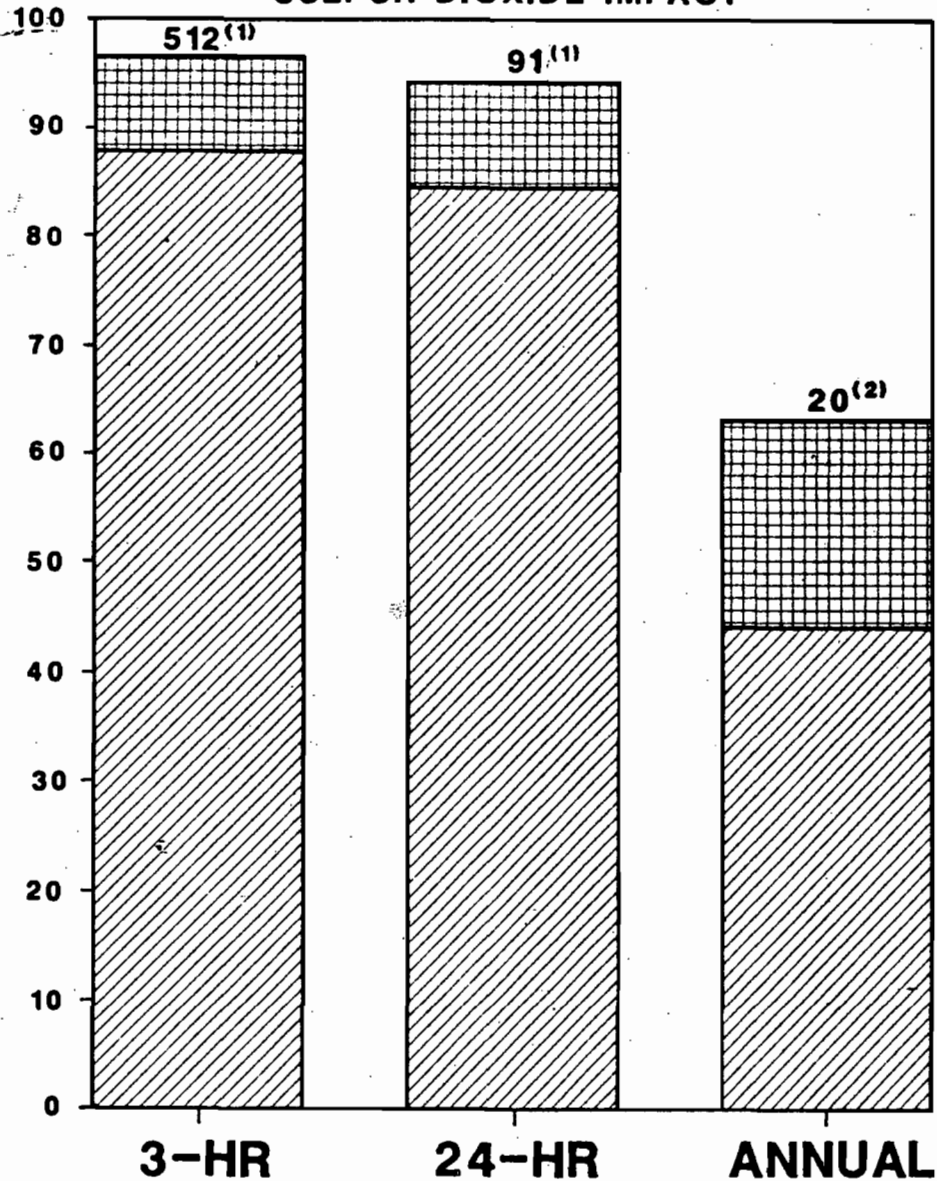
INTERCEPTOR AND MONITOR WELL
LOCATIONS AND APPROXIMATE
CONES OF DEPRESSION

Figure 4.2-1

PSD INCREMENT (ug/m³)

SULFUR DIOXIDE IMPACT

PERCENT CONSUMED



AIR QUALITY STANDARD

OTHER SOURCES

RDF

%
CONSUMED

3-HR	87.9	8.8
24-HR	84.6	9.5
ANNUAL	44.5	18.9

NOTE 1: AVAILABLE PSD INCREMENT NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR

NOTE 2: AVAILABLE PSD INCREMENT NOT TO BE EXCEEDED

UPDATED: DEC. 2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



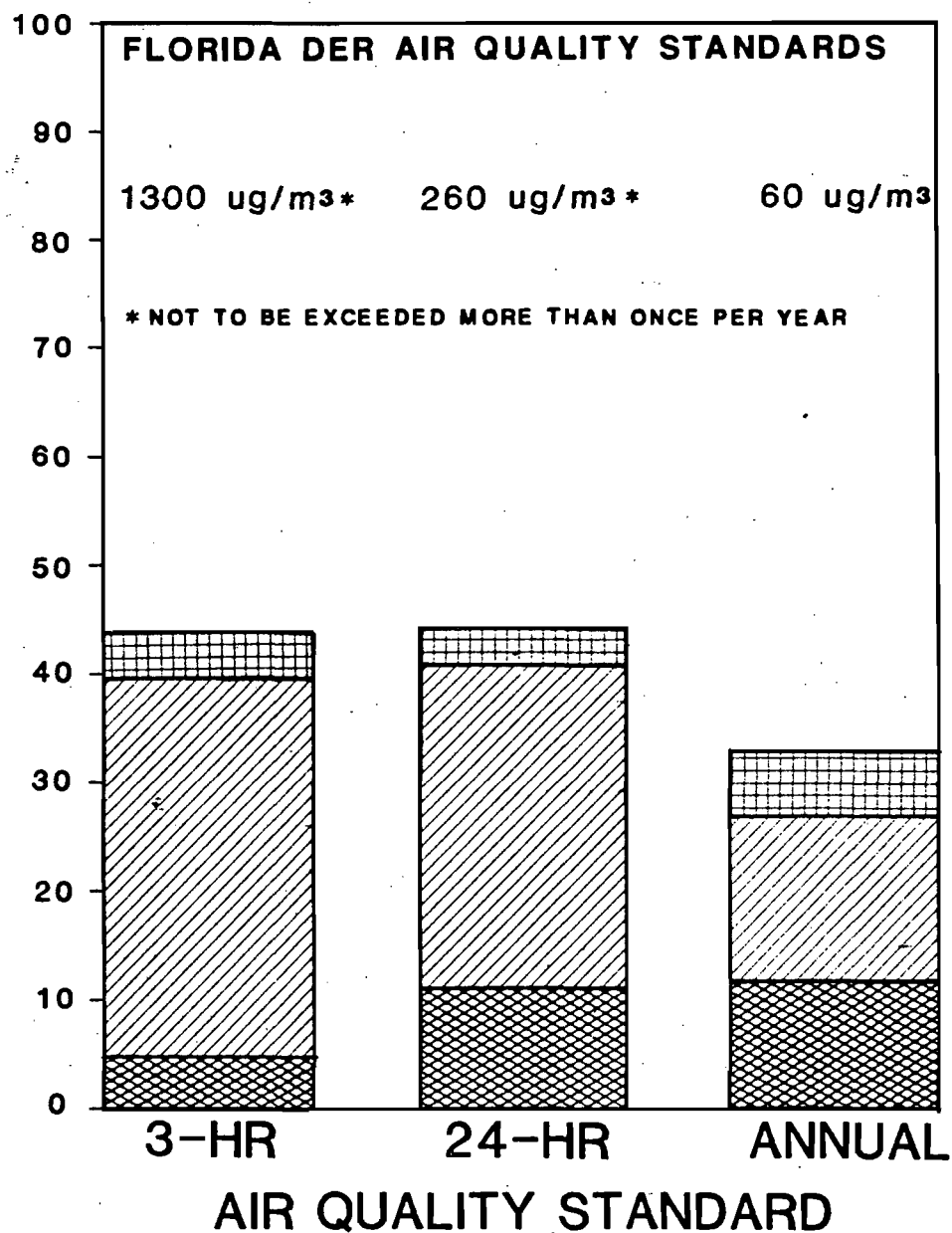
PSD INCREMENT

FIGURE 5.6-1

CONTRIBUTIONS TO AQSTD

SULFUR DIOXIDE IMPACT

PERCENT AQSTDs



BACKGROUND



OTHER SOURCES



RDF

% CONSUMED	3-HR	4.85	34.6	3.45
	24-HR	11.15	29.6	3.3
	ANNUAL	11.7	14.8	6.3

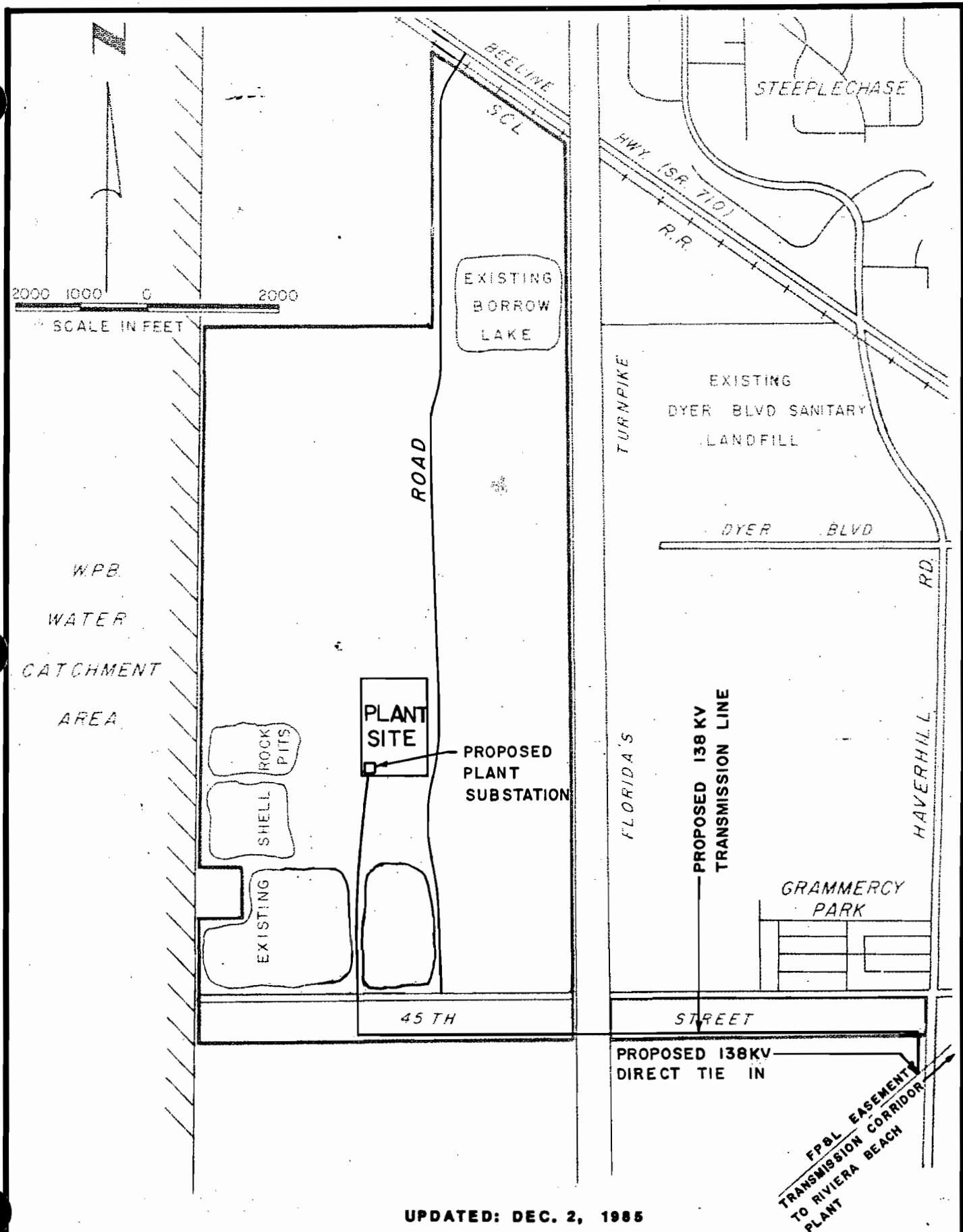
UPDATED: DEC. 2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



CONTRIBUTIONS TO AQSTD

FIG 5.6-2



UPDATED: DEC. 2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



TRANSMISSION LINE CORRIDOR

FIG. 6.1-1

Received DER

PALM BEACH COUNTY, FLORIDA

NOV 27 1985

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

LETTER DATED AUGUST 22, 1985

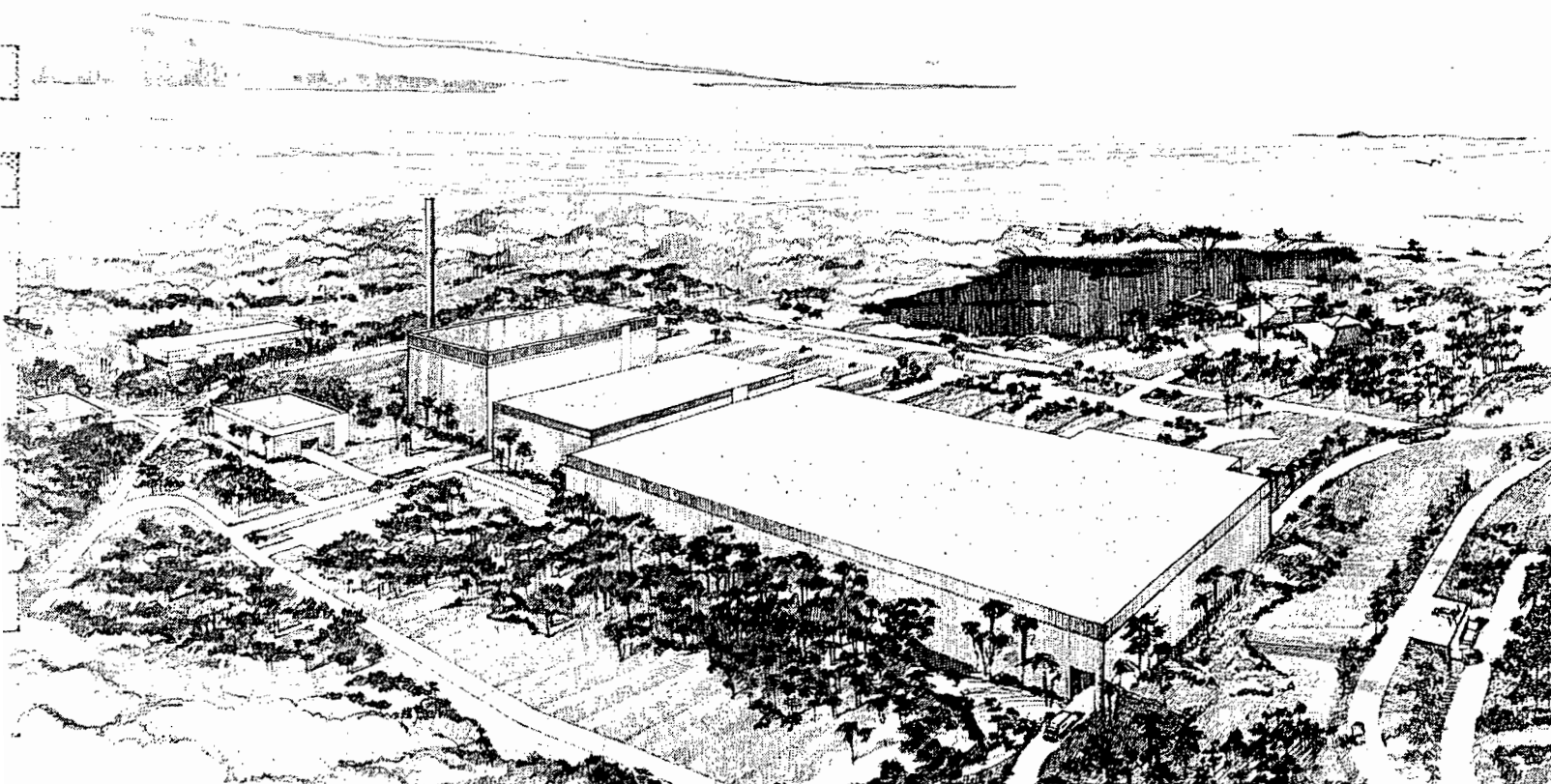
PALM BEACH COUNTY RESOURCE RECOVERY FACILITY

PA 84-20

DOAH CASE NO. 85-2032

SUBMITTED BY

THE PALM BEACH COUNTY SOLID WASTE AUTHORITY



PALM BEACH COUNTY SOLID WASTE AUTHORITY



November 19, 1985

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

Attn: Mr. Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

Re: Response to August 22, 1985 Letter
Application for Power Plant Siting Certification
Resource Recovery Facility
Solid Waste Authority
Palm Beach County, Florida

Dear Mr. Oven:

Accompanying this letter are 45 copies of the Response to your letter of August 22, 1985 in which a total of 10 questions/comments were raised by the Florida Department of Health and Rehabilitative Services concerning the Application. Individual responses to each of the 10 questions/comments are included in each response book for distribution.

Should you have any further questions, please contact our office.

Very truly yours,

Thomas R. Keith
Director of Environmental
Programs

TRK/esc
enclosures

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION



TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 22, 1985

Mr. Tim Hunt, Jr.
Executive Director
Palm Beach County Solid
Waste Authority
3114 Okeechobee Blvd.
Suite 2C
West Palm Beach, FL 33409

Dear Mr. Hunt:

Attached are comments and questions submitted by the Palm Beach County Health Department. You may wish to consider or respond to these comments as may be appropriate.

Sincerely,

Hamilton S. Oven, Jr.
Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

HSOjr/sb

Attachment

cc: Don White

RECEIVED
AUG 26 1985

STATE OF FLORIDA



DEPARTMENT OF

Health & Rehabilitative Services

District Nine
P. O. Box 29

Bob Graham, Governor

Palm Beach County Health Dept.
West Palm Beach, Florida 33402

Please Address
Reply to: ESE-WPB

Received DER

AUG 22 1985

EES

August 15, 1985

Mr. Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Dear Mr. Oven:

Below please find our very preliminary comments pursuant to your letter dated June 19, 1985 regarding the Palm Beach County Resource Recovery Plant (PA 84-20).

Our staff will continue to review subject application and submit comments at appropriate times.

1. Vol IV - Air Quality, page 2, paragraph 1.4 states that "Palm Beach County is in attainment with all NAAQS". It should be noted that Palm Beach County has been officially designated non-attainment for the pollutant ozone and that the plans to construct subject facility should be prepared accordingly.
2. Vol IV - Air Quality, page 16. Where will the CO monitor be located?
3. Volume IV, page 18 states that the SO₂ emission factor, used in calculating the facilities emissions, is based only on the sulfur content of RDF.

Volume IV, page 23 states that auxiliary fuel is used during start-up and shut-down and will constitute 1.25% of the heat input to each furnace and either No. 2 oil or natural gas will be used as the auxiliary fuel.

Volume I, Section 3-11 indicates that auxiliary burners will be used to assist the combustion process when refuse is wet or otherwise difficult to burn.

Volume 1, Section 3-8 suggests that landfill gas may be used as a source of auxiliary fuel.

Mr. Hamilton S. Oven, Jr., P.E.

Page 2

August 15, 1985

It should be determined what the auxiliary fuel will be, what the amount consumed will be, and what the actual sulfur content of this fuel will be.

Auxiliary fuel usage may prove to be a significant source of SO₂ and should be examined more closely.

4. Volume I, Section 2-10 states that should a total combustion shutdown occur, the RDF processing line would continue to operate until the RDF stockpile exceeded storage capacity (2 to 3 days).

If a total combustion shutdown occurred, the negative air system utilized in the storage area would not be able to vent the odors to the furnace for incineration as originally intended.

Is an alternative method of odor abatement to be employed during total combustion shutdown?

5. The dust control system used on the RDF processing line is currently designed to vent exhaust air directly to the outside environment.

The negative air system servicing the RDF processing building vents air to the furnace so that odors will be incinerated.

The dust control system should also vent the exhaust air into the furnace or it will defeat the purpose of the negative air system.

5. Dewatered ash from the furnaces will be carried by a conveyor system and discharged into open top ash trucks. Adequate precautions should be taken to prevent emissions of this material to the ambient air (material should be kept moist or covered).

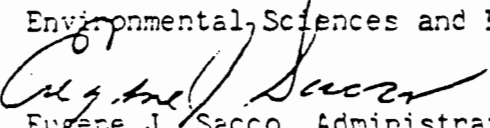
7. Access roads should be paved to reduce dust emissions.

8. Land clearing material generated during site preparation should be land-filled and not burned.

9. Unconfined emissions of particulate matter as described in Chapter 17-2. 610(3), FAC shall be adequately controlled during site preparation and plant construction.

Sincerely,

For the Division Director
Environmental Sciences and Engineering


Eugene J. Sacco, Administrator
Air Pollution, Solid and
Hazardous Waste Control

FJG/EJS/sc

STATE OF FLORIDA



DEPARTMENT OF

Health & Rehabilitative Services

District Nine
P. O. Box 29

Bob Graham, Governor

Palm Beach County Health Dept.
West Palm Beach, Florida 33402

Please Address
Reply to: ESE-WPB

Received DER

August 19, 1985

AUG 22 1985

P P S

Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Dear Mr. Oven:

Below are comments inadvertently omitted from our letter of August 15, 1985, regarding the Palm Beach County Resource Recovery Plant (PA 84-20).

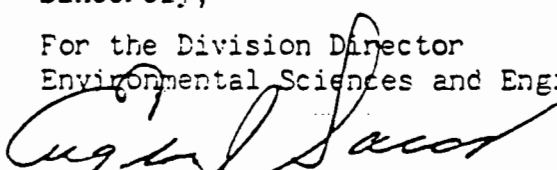
10. According to Appendix 10.14.7, proposed wells for the City of Riviera Beach P.W.S. are within 1 mile of the proposed interceptor wells for the new facility at Site 7. The six interceptor wells will have a combined maximum withdrawal of 3.2 MGD for cooling, boiler and irrigation purposes, as well as creating a hydraulic barrier, should the liner system fail in the immediate area, and to recover existing leachate under the site.

In view of this fact, several points need further clarification and/or investigation:

- o Is it possible to relocate the proposed Riviera Beach Wells?
- o If relocation is not possible, what will be the permitted, daily (or monthly) withdrawal of these PWS wells, and will their "cones of influence" supersede that of the interceptor wells?
- o If leachate is detected in a monitoring well, and there happens to be a pump failure at the inteceptor well, will there be back-up pumps available?

Sincerely,

For the Division Director
Environmental Sciences and Engineering


Eugene J. Sacco, Administrator
Air Pollution, Solid and
Hazardous Waste Control

FJG/EJS/sc

Letter Dated August 22, 1985

ITEM 1: Volume IV - Air Quality, page 2, paragraph 1.4 states the "Palm Beach County is in attainment with all NAAQB". It should be noted that Palm Beach County has been officially designated non-attainment for the pollutant ozone and that the plans to construct subject facility should be prepared accordingly.

RESPONSE: In Volume IV - Air Quality, Page 2, Paragraph 1.4, noted that the county was in attainment based on the most recent information available (Palm Beach County Health Department's Annual Report, 1983). It went on to note that the U.S. Environmental Protection Agency did not consider the County to be in compliance with regards to ozone until the County completed a monitoring program which was ongoing during the preparation of the Air Quality Volume.

With definitive information now available that the County is in non-attainment, the following non-attainment review is offered.

Nonattainment Review

If a proposed major stationary source will emit pollutants for which the area in which it is to be located has been designated non-attainment, the source is exempt from the Prevention of Significant Deterioration (PSD) review for those specific pollutants which are in non-attainment. This source, however, must meet the applicable requirements of New Source Review (NSR) for each pollutant that is in nonattainment. Additionally, the Lowest Achievable Emission Rate (LAER) for each affected pollutant with the possibility of offset requirements may be applicable.

It is noted that non-attainment requirements do not apply to every new source; rather, they apply on a "per pollutant" basis. The test of applicability is whether or not the affected pollutant has an emission rate that exceeds 100 tons per year.

The regulated pollutant for which Palm Beach County is in non-attainment is ozone. The indicator pollutant relative to emissions for ozone is non-methane hydrocarbons.

In accordance with Table 4-1, Controlled Emission Factors for the RDF Fired Spreader Stoker Furnaces, page 19, Volume IV - Air Quality, volatile organic compounds (VOC) are projected to be emitted at the rate of 65.6 tons per year for three operational furnaces. Under these circumstances, the non-attainment review is not required since the annual emissions are less than 100 tons per year.

The ambient air quality modeling in Volume IV - Air Quality, Table 5-9F, page 67, has shown that a maximum Highest Second-Highest (HSH) 3 hour average for VOC will be 1.6 ug m^{-3} at a distance of only 770 meters from the source's nearest boundary line (730 meters). This impact is only 1% of the VOC guideline value of 160 ug m^{-3} (for a 3 hour impact average between the hours of 0600-0900). The maximum modelled impact was found during the 3 hour time interval from 1200-1500. It may be assumed, therefore, that VOC emissions from the refuse derived fuel will not make a significant contribution to the formation of oxidants (ozone) in and/or around Palm Beach County.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated August 22, 1985

ITEM 2: Volume IV - Air Quality, page 16. Where will the CO monitor be located?

RESPONSE: The location of the CO monitor has been specified in Volume I of the Application, Chapter 3, Section 3.4.1.4.4.5, page 3-25. The CO monitors will be located in the gas outlets of each boiler prior to any heat traps or air pollution control devices as further referenced in Chapter 5, Section 5.6.2, page 5-18.

Letter Dated August 22, 1985

ITEM 3: Volume IV, page 18 states that the SO₂ emissions factor, used in calculating the facilities emissions, is based only on the sulfur content of RDF.

Volume IV, page 23 states that auxiliary fuel is used during start-up and shut-down and will constitute 1.25% of the heat input to each furnace and either No. 2 oil or natural gas will be used as the auxiliary fuel.

Volume I, Section 3-11 indicates that auxiliary burners will be used to assist the combustion process when refuse is wet or otherwise difficult to burn.

Volume I, Section 3-8 suggests that landfill gas may be used as a source of auxiliary fuel.

It should be determined what the auxiliary fuel will be, what the amount consumed will be, and what the actual sulfur content of this fuel will be.

Auxiliary fuel usage may prove to be a significant source of SO₂ and should be examined more closely.

RESPONSE: Auxiliary fuel is provided to the furnaces for start-up and on rare occasions for use in the afterburner. Furnaces firing RDF would not be expected to be shut down more often than two or three times a year, and in practice the percentage of auxiliary fuel would not be expected to exceed a fraction of 1%. For conservative design calculation purposes 1.25% is used.

It is expected that landfill gas would be available from Dyer Boulevard Landfill for a period up to 10 years after closure and, thus, would be the natural choice for the auxiliary fuel. If

circumstances are such that landfill gas is not available to the resource recovery plant, either #2 fuel oil or natural gas would be used. Both are available, and natural gas would be the preferred fuel if the cost of installation for the gas line is not prohibited. This will be determined during the design phase.

Whichever fuel is selected, there would be little or no effect on SO₂ emissions. Natural gas supplied locally contains no sulphur, #2 fuel oil has a maximum sulphur content of 0.3%, and landfill gas generally contains approximately 0.01% sulphur. RDF has a sulphur content of approximately 0.2%, which is about the same as #2 fuel oil, while the content in landfill and natural gas is substantially less.

Letter Dated August 22, 1985

ITEM 4: Volume I, Section 2-10 states that should a total combustion shutdown occur, the RDF processing line would continue to operate until the RDF stockpile exceeded storage capacity (2 to 3 days).

If a total combustion shutdown occurred, the negative air system utilized in the storage area would not be able to vent the odors to the furnace for incineration as originally intended.

Is an alternative method of odor abatement to be employed during total combustion shutdown?

RESPONSE: The Authority plans call for the construction of a combustion facility adjacent to the RDF manufacturing plant which will reduce odors by taking combustion air from the refuse storage areas. When the combustion units are down, roofs vents will ventilate the storage areas.

The majority of the RDF manufacturing plants in this country ventilate odors to the outside because they do not have combustion facilities attached or adjacent to them. The odors outside the manufacturing and storage areas of these plants are "none" to "very minor" and "none" at the property line.

Letter Dated August 22, 1985

ITEM 5: The dust control system used on the RDF processing line is currently designed to vent exhaust air directly to the outside environment.

The negative air system servicing the RDF processing building vents air to the furnace so that odors will be incinerated.

The dust control system should also vent the exhaust air into the furnace or it will defeat the purpose of the negative air system.

RESPONSE: The dust control system on a particular process line in the RDF manufacturing area is only in operation when that line is processing refuse. To connect furnace combustion air systems to the dust control systems would be quite complicated and unbalanced. The amount of air needed for combustion is only a fraction of what would be used for both odor and dust control.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated August 22, 1985

ITEM 6: Dewatered ash from the furnaces will be carried by a conveyor system and discharged into open top ash trucks. Adequate precautions should be taken to prevent emissions of this material to the ambient air (material should be kept moist or covered).

RESPONSE: The dewatered ash is conveyed to dump trucks in an enclosed area. The ash is quite wet, with a 35% to 40% moisture content, and does not pose a dust problem.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated August 22, 1985

ITEM 7: Access roads should be paved to reduce dust emissions.

RESPONSE: As stated in the Response to the Department of Environmental Regulation Letter of July 2, 1985, Item No. 14, the Solid Waste Authority proposes to provide a bituminous prime coat on all permanent roadways on the construction site as early as possible to reduce potential particulate emissions. A comprehensive watering program will be the primary means of controlling particulate emissions on unpaved roadways.

Letter Dated August 22, 1985

ITEM 8: Land clearing material generated during site preparation should be landfilled and not burned.

RESPONSE: The land clearing material generated during site preparation may be disposed of in accordance with FAC 17-6, Open Burning, or by landfilling. Land clearing material may be burned with approval from the Fire Marshal's office and the Palm Beach County Health Department. During the construction of the Resource Recovery Facility, the Solid Waste Authority shall comply with current requirements of the regulatory agencies for the disposal of land clearing material.

Since controlled open burning of land clearing debris is a common and approved process in Palm Beach County, the Authority fails to see any reason not to avail itself of the opportunity to utilize this practice. Land preparation for this project is no different from any other development project in the County. Additionally, controlled open burning of land clearing debris will save in Class III landfill space. Consequently, the Solid Waste Authority will be pursuing appropriate authorization to engage in controlled open burning of the land clearing debris generated during site development.

Letter Dated August 22, 1985

ITEM 9: Unconfined emissions of particulate matter as described in Chapter 17-2.610(3), FAC shall be adequately controlled during site preparation and plant construction.

RESPONSE: During site preparation and other plant construction, good construction practices shall be used to minimize particulate emissions. The Authority has watering tankers, and a watering program shall be used as needed.

Letter Dated August 22, 1985

ITEM 10: According to Appendix 10.14.7, proposed wells for the City of Riviera Beach P.W.S. are within 1 mile of the proposed interceptor wells for the new facility at Site 7. The six interceptor wells will have a combined maximum withdrawal of 3.2 MGD for cooling, boiler and irrigation purposes, as well as creating a hydraulic barrier, should the liner system fail in the immediate area, and to recover existing leachate under the site.

In view of this fact, several points need further clarification and/or investigation:

- a) Is it possible to relocate the proposed Riviera Beach Wells?
- b) If relocation is not possible, what will be the permitted, daily (or monthly) withdrawal of these PWS wells, and will their "cones of influence" supersede that of the interceptor wells?
- c) If leachate is detected in a monitoring well, and there happens to be a pump failure at the interceptor well, will there be back-up pumps available?

RESPONSE: a) The locations of the proposed Riviera Beach wells were chosen by the City of Riviera Beach. We are not in a position to examine alternative well locations for the City.

b) At this time it is not known what the actual permitted withdrawal rates will be. The withdrawal rates will be determined by the South Florida Water Management District. To the best of our knowledge, the daily withdrawal rate from the nine wells (five of these are proposed) will be about 3 mgd (million

gallons per day), as stated in Appendix 10.4 (Proposed Plan for the Recovery and Use of Ground Water by Pumping at the Dyer Boulevard and the Proposed Site 7 Landfills) of the Application.

The City of Riviera Beach currently operates four wells in the subject area; five more are proposed. The five proposed Riviera Beach wells are expected to pump 5/9ths of 3 mgd, or 1.66 mgd. Under average conditions of water availability, the cones of depression caused by the interceptor wells and the Riviera Beach wells will not significantly interfere with each other. The interceptor wells will cause a drawdown in the proposed Riviera Beach wells of 0.4 feet or less. Figure 6 in the cited report shows that a ground water divide between the two well fields will persist.

c) Pump failure in any interceptor well can be remedied in a matter of days. The groundwater flow rate in the vicinity of the interceptor wells will be on the order of one foot per day when the interceptor wells are operating. Therefore, only minor uncontrolled ground water flow would occur in the vicinity of the failed well during a period of pump failure.

PALM BEACH COUNTY SOLID WASTE AUTHORITY



November 13, 1985

Mr. Claire H. Fancy
Central Air Permitting Section
Bureau of Air Quality Management
State of Florida
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Re: Federal PSD Permitting Procedures

Dear Mr. Fancy:

As referenced in Department correspondence to this office, dated August 27, 1985, the USEPA has taken the position that the requirements of the Florida Electrical Power Plant Siting Act (PPSA) are not fully compatible with federal regulations, particularly with regard to federal PSD review and permitting. Consequently, the USEPA maintains that a source which obtains certification pursuant to the PPSA must additionally obtain a valid PSD permit before construction may commence. Hopefully, FDER and USEPA will be able to rectify this glitch in the PPSA certification process. In the meantime however, applicants such as the Authority are subjected to an unnecessary degree of uncertainty and confusion in attempting to ensure that the appropriate permits and authorizations are properly sought.

In accordance with the recommendations of the Bureau of Air quality Management, the Palm Beach County Solid Waste Authority hereby formally requests that the Department perform the Technical and Administrative PSD review and that its comments be forwarded to the USEPA for consideration in the issuance of a federal PSD permit. It is hoped that this request will facilitate a coordinated PSD review and expediate USEPA permit issuance.

If you have any questions or comments regarding this request, please call.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas R. Keith", is written over a horizontal line.

Thomas R. Keith
Director
Environmental Programs

TRK/ja

cc: Mr. Winston Smith, USEPA
Mr. Mike Schenk, Barker, Osha & Anderson
Mr. Stan Timmerman, Hayden/Wegman
Mr. Buck Oven, FDER

5114 Okeechobee Blvd. / Suite 2C / West Palm Beach, Florida 33409 / Telephone (305) 471-5770

DER

NOV 19 1985

BAQM

Best Available Copy

DER



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

OCT 03 1985

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

OCT 07 1985

BAQM

REF: 4APT-AP

Mr. Clair Fancy
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

RE: PSD-FL-108 Palm Beach County Solid Waste Resource
Recovery Facility

Dear Mr. Fancy:

This is to acknowledge receipt of your July 2, 1985, submittal of the above referenced company's application for a Power Plant Siting Act certification. We have reviewed the application and found insufficient data to adequately review the modeling portion of the application. Therefore, we request that you send us copies of the model options printouts for each model run as well as the input parameters for these runs.

In regard to our review of the engineering analysis portion of the application, the emissions estimates and control technology were discussed with Mr. Ed Svec of your staff. EPA-Region IV is in agreement with Mr. Svec's assessment of emissions estimates and controls for this refuse derived fuel fired resource recovery facility. We, therefore, concur on the engineering analysis portion of the application. Concurrence on the modeling portion is being withheld until verification of the modeling procedure can be made by our meteorologist. However, no problems were discovered in our review of the modeling summaries of the predicted ambient impacts contained within the application.

In addition to the above, we notified Mr. Timothy F. Hunt, Executive Director of the Palm Beach County Solid Waste Authority, by letter dated September 17, 1985, that certification of this proposed facility under the Florida Power Plant Siting Act does not constitute a federal PSD permit. We further informed Mr. Hunt that EPA and the Florida DER are presently contemplating methods through which the source may receive a federal PSD permit. A copy of this correspondence has been forwarded to your office.

If you have any questions or comments regarding this matter, please contact Mr. Wayne J. Aronson, Leader, Program Support Team, at 404/881-4901.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller, Acting Chief
Air Programs Branch
Air, Pesticides, & Toxics Division



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

DER

SEP 20 1985

BAQM

SEP 17 1985

REF: 4APT-AP

Mr. Timothy F. Hunt
Executive Director,
Palm Beach County
Solid Waste Authority
West Palm Beach, Fl. 33409

RE: Palm Beach County Solid Waste Resource Recovery Facility

Dear Mr. Hunt:

On November 22, 1983, the EPA approved Florida's Prevention of Significant Deterioration (PSD) regulations as part of the federally approved State Implementation Plan (SIP), Florida Administrative Code §17.2-500, thereby transferring to Florida the legal authority to process and issue PSD permits to sources in Florida which are required to obtain PSD permits. However, EPA recently became aware that, due to a conflict between the language of the Florida Electrical Power Plant Siting Act (PPSA), Public Health Code §§403.501-403.519, and that of the PSD regulations in the Florida SIP, EPA's approval of the PSD regulations as part of the SIP is void as to sources which are subject to the PPSA. Therefore, a source which obtains certification pursuant to the PPSA is still required to obtain a valid PSD permit before constructing or modifying.

We understand that Florida is currently processing, under the PPSA, a request by the Palm Beach County Solid Waste Authority to construct a solid waste resource recovery facility which shall generate electric power from combustion of refuse derived fuel and recover recyclable materials. This is to notify you that any such certification issued by Florida does not abrogate your responsibility to obtain a federal PSD permit. Construction of the source without a valid PSD permit will be considered a violation of the Clean Air Act and subject your facility to enforcement action.

We are currently engaged in discussions with the Florida Department of Environmental Regulation (DER) regarding courses of action that would enable a source subject to the PPSA to apply for a federal PSD permit with the DER. One possible solution currently under consideration by the DER and EPA involves placing the responsibility for the technical and administrative portions of the federal PSD review with the DER and the responsibility for issuance of the PSD permit with EPA.

DEPARTMENT OF ENVIRONMENTAL REGULATION

**ROUTING AND
TRANSMITTAL SLIP**

ACTION NO

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION)

Chair

Initial

Date

2.

*Send copy to Buck Oran's & Sue
letter to me*

Initial

Date

3.

sent 9/24

Initial

Date

4.

Initial

Date

REMARKS:

*edhvec -
for file*

INFORMATION

Review & Return

Review & File

Initial & Forward

DISPOSITION

Review & Respond

Prepare Response

For My Signature

For Your Signature

Let's Discuss

Set Up Meeting

Investigate & Report

Initial & Forward

Distribute

Concurrence

For Processing

Initial & Return

FROM:

Steve Smallwood

DATE

PHONE

There are a number of legal considerations which must be addressed before the current situation is resolved. EPA will keep you informed of all developments.

In the meantime, you or your representatives may call our office to discuss the current status of these discussions. If you have any questions regarding this letter, or information on how to apply for a PSD permit, please feel free to contact Mr. Wayne Aronson, Team Leader, Program Support Team at 404/881-4901.

Sincerely Yours,

A handwritten signature in cursive script, appearing to read "Winston Smith".

Winston Smith, Director
Air, Pesticides & Toxics Division

cc:

Mr. Steve Smallwood, Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To: <i>Ed Suec</i>	Locn.:	
To: _____	Locn.:	
To: _____	Locn.:	
From: _____	Date:	
Reply Optional []	Reply Required []	Info. Only []
Date Due: _____	Date Due: _____	

TO: Hamilton Oven
FROM: Clair Fancy *CAF*
DATE: August 23, 1985
SUBJ: Palm Beach County Resource Recovery Facility -
Sufficiency Review

Listed below are questions my staff has prepared to be submitted to the applicant. These questions need to be answered before final review of the application can be completed.

1. Submit a copy of the appropriate sections of the references used to devise the emission factors for all the pollutants emitted by the proposed facility.
2. Provide documentation that an electrostatic precipitator (ESP) will remove 99% of sulfuric acid mist at an exit gas temperature of 450 °F.
3. The emission factor for dioxins appears to be based on the emission factor for the Brooklyn Navy Yard project which will use a dry scrubber and baghouse for control. What is the emission factor when an ESP is used as the only control device.
4. Wet scrubbers were not evaluated in the BACT because they produced an "aesthetically undesirable water vapor plume." Provide all the appropriate evaluations of wet scrubbers for the proposed BACT.
5. The proposed BACT compares an ESP to a dryscrubber and baghouse. This is not a valid comparison. Submit the necessary data comparing a baghouse to an ESP and a dryscrubber with a baghouse to scrubber with an ESP.
6. A BACT economic analysis which evaluates unit cost per ton of pollutant removed should include all the pollutants; for example, dry scrubbers should address acids, SO₂ etc. Resubmit the economic data for all of the control systems which are to be evaluated.

Hamilton Oven
Page Two
August 23, 1985

7. Will any hospital waste or "red bag" waste be incinerated at this facility. If so, please quantify the amounts, composition, and the source of these materials.
8. Verify and correct, if necessary, the tons per year emissions contained in the air permit application.
9. Tables 5-9 A through F of appendix 10.1.5 contain results of the highest, second high modeled concentrations for the proposed facility. These results include values at a distance of 730 meters from the center of the facility. The modeled runs, however, do not include any receptors at this distance. Please explain.
10. EPA informed us very recently that The Power Plant Act is not totally compatable with their rules and they are going to rescind our delegation of sources subject to PSD PPS. The county needs to be informed of such and they must send a letter to me requesting that we perform the Technical and Administrative review for EPA so that they can issue a federal PSD permit.

TR/ks

PALM BEACH COUNTY

SOLID WASTE AUTHORITY



November 5, 1985

Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Attn: Mr. Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

Re: Response to August 27, 1985 Letter
Application for Power Plant Site Certification
Resource Recovery Facility
Solid Waste Authority
Palm Beach County, Florida

Dear Mr. Oven:

Accompanying this letter are 45 copies of the response to your letter of August 27, 1985 in which (1) ten questions/comments from the Department of Environmental Regulation's Bureau of Air Quality Management and (2) comments from the U.S. Department of the Interior National Park Service concerning the application were included.

Responses to all of the questions/comments concerning the application are included in each response booklet for distribution. Responses to the Bureau of Air Quality Management questions 1 through 3 are under Tab No. 1, questions 4 through 6 are under Tab No. 2 and questions 7 through 10 are under Tab No. 3. The response to the comments from the National Park Service is under Tab No. 4. References B, C and D accompanying the responses are under Tab No. 5, 6 and 7 respectively.

Should you have any further questions please contact our office.

Very truly yours,

Thomas R. Keith
Environmental Compliance
Administrator

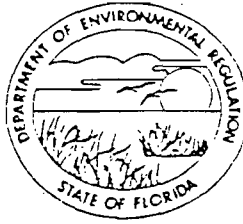
TRK/pc
enclosure

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

RECEIVED
AUG 29 1985

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 27, 1985

Mr. Tim Hunt, Jr.
Executive Director
Palm Beach County Solid
Waste Authority
5114 Okeechobee Blvd.
Suite 2C
West Palm Beach, FL 33409

RE: Palm Beach County Resource Recovery Facility
PA 84-20

Dear Mr. Hunt:

Please respond to the attached comments from the department's Bureau of Air Quality Management concerning sufficiency of the certification application. Also you may wish to review the enclosed letter from the National Park Service.

Sincerely,

Hamilton S. Owen, Jr.
Hamilton S. Owen, Jr., P.E.
Administrator
Siting Coordination Section

HS0jr/sb

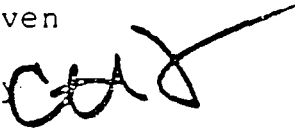
Attachment

cc: William Kendrick
All Parties
Don White

INTEROFFICE MEMORANDUM

For Routing To District Offices An To Other Than The Addressee			
To: _____	Locn.: _____		
To: _____	Locn.: _____		
To: _____	Locn.: _____		
From: _____	Date: _____		
Reply Optional ☐	Reply Required ☐	Info. Only ☐	
Date Due: _____	Date Due: _____		

TO: Hamilton Oven

FROM: Clair Fancy 

DATE: August 23, 1985

SUBJ: Palm Beach County Resource Recovery Facility -
Sufficiency Review

Listed below are questions my staff has prepared to be submitted to the applicant. These questions need to be answered before final review of the application can be completed.

1. Submit a copy of the appropriate sections of the references used to devise the emission factors for all the pollutants emitted by the proposed facility.
2. Provide documentation that an electrostatic precipitator (ESP) will remove 99% of sulfuric acid mist at an exit gas temperature of 450 °F.
3. The emission factor for dioxins appears to be based on the emission factor for the Brooklyn Navy Yard project which will use a dry scrubber and baghouse for control. What is the emission factor when an ESP is used as the only control device.
4. Wet scrubbers were not evaluated in the BACT because they produced an "aesthetically undesirable water vapor plume." Provide all the appropriate evaluations of wet scrubbers for the proposed BACT.
5. The proposed BACT compares an ESP to a dryscrubber and baghouse. This is not a valid comparison. Submit the necessary data comparing a baghouse to an ESP and a dryscrubber with a baghouse to scrubber with an ESP.
6. A BACT economic analysis which evaluates unit cost per ton of pollutant removed should include all the pollutants; for example, dry scrubbers should address acids, SO₂ etc. Resubmit the economic data for all of the control systems which are to be evaluated.

Hamilton Oven
Page Two
August 23, 1985

7. Will any hospital waste or "red bag" waste be incinerated at this facility. If so, please quantify the amounts, composition, and the source of these materials.
8. Verify and correct, if necessary, the tons per year emissions contained in the air permit application.
9. Tables 5-9 A through F of appendix 10.1.5 contain results of the highest, second high modeled concentrations for the proposed facility. These results include values at a distance of 730 meters from the center of the facility. The modeled runs, however, do not include any receptors at this distance. Please explain.
10. EPA informed us very recently that The Power Plant Act is not totally compatible with their rules and they are going to rescind our delegation of sources subject to PSD PPS. The county needs to be informed of such and they must send a letter to me requesting that we perform the Technical and Administrative review for EPA so that they can issue a federal PSD permit.

TR/ks



United States Department of the Interior

NATIONAL PARK SERVICE SOUTHEAST REGIONAL OFFICE

75 Spring Street, S.W.

Atlanta, Georgia 30303

IN REPLY REFER TO:

N3615(SER-OPS)

AUG 16 1985

Mr. Tom Rogers
Bureau of Air Quality Management
State of Florida
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Rogers:

Thank you for sending us a copy of the Palm Beach County Resource Recovery power plant site certification application for a proposed resource recovery facility in Palm Beach County, Florida, approximately 120 km northeast of Everglades National Park. Your early notification of this project is appreciated.

We have reviewed the information you sent to us and, based on that information, we would not expect emissions from the proposed facility to adversely impact the air quality or air quality values of Everglades National Park.

However, we have several comments regarding the air quality and control technology analyses contained in the application. These comments are discussed in the enclosed technical review document. We ask that you consider these comments while performing your review of the application. We also ask that you forward us a copy of your preliminary determination document once your technical review of the project is completed. We will review your preliminary determination and submit any additional comments regarding the project during the 30-day public comment period.

If you have any questions regarding the enclosed comments, please contact Mark Scruggs of our Air Quality Division in Denver at (303) 236-8765.

Sincerely,

Regional Director
Southeast Region

Enclosure

DER

AUG 22 1985

BAOM

Technical Review of Power Plant Site Certification Application
for Palm Beach County Solid Waste Authority

By

Permit Review and Technical Support Branch
Air Quality Division - Denver

Palm Beach County Solid Waste Authority (Palm Beach County) is proposing to construct a resource recovery facility in an unincorporated section of Palm Beach County. The location is approximately 120 km northeast of Everglades National Park, a PSD class I area administered by the National Park Service. The purpose of the facility is to dispose of solid waste generated in Palm Beach County. The project will be a mass-burn facility with a maximum continuous design rated capacity of 3,000 tons per day of solid waste and a maximum electrical generating capacity of approximately 75 megawatts. The initial design is for 2,000 tons per day capacity and 50 megawatt generating capacity. The emissions from the proposed facility are estimated as follows based on 1,800 tons per day (annual average) of refuse burned: 3,942 tons per year (TPY) of carbon monoxide, 1,314 TPY of nitrogen oxides, 2,957 TPY of sulfur dioxide, 1,150 TPY of chlorides, 65.6 TPY of volatile organic compounds, 214 TPY of particulate matter, 0.131 TPY of sulfuric acid mist, 13.2 TPY of fluorides, 0.46 TPY of lead, 0.98 TPY of mercury, and 0.003 TPY of beryllium.

Under the PSD regulations, these emission rates are considered significant for carbon monoxide, nitrogen oxides, sulfur dioxide, volatile organic compounds, fluorides, mercury, beryllium, and particulate matter. Therefore, new source review is required for the aforementioned pollutants. Following are our comments on the best available control technology, air quality, and air quality related values analyses with respect to the project's expected impacts.

BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

The major sources of emissions at the proposed facility are the three associated boilers. Therefore, our review will focus on emission controls on these units. Also, there is a relatively recent publication entitled, "Air Pollution Control at Resource Recovery Facilities" that discusses resource recovery facilities in detail. This document was published in May 1984 by the California Air Resources Board, and was summarized in a technical paper presented at the 77th annual meeting of the Air Pollution Control Association held in June 1984. As of 1984, all refuse-burning facilities with applications pending in California are proposing control technologies that are consistent with, or more stringent than, the guideline emission limits discussed in this report. We refer to this publication throughout our comments on the proposed air pollution control technology analysis.

Particulate Matter (PM)

Palm Beach County proposes to use electrostatic precipitators (ESPs) to minimize PM emissions generated by combustion of the solid waste in the boilers. Each ESP will be capable of reducing the exhaust gas PM concentration to 0.03 grains per dry standard cubic foot (gr/dscf). Palm Beach County states that an ESP with an outlet grain loading of 0.03 gr/dscf is best available control technology (BACT) for the proposed facility.

We agree that high efficiency control devices such as ESPs or baghouses represent BACT for PM emissions from the proposed facility. However, based on information provided in the California Air Resources Board (CARB) document referenced above, an emission limit of 0.01 gr/dscf can be achieved with these devices. This is the guideline emission limit proposed by the CARB for new refuse recovery facilities in California and should be considered as the BACT emission limit.

Palm Beach County indicates on page 8, Volume IV, of their certification application that they could obtain a guaranteed PM emission rate of less than 0.01 gr/dscf from a baghouse. However, they determined a baghouse was not appropriate due to filter media blinding and due to the incidence of fires caused by sparks.

Baghouses have been installed at several refuse burning facilities. Blinding problems were encountered at the East Bridgewater, Massachusetts, installation, but the unit was rebuilt to maintain flue gas temperature at 500°F through the baghouse. The modification apparently solved the major blinding problems. If baghouses are installed, and if the proposed flue gas temperature is increased from 450°F to 500°F, blinding should not be a major problem. The spark carry over and danger of fire in the bags could be minimized by installing a primary collector such as a multitube cyclone ahead of the baghouse. Regardless of whether baghouses or ESPs are installed we feel an emission limit of 0.01 gr/dscf represents BACT.

Sulfur Dioxide (SO₂)

Palm Beach County is proposing no control devices for limiting SO₂ emissions; rather, they are proposing the firing of low sulfur refuse as BACT for the proposed facility. The resulting BACT limit proposed is 0.7 pounds per million Btu heat input (lb/10⁶ Btu).

The emission guideline recommended in the CARB document is 30 ppm, which corresponds to an SO₂ emission rate of approximately 0.08 lb/10⁶ Btu. To achieve this emission level, flue gas controls such as wet or dry scrubbing are required. Dry scrubbing processes have been effectively employed at pilot and full-scale refuse burning facilities in Europe, Japan, and the United States. Wet scrubbers have also been employed at full-scale refuse burning facilities. In light of this information, we recommend that Palm Beach County re-evaluate flue gas scrubbing as BACT for SO₂ emissions from the proposed facility.

Nitrogen Oxide (NO_x) and Carbon Monoxide (CO)

The proposed BACT for NO_x and CO emissions is boiler design and good combustion practices. The resulting NO_x and CO emissions limits proposed are 0.3 and 1.0 lb/10⁶ Btu, respectively. Based on information presented in the CARB report, combustion modifications such as staged combustion, low excess air, and flue gas recirculation can reduce NO_x emissions to between 140 to 200 ppm or 0.28 to 0.4 lb/10⁶ Btu. Since the proposed NO_x limit falls in this range, we agree that the proposed combustion controls and corresponding emission limit represent NO_x BACT. Regarding CO emissions, proper application of the above combustion modification techniques will also minimize CO emissions.

Other Pollutants

Other pollutants emitted from the proposed resource recovery facility requiring BACT review include fluoride, beryllium, and mercury. The proposed BACT for beryllium is the ESPs for the control of particulate matter emissions. Beryllium is emitted in the solid phase, therefore control of PM emissions will also control beryllium emissions. We agree that the proposed ESPs represent BACT for beryllium.

Fluorides and mercury are emitted in small quantities primarily in the gaseous phase. No additional controls are proposed for these pollutants. However, if the wet or dry scrubbers recommended for SO₂ control were installed, the fluoride emissions could be reduced by over 90 percent.

Our last comment in this section pertains to the large discrepancies in some of Palm Beach County's emission estimates compared to those made for the Broward County refuse recovery facility in their March 1985 site certification application. Since the Palm Beach County facility is rated (annual average) at 1,800 tons per day (initial stage) and the Broward County facility is rated at 3,300 tons per day, we would expect the ratio of the Palm Beach County to Broward County emissions to be 1800/3300 or 0.55.

The following table illustrates that, for several pollutants, this is not the case:

Pollutant	Emission		Palm Beach C Broward Co. Ratio
	Rate for Palm Beach County (Tons Per Year)	Rate for Broward County (Tons Per Year)	
SO ₂	2957	3428	0.86
NO _x	1314	3491	0.38
CO ₂	3942	555	7.10
PM ₁₀	214	461	0.46
Lead	0.46	187	0.002
Fluorides	13.2	156	0.085
Sulfuric Acid Mist	0.131	17.3	0.008

The above inconsistencies in emission estimates should be resolved before granting power plant site certifications for the proposed facilities.

AIR QUALITY ANALYSIS

The air quality modeling analysis appears to be adequate for the study area that was analyzed. However, there is no indication of estimates of concentration values in Everglades National Park, a class I area. A screening level air quality modeling analysis should have been performed. Also, at a minimum, a Level I visibility analysis should be done and the results given. (Note: Due to the lack of such a technical analysis, we performed a Level I

visibility analysis. Based on the expected emissions and the distance to the park, the analysis confirms that the project should not significantly impact the visibility at Everglades National Park).

AIR QUALITY RELATED VALUES ANALYSIS

Presently, low SO₂ concentrations have been monitored in Everglades National Park, and the proposed project would probably contribute little to the concentrations. Therefore, we do not anticipate any adverse impacts on air quality related values (AQRVs) in the park from SO₂. However, because this appears to be a high-growth area, and because bioassays of lichens and epiphytes in the park are showing elevated levels of sulfur, we would like to see a cumulative modeling analysis showing the pollutant concentrations expected at Everglades National Park from the proposed source, background, and all other proposed sources.

In addition, high ozone levels have been monitored in Everglades National Park, and we have commenced studies to determine if there are any adverse impacts on vegetation. However, we do not expect the proposed source to significantly contribute to ozone levels in the park. However, it is known that for some species small amounts of SO₂ can act synergistically with the ozone to cause more foliar injury than would be expected with the SO₂ or ozone alone. We are awaiting results of fumigation studies being conducted for us by EPA on slash pine using O₃ and SO₂ which will give us information on how much SO₂ can be added to high O₃ areas before impacts on slash pine will occur.

CONCLUSION

Based on the information provided, we would not expect emissions from the proposed facility to adversely impact the air quality or air quality related values of Everglades National Park. However, we have made several comments regarding the proposed control technology and air quality analyses that should be addressed before the power plant site certification is granted for the proposed project. Results from current studies may lead to the National Park Service reaching different conclusions about the effects of similar sources on AQRVs in the future.

October 18, 1985

PALM BEACH COUNTY SOLID WASTE AUTHORITY

SUPPLEMENTAL REPORT

IN RESPONSE TO

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SUFFICIENCY REVIEW

OF

AIR QUALITY IMPACTS ANALYSIS

FOR PROPOSED

PALM BEACH COUNTY SOLID WASTE AUTHORITY

SOLID WASTE-TO-ENERGY FACILITY

PREFACE

This Supplemental Report is in response to State of Florida Department of Environmental Regulation (DER) communication of August 27, 1985 (from Hamilton S. Oven, Jr., P.E., Administrator, Siting Coordination Section to Tim Hunt, Jr., Executive Director, Palm Beach County Solid Waste).

The DER communication included a Sufficiency Review by DER staff embodied in a two-page Interoffice Memorandum listing ten questions (from Clair Fancy to Hamilton Oven) dated August 23, 1985 and also a four-page Technical Review of the Authority's Power Plant Site Certification Application. The Technical Review was authored by the U.S. Department of the Interior National Park Service Southeast Regional office, transmitted by National Park Service August 16, 1985 letter directed to Mr. Tom Rogers, Bureau of Air Quality Management of the DER.

The response to questions raised by DER and the National Park Service is provided in four sections of this Supplemental Report as follows:

Section I - addresses Questions 1,2 and 3 of DER August 23, 1985 Interoffice Memorandum on the subject of Emission Factors.

Section II - responds to DER August 23, 1985 Interoffice Memorandum Questions 4, 5 and 6 on the issues of Best Available Control Technology (BACT) and addresses comments by National Park Service on this subject.

Section III - covers the Authority's response to DER Questions 7, 8, 9 and 10 on miscellaneous matters encompassing hospital waste, annual emissions, air quality modeling receptors and Technical and Administrative review protocol, respectively.

Section IV - responds specifically to the issues raised in the National Park Service Technical Review.

An Appendix section is included, reproducing in entirety References B, C and D used in Section I development of emission factors. These reference documents may not be readily available to DER and are included in the Appendix to facilitate the DER review by providing complete contexts to the exhibited excerpts taken from the documents for development of specific emission factors.

SECTION I

EMISSION FACTORS

SECTION I

EMISSION FACTORS

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SECTION I

EMISSION FACTORS

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* For list of References, See pages I-1 & 2.

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<u>Exhibit</u>	<u>Title</u>	<u>Ref*</u>	<u>Page</u>
4-7.2	Table 40 Observed Metal Emission Factors for Facilities Burning Coal, Oil, Refuse and Coal/Refuse Mixtures (mg/MJ) as Fired	A	I-28
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4-8.2	Page 292 - Table 12 - Mercury Emissions	B	I-32
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* For List of References, see pages I-1 & 2.

PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE - TO ENERGY FACILITY
REPORT ON AIR QUALITY IMPACTS ANALYSIS
RESPONSE TO FLORIDA DER SUFFICIENCY REVIEW

QUESTION NO. 1:

SUBMIT A COPY OF THE APPROPRIATE SECTIONS OF THE REFERENCES USED TO DEVISE THE EMISSION FACTORS FOR ALL THE POLLUTANTS EMITTED BY THE PROPOSED FACILITY.

RESPONSE:

LIST OF REFERENCES

- A. "AIR POLLUTION CONTROL AT RESOURCES RECOVERY FACILITIES",
PRELIMINARY DRAFT,
CALIFORNIA AIR RESOURCES BOARD,
NOVEMBER 15, 1983
- B. "EMISSIONS AND EMISSION CONTROL IN MODERN INCINERATORS",
W. L. O'CONNELL, G. C. STOTLER, AND R. CLARK,
BATTELLE'S COLUMBUS LABORATORY, COLUMBUS, OHIO
1982 ASME NATIONAL WASTE PROCESSING CONFERENCE PROCEEDINGS
- C. "AN EVALUATION OF EMISSION FACTORS FOR WASTE - TO - ENERGY SYSTEMS" -
EXECUTIVE SUMMARY,
G. M. RINALDI, T. R. BLACKWOOD, D. L. HARRIS & K. M. TACKETT
MAY 29, 1979 USEPA CONTRACT NO. 68-03-2550, TASK II
- D. "SUMMARY REPORT - ASSESSMENT OF NON-CRITERIA POLLUTANT EMISSIONS"
PREPARED FOR NORTH SANTA CLARA COUNTY SOLID WASTE AUTHORITY
BY HAYDEN-WEMAN/CARROLLO ENGINEERS
OCTOBER 25, 1983
- E. FOSTER WHEELER ENERGY CORPORATION LETTER TO HAYDEN-WEGMAN, INC.
DECEMBER 6, 1984
- F. VOLUME IV - AIR QUALITY REPORT, APPENDIX 10.1.5 ON PREVENTION OF
SIGNIFICANT DETERIORATION, PALM BEACH COUNTY, FLORIDA SOLID WASTE

RESOURCE RECOVERY FACILITY APPLICATION FOR POWER PLANT SITE

CERTIFICATION DATED APRIL, 1985

- G. "ASSESSMENT OF POTENTIAL PUBLIC HEALTH IMPACTS ASSOCIATED WITH PREDICTED EMISSIONS OF POLYCHLORINATED DIBENZO-DIOXINS AND POLYCHLORINATED DIBENZO-FURANS FROM THE BROOKLYN NAVY YARD RESOURCE RECOVERY FACILITY"

BY FRED C. HART ASSOCIATES.

AUGUST 17, 1984.

PARAGRAPH NUMBERS PROVIDED BELOW ARE KEYED TO THE PARAGRAPH NUMBERS USED IN THE AUTHORITY INITIAL APPLICATION.

4.1.1 TOTAL SUSPENDED PARTICULATE (PM)

THE EMISSION FACTOR IS BASED UPON THE ABILITY OF THE ELECTROSTATIC PRECIPITATOR MANUFACTURER TO NOT EXCEED A GUARANTEED GRAIN LOADING OF 0.03 GRAINS/DSCF AT 12% CO₂. THIS EMISSION LEVEL REPRESENTS BACT FOR TSP.

FROM REFERENCE "A", TABLE 29, (EXHIBIT 4-1) UNDER RDF-FIRED SPREADER STOKER TYPE,

UNCONTROLLED PM EMISSION IN GRAINS/DSCF, 12% CO₂
= 1.08 TO 3.52 = 2.30 (AVERAGE); % REMOVAL EFF. TO OBTAIN 0.03
GR/DSCF ASSUMING GRAIN LOADING OF 3.0 GR/DSCF = $100(1 - \frac{0.03}{3.00}) = 99\%$

UNCONTROLLED PM EMISSION IN LB/1.0E6 BTU
= 3.0 TO 7.4 = 5.2 (AVERAGE)
CONVERT LB/1.0E6 BTU TO LB/TON,
 $5.2 \text{ LB/1.0E6} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON} = 64.11 \text{ LB/TON}$

AFTER 99% REMOVAL BY ESP,
CONTROLLED PM EMISSION = $64.11 \times (1 - .99)$
= 0.6411 LB/TON
= 0.65 LB/TON (ROUNDED)

Table 29

EXHIBIT 4-1

Uncontrolled Particulate Matter Emissions at Refuse-Burning Facilities

Type of Facility	Particulate Matter Emissions			
	Concentrations grams/Nm ³ , dry† (grains/dscf)		Emission Rates grams/GJ†† (lb/10 ⁶ Btu)	
	Low	High	Low	High
Mass Burning Refractory Wall	1.26 (0.55)	3.96 (1.73)	198 (0.46)	955 (2.22)
Mass Burning Waterwall	1.90 (0.83)	4.70 (2.05)	547 (1.27)	3150 (7.32)
RDF-Fired Spreader Stoker	2.47 (1.08)	8.06 (3.52)	1290 (3.0)	3180 (7.4)
Rotary Kiln	2.66 (1.16)	3.53 (1.54)	1080 (2.51)	1450 (3.37)

†Concentrations corrected to 12% CO₂ and are based on the front half of EPA Method 5 Sampling Train

††Rates based on HHV of refuse "as-fired"

Source: Appendix B

Concentration data listed in Table 29 are corrected to 12 percent CO₂ for comparative purposes. The concentration data indicate that uncontrolled particulate matter concentrations are highest at RDF-fired spreader stoker units and lowest at the refractory wall mass-burning units and rotary kilns. In addition, the concentration data show that wide variations exist within each class of facility.

Emission rate data follow a pattern similar to the one set by the concentration data. The RDF-fired spreader stoker units are the highest emitters of uncontrolled particulate matter. Uncontrolled particulate matter emission rates at these facilities range between approximately 1300 to 3200 grams per billion Joules (3.02 to 7.44 lbs per million Btu) of fuel (as-fired). Mass-burning waterwall units have slightly lower particulate matter emission rates, ranging from approximately 550 to 3200 grams per billion Joules (1.28

4.1.2 SULFUR DIOXIDE (SO₂)

THE SO₂ EMISSION FACTOR IS BASED UPON RDF FUEL SULFUR CONTENT WHICH IS ASSUMED TO BE COMPLETELY CONVERTED TO SO₂.

FROM TABLE 1-2 ON PAGE 4 (EXHIBIT 4-2) IN *VOL. IV - AIR QUALITY REPORT, APPENDIX 10.1.5 ON PREVENTION OF SIGNIFICANT DETERIORATION,

$$\begin{aligned}\text{SULFUR CONTENT IN RDF} &= 0.22 \text{ LB/100 LB RDF} \\ &= 4.4 \text{ LB/TON RDF}\end{aligned}$$

ASSUME 100% CONVERSION FROM S TO SO₂,



MOL. WT. 32	64

THEREFORE,

$$\begin{aligned}4.4 \text{ LB S/TON} &= 8.8 \text{ LB SO}_2\text{/TON} \\ &= 9.0 \text{ LB SO}_2\text{/TON (ROUNDED)}\end{aligned}$$

*PALM BEACH COUNTY, FLORIDA SOLID WASTE RESOURCE RECOVERY FACILITY
APPLICATION FOR POWER PLANT SITE CERTIFICATION DATED APRIL, 1985

HAYDEN-WEGMAN /
BARKER, OSHA & ANDERSON
ENGINEERS - PLANNERS

TABLE 1-2

PALM BEACH COUNTY SOLID WASTE COMPOSITION STUDY

TYPICAL ANALYSIS AND COMPOSITION OF REFUSE DERIVED FUEL (RDF)
PERCENT BY WEIGHT

COMPONENT	RECOVERY RATE (%)	MOISTURE	INORGANIC	CARBON	HYDROGEN	OXYGEN	NITROGEN	CHLORINE	SULFUR	TOTAL	HHV BTU/LB
CORRUGATED BOARD	99.0	1.48	0.17	2.72	0.38	2.62	0.01	0.01	0.02	7.39	461.
NEWSPAPER	99.0	5.10	0.37	8.76	1.11	7.60	0.03	0.03	0.04	23.03	1488.
MAGAZINES	99.0	0.78	0.62	1.55	0.22	1.54	0.01	0.01	0.01	4.72	260.
OTHER PAPER	99.0	5.78	2.39	8.56	1.19	7.90	0.08	0.16	0.05	26.12	1448.
PLASTICS	98.0	1.12	0.90	5.92	0.82	0.84	0.09	0.31	0.03	10.03	1215.
RUBBER, LEATHER	99.0	0.20	0.64	1.22	0.15	0.33	0.04	0.14	0.03	2.76	239.
WOOD	99.0	0.14	0.03	0.50	0.06	0.42	0.00	0.00	0.00	1.16	84.
TEXTILES	98.0	0.41	0.10	1.92	0.26	1.40	0.16	0.01	0.01	4.28	340.
YARD WASTE	85.0	0.50	0.13	0.30	0.04	0.22	0.01	0.00	0.00	1.19	51.
FOOD WASTE	60.0	0.69	0.29	1.04	0.15	0.74	0.07	0.02	0.00	3.01	189.
MIXED COMBUSTIBLES	40.0	3.70	0.77	2.21	0.31	1.75	0.05	0.04	0.02	8.85	386.
FERROUS	7.0	0.01	0.53	0.01	0.00	0.01	0.00	0.00	0.00	0.56	1.
ALUMINUM	35.0	0.01	0.88	0.01	0.00	0.01	0.00	0.00	0.00	0.93	2.
OTHER NON-FERROUS	10.0	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.
GLASS	35.0	0.08	5.78	0.03	0.00	0.02	0.00	0.00	0.00	5.92	5.
TOTALS		20.00	13.66	34.75	4.69	25.40	0.54	0.73	0.22	100.00	6171.

HEAT VALUE AS PRODUCED (20.0% H₂O) = 6171.
HEAT VALUE OF DRY SOLIDS = 7714.
HEAT VALUE OF COMBUSTIBLES = 9302.

ASH AS PRODUCED (20.0% H₂O) = 13.7%
DENSITY = 2.5 TO 3.5 POUNDS/CUBIC FOOT
SIZE = MINUS 2" X MINUS 2" X MINUS 2"

4.1.3 CARBON MONOXIDE (CO)

SEVERAL DATA BASES WERE INVESTIGATED TO DEVELOP AN EMISSION FACTOR FOR CO.
FROM REFERENCE "A", TABLE 34 (EXHIBIT 4-3.1) UNDER RDF-FIRED
SPREADER STOKER,

UNCONTROLLED CO EMISSION IN LB/1.0E6 BTU = .44 TO 2.3

CONVERT LB/1.0E6 BTU TO LB/TON,

$$.44 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON} = 5.43 \text{ LB/TON}$$

$$2.3 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON} = 28.35 \text{ LB/TON}$$

THEREFORE,

UNCONTROLLED CO EMISSION IN LB/TON = 5.43 TO 28.35

FROM REFERENCE "B", PAGE 290, TABLE 7 (EXHIBIT 4-3.2)

UNCONTROLLED CO EMISSION IN LB/TON = 1.9 LB/TON

FROM REFERENCE "E", (EXHIBIT 4-3.3 SHEETS 1&2)

UNCONTROLLED CO EMISSION IN PPM = 500 -----(1)

CONVERT FROM PPM TO LB/TON RDF BASED ON FOSTER WHEELER'S DATA,

$$500 \text{ CF OF CO} = 500 \text{ CF} \times 28 \text{ LB/379 CF} = 36.94 \text{ LB OF CO} \text{ -----(2)}$$

$$212,500 \text{ ACFM} = 212,500 \text{ ACF/MIN} \times (460+60) \text{ R}/(460+450) \text{ R}$$

$$= 121,429 \text{ SCFM} \text{ -----(3)}$$

$$750 \text{ TPD} = 750 \text{ TPD} \times \text{HR}/60 \text{ MIN} \times \text{DAY}/24 \text{ HR} = 0.5208 \text{ TON/MIN} \text{ --(4)}$$

$$(3)/(4) = 121,429 \text{ SCFM} / 0.5208 \text{ TON/MIN} = 233,159 \text{ SCF/TON RDF}$$

$$1000000 \text{ SCF OF FLUE GAS} = 1000000 \text{ SCF} / 233,159 \text{ SCF/TON RDF}$$

$$= 4.29 \text{ TON RDF} \text{ -----(5)}$$

$$(2)/(5) = 500 \text{ PPM} = 36.94 \text{ LB CO} / 4.29 \text{ TON RDF}$$

$$= 8.61 \text{ LB CO/TON RDF}$$

THE PRINCIPAL REASON FOR THE DIFFERENCE IN EMISSION FACTORS LISTED ABOVE IS DUE TO EXCESS AIR DESIGN. MOST OF THE SPREADER STOKER FURNACES CITED BY CARB WERE DESIGNED TO FIRE RDF AT ABOUT 40% EXCESS AIR. OUR INVESTIGATIONS HAVE INDICATED THAT A PRUDENT OPERATING POINT FOR RDF COMBUSTION TO BE AT 50% EXCESS AIR WITH A DESIGN POINT OF 60% TO ACCOMMODATE VARIATIONS IN FUEL MOISTURE AND HEATING VALUE. ACCORDINGLY A MEDIUM VALUE OF 12 LB/TON RDF IS SELECTED AS THE EMISSION FACTOR FOR CO.

Table 34

**Uncontrolled Matter Emissions of CO and THC
at Refuse-Burning Facilities***

Type of Facility	Concentrations (ppmv, dry)+				Emissions Rates grams/GJ (lb/10 ⁶ Btu)			
	CO Low	CO High	THC** Low	THC** High	CO Low	CO High	THC Low	THC High
Mass Burning Refractory Wall	87	99	84	169	26 (.06)	27 (.06)	14 (.03)	17.0 (.04)
Mass burning Waterwall	105	2186	7.3	60	65 (.15)	860 (2.0)	1.3 (.003)	1.7 (.004)
RDF-Fired Spreader Stoker	196	1160	8	2450	190 (.44)	1000 (2.3)	8.6 (.02)	470 (1.09)
Rotary Kiln	48	3500	NA	NA	14 (.03)	1100 (2.6)	NA	NA

+ Concentrations corrected to 12% CO₂

* Rates based on HHV of fuel "as-fired"

** THC reported as methane

NA Not Available

Source: Appendix B

TABLE 6 NITROGEN OXIDE EMISSIONS

Incinerator	lb/Ton	$\frac{lb}{kg}$	actual ppm	ppm corr. to 12% CO ₂	Ref.
Various	3.0	(1.5)			8
Various	1.6	(0.8)			1
Braintree			94		4
Memphis			146	160	29
Bayton			35.6	78	31
Bayton			28.9	64.6	28
Support Nova			39	151	30
St. Brooklyn			61.3	156	30
Greenidge			104		30
Oberhausen				159	15
Various			4-177		6
Chicago W.			179		12
E. Hamilton			112		12
Harrisburg	2.66	(1.33)			12
Harrisburg			123		3
Saugus	2.25	(1.12)			17
Average	2.38	(1.19)	86.7	129.4	
Std. Dev.	.52	(0.26)	57.1	41.6	

The nitrogen oxide emissions reported are quite variable. We feel that the Rinaldi [1] value of 1.6 lb/ton (0.8 kg/Mg) of refuse burned, which is equivalent to about 75 ppm in the flue gas, is a reasonable and conservative value for a modern waterwall incinerator.

CONTROLS

Since the NO_x levels are naturally comparatively low, the control of NO_x is not practiced on mass-burning municipal incinerators. Combustion modification techniques applicable to fossil fuel-fired-boilers either are generally not applicable to the mass-burning situation or tend to cause higher CO emissions and unacceptable boiler corrosion. One of the add-on control systems available for fossil fuel-fired-boilers has been tested in Japan [32]. The results of the test showed that the NO_x could be reduced by 60 percent by injecting NH₃ under precise control into the incinerator firebox. About 20 ppm of unreacted NH₃ remaining in the gas caused precipitates of ammonium salts to form in the economizer.

This test does not appear to establish that these reductions have been "achieved in practice" by a municipal incinerator as required in the regulations to establish LAER or BACT and therefore should not be used to establish BACT or LAER.

CARBON MONOXIDE

EMISSIONS

Carbon monoxide is a product of incomplete combustion and for municipal incineration depends

largely on the overfire air ratio, the design of the overfire air jets, and the combustion temperature. Values of CO reported in the literature are shown in Table 7. Considering these data, we have chosen a somewhat conservative 150 ppm as a reasonable estimate for a modern incinerator design using the combustion control measures now commonly used to control boiler tube wastage. This is equivalent to an emission rate of 1.9 lb/ton (0.95 kg/Mg) of refuse burned.

TABLE 7 CARBON MONOXIDE EMISSIONS

Incinerator	lb/Ton	$\frac{lb}{kg}$	actual ppm	ppm corr. to 12% CO ₂	Ref.
Various	35	(18)			8
Braintree			873*	1340	4
Memphis			153	176	29
Support Nova			5.2-145		30
Various			6.1-179		6
Saugus	0.17	(0.08)			17
Average			103.3	758	
Std. Dev.			67.9	-	

* Incineration problems reported

CONTROLS

The CO emissions from modern incinerators are usually limited to a few hundred ppm by combustion control measures designed to achieve good combustion and minimize boiler tube wastage. The maintenance of a minimum temperature and adequate turbulence (usually by means of overfire air jets) in the firebox — as required to control flame length, insure complete combustion, and reduce the corrosion of the boiler tubes — normally provides adequate control of CO and no additional controls are required.

HYDROCARBONS

EMISSIONS

Hydrocarbons appearing in the flue gas of an incinerator are products of incomplete combustion. They are mostly low-molecular-weight hydrocarbons, aldehydes, and organic acids with traces of high molecular-weight compounds also present. Values reported for hydrocarbon emissions from municipal incinerators are shown in Table 8. Older refractory wall incinerators frequently have higher HC and CO emissions than modern waterwall incinerators. Considering these data, we have chosen an emission rate of 0.12 lb/ton (0.06 kg/Mg) which



FOSTER WHEELER ENERGY CORPORATION

38 MEADOWLAND PARKWAY • SECAUCUS, N. J. 07094 • PHONE 201-884-9880 • (NYC) 212-584-5301

December 6, 1984

Hayden-Wegman, Inc.
330 West 42nd Street
New York, New York 10036

Attention: Mr. Louis A. Terracciano

Subject: Hayden-Wegman for
Palm Beach County, Florida
FWL Ref. 282-253

Dear Lou:

Please accept my apologies for the delay in getting the information you requested to you.

We have recalculated the data contained herein on the basis of two boilers each capable of handling 750 tons of RDF.

The following data applies for MCR, 75% load, and 50% load respectively.

	<u>MCR</u>	<u>75%</u>	<u>50%</u>
Fuel Qty. (pph)	62,187.5	46,227.5	30,597.5
Fuel HHV (Btu/lb.)	6,164	6,164	6,164
Excess Air (%)	80	80	80
Gas Exit Temp. (deg F)	450	430	410
ACFM	212,500	156,250	100,000
NO _x (ppm)	250	Note 1	
SO _x (ppm)	150	Note 2	
Particulate (lb./10 ⁶ Btu)	0.1	Note 3	
CO (ppm)	500	Note 4	
HC (ppm)	70	Note 4	

Notes:

1. As load decreases, NO_x will decrease slightly. However, no data available to determine by how much.

Notes (continued):

2. SO_x level will remain fairly constant as load decreases.
3. Particulate after precipitation will decrease slightly as load decreases but very slightly.
4. CO and HC emissions will increase slightly as load decreases. However, no data available to determine by how much.

I hope that this new data meets your needs. Should you have any questions, please do not hesitate to call me and, I assure you, we will be more prompt in answering these requests.

Sincerely,

FOSTER WHEELER ENERGY CORPORATION

Bill

William F. Bischoff
Assistant Regional Manager
Northeast Region

/lja

ccb: J.L. Van Buren
J.G. Foster
I.G. Lutes
D.A. Cassino
W. Murray
H.J. Schonhans
C.C. Robinson - FWL
H.M. Trammell, Jr. - Miami office

4.1.4 VOLATILE ORGANIC COMPOUNDS (VOC)

THE EMISSION FACTOR FOR VOC REPRESENTS THE NON-METHANE PORTION OF THE TOTAL HYDROCARBON EMISSIONS.

FROM REFERENCE "A", TABLE 34, PAGE (EXHIBIT 4-4.1) UNDER RDF-FIRED SPREADER STOKER TYPE,

UNCONTROLLED TOTAL HYDROCARBON EMISSION IN LB/1.0E6 BTU
= 0.02 TO 1.09

CONVERT LB/10E6 TO LB/TON,

.02 LB/1.0E6 BTU X 6164 BTU/LB X 2000 LB/TON = 0.25 LB/TON

1.09 LB/1.0E6 BTU X 6164 BTU/LB X 2000 LB/TON = 13.44/TON

THEREFORE,

UNCONTROLLED TOTAL HYDROCARBON EMISSION IN LB/TON
= 0.25 TO 13.44

FROM REFERENCE "B", PAGES 290 & 291 (EXHIBIT 4-4.2 SHEETS 1 & 2)

UNCONTROLLED TOTAL HYDROCARBON EMISSION IN LB/TON
= 0.12

FROM REFERENCE "C", TABLE 10, PAGE 8 (EXHIBIT 4.4.3)

UNCONTROLLED TOTAL HYDROCARBON EMISSION IN LB/TON
= 0.002 TO 0.01

REFERENCE LITERATURE INDICATED A WIDE RANGE OF VOC EMISSIONS. THIS WIDE RANGE IS BELIEVED TO BE CAUSED BY THE VARIATIONS IN EXCESS AIR DESIGN CITED IN DISCUSSION ABOVE FOR CO AND THE INABILITY TO MAINTAIN SUFFICIENT TEMPERATURE AND INADEQUATE COMBUSTION CONTROLS. THE PROPOSED FACILITY WILL UTILIZE STATE-OF-ART COMBUSTION CONTROLS COUPLED WITH CONSERVATIVE FURNACE DESIGN IN TERMS OF EXCESS AIR, GAS TEMPERATURE AND DWELL TIME TO MINIMIZE VOC EMISSIONS. ACCORDINGLY, THE VOC EMISSION FACTOR OF 0.20 LB/TON WAS SELECTED FROM MID-RANGE DATA TO PROVIDE SUFFICIENT CONSERVATISM AND AVOID UNDERSTATING POSSIBLE FACILITY EMISSIONS.

Table 34

**Uncontrolled Matter Emissions of CO and THC
at Refuse-Burning Facilities***

Type of Facility	Concentrations (ppmv, dry)+				Emissions Rates grams/GJ (lb/10 ⁶ Btu)			
	CO		THC**		CO		THC	
	Low	High	Low	High	Low	High	Low	High
Mass Burning Refractory Wall	87	99	84	169	26 (.06)	27 (.06)	14 (.03)	17.0 (.04)
Mass burning Waterwall	105	2186	7.3	60	65 (.15)	860 (2.0)	1.3 (.003)	1.7 (.004)
RDF-Fired Spreader Stoker	196	1160	8	2450	190 (.44)	1000 (2.3)	8.6 (.02)	470 (1.09)
Rotary Kiln	48	3500	NA	NA	14 (.03)	1100 (2.6)	NA	NA

+ Concentrations corrected to 12% CO₂

* Rates based on HHV of fuel "as-fired"

** THC reported as methane

NA Not Available

Source: Appendix B.

CO/Hc

TABLE 6 NITROGEN OXIDE EMISSIONS

Incinerator	lb/Ton	lb Mg	actual ppm	ppm corr. to 12% CO ₂	Ref.
Various	3.0	(1.5)			8
Various	1.6	(0.8)			1
Braintree			96		8
Knoxville			106	160	29
Boston			35.8	78	31
Boston			20.9	64.6	28
Sanport, Mass			39	151	30
St. Brooklyn			61.3	156	30
Greenfield			104		30
Overhaddon				159	15
Various			8-177		6
Chicago, Ill			179		12
E Hamilton			112		12
Harrisburg	2.66	(1.33)			17
Harrisburg			123		3
Bogus	2.25	(1.12)			17
Average	2.30	(1.19)	86.7	129.4	
Std. Dev.	.52	(0.26)	57.1	61.6	

The nitrogen oxide emissions reported are quite variable. We feel that the Rinaldi [1] value of 1.6 lb/ton (0.8 kg/Mg) of refuse burned, which is equivalent to about 75 ppm in the flue gas, is a reasonable and conservative value for a modern waterwall incinerator.

CONTROLS

Since the NO_x levels are naturally comparatively low, the control of NO_x is not practiced on mass-burning municipal incinerators. Combustion modification techniques applicable to fossil fuel-fired-boilers either are generally not applicable to the mass-burning situation or tend to cause higher CO emissions and unacceptable boiler corrosion. One of the add-on control systems available for fossil fuel-fired-boilers has been tested in Japan [32]. The results of the test showed that the NO_x could be reduced by 60 percent by injecting NH₃ under precise control into the incinerator firebox. About 20 ppm of unreacted NH₃ remaining in the gas caused precipitates of ammonium salts to form in the economizer.

This test does not appear to establish that these reductions have been "achieved in practice" by a municipal incinerator as required in the regulations to establish LAER or BACT and therefore should not be used to establish BACT or LAER.

CARBON MONOXIDE

EMISSIONS

Carbon monoxide is a product of incomplete combustion and for municipal incineration depends

largely on the overfire air ratio, the design of the overfire air jets, and the combustion temperature. Values of CO reported in the literature are shown in Table 7. Considering these data, we have chosen a somewhat conservative 150 ppm as a reasonable estimate for a modern incinerator design using the combustion control measures now commonly used to control boiler tube wastage. This is equivalent to an emission rate of 1.9 lb/ton (0.95 kg/Mg) of refuse burned.

TABLE 7 CARBON MONOXIDE EMISSIONS

Incinerator	lb/Ton	lb Mg	actual ppm	ppm corr. to 12% CO ₂	Ref.
Various	35	(18)			8
Braintree			473*	1300	4
Knoxville			153	176	29
Sanport, Mass			5.2-195		30
Various			8.1-177		6
Bogus	0.17	(0.08)			17
Average			103.3	158	
Std. Dev.			87.9	-	

* Incineration problems reported

CONTROLS

The CO emissions from modern incinerators are usually limited to a few hundred ppm by combustion control measures designed to achieve good combustion and minimize boiler tube wastage. The maintenance of a minimum temperature and adequate turbulence (usually by means of overfire air jets) in the firebox — as required to control flame length, insure complete combustion, and reduce the corrosion of the boiler tubes — normally provides adequate control of CO and no additional controls are required.

HYDROCARBONS

EMISSIONS

Hydrocarbons appearing in the flue gas of an incinerator are products of incomplete combustion. They are mostly low-molecular-weight hydrocarbons, aldehydes, and organic acids with traces of high molecular-weight compounds also present. Values reported for hydrocarbon emissions from municipal incinerators are shown in Table 8. Older refractory wall incinerators frequently have higher HC and CO emissions than modern waterwall incinerators. Considering these data, we have chosen an emission rate of 0.12 lb/ton (0.06 kg/Mg) which

is equivalent to approximately 16 ppm as a reasonable value for total hydrocarbon emissions for this type of incinerator.

TABLE 8 HYDROCARBON EMISSIONS

Incinerator	Lb H ₂	THC		Aldehydes ppm	Organic Acids ppm	Ref.
		Lb/Ton	ppm			
Various	(0.75)	1.5				8
Various	(0.06)	0.12				1
Braintree			11.3	1.3		4
Bouquet News			10	0.1	1	30
Oswego			1.5	0.25	1	30
Babylon				2.6	44	31
Various			25.5-42.5	0.15-1.06		6
Unknown	(0.116)	0.231				33
Unknown	(0.002)	0.001				17
Babylon				2.3	50.5	28
Average	(0.2320)	.664	18.2	1.11	24.1	
Std. Dev.	(0.35)	.70	14.8	.95	23.2	

* Total hydrocarbons

CONTROLS

To the authors' knowledge, no municipal incinerator uses any type of add-on control to reduce hydrocarbon emissions and there are no published correlations between design or operating parameters and hydrocarbon emissions; however, it is reasonable to expect that measures used to control CO will control hydrocarbons even more effectively.

HYDROCHLORIC ACID

EMISSIONS

Flue gases from municipal incinerators normally contain hydrochloric acid as a by-product of the combustion of PVC, other chlorinated plastics, and sodium chloride found in the waste. Hydrochloric acid emissions are not regulated by the U.S. EPA, but most states require the emissions to be reported and control regulations are under consideration in several states. It has been reported that only about half of the chloride in the waste is converted to hydrochloric acid [28] and some of the evolved HCl may be removed on the ash particles [34] as the flue gases pass through the boiler and electrostatic precipitator. Emissions of hydrochloric acid reported in the literature are found in Table 9. Considering these data, we feel that 200 ppm or 3.4 lb/ton (1.7 kg/Mg) is a reasonable estimate of the hydrochloric acid emissions.

CONTROLS

Wet scrubbers were commonly used on municipal incinerators in the past for particulate control,

TABLE 9 HYDROCHLORIC ACID EMISSIONS

Incinerator	Lb/Ton	Lb H ₂	ppm	Ref.
Various	1.8	(0.9)		8
Oswego			980**	15
Oswego			113	30
Babylon			237	31
Babylon			110	29
Unknown	4.2	(2.1)	213	35
Unknown	4.2	(2.1)	230	35
Unknown	4.0	(2.0)	261	35
Unknown	4.0	(2.0)	254	35
Various			63-1260**	6
Braintree			273	3
Braintree			79	4
Babylon			224	28
Average	3.55	(1.78)	200	
Std. Dev.	1.01	(0.50)	67	

*Corrected to 12% CO₂

**Data point estimated as nonrepresentative

and more recently for gas cooling ahead of ESPs, and the acid control they gave was incidental.

These scrubbers were incapable of meeting current particulate emission standards and heat recovery boilers have largely replaced water quenching so scrubbers became uncommon on municipal incinerators. Acid gas control has been required in West Germany and Japan for several years and is now being required by several local and state agencies, most notably in California.

Wet scrubbers are being used for acid gas control on municipal incinerators in West Germany in conjunction with electrostatic precipitators, and are common on hazardous waste incinerators; however, corrosion and waste water disposal problems have restricted their use on municipal incinerators. Where acid gas control is required, dry scrubbers are now commonly used. Of the seventeen scrubbing systems we are aware of that were installed in Germany and Japan in 1980 and 1981, eleven were dry scrubbers.

FLUORIDES

EMISSIONS

Traces of hydrogen fluoride from the combustion of fluorinated plastics or similar materials appear in the flue gas from municipal incinerators. There are no federal regulations limiting the emissions of fluorides from municipal incinerators, however the PSD regulations require that the fluoride emissions be estimated and reported. The emissions of fluorides from municipal incinerators reported in the literature are shown in Table 10.

TABLE 11. EMISSION FACTORS FOR OTHER CRITERIA
POLLUTANTS FROM COAL COMBUSTION^a

Pollutant	Emission factor					
	Average		Range			
	g/kg	lb/ton	g/kg		lb/ton	
Sulfur oxides (as SO ₂)	32	64	18	- 52	35	- 104
Nitrogen oxides (as NO ₂)	2.1	4.2	1.7	- 2.9	3.4	- 5.9
Hydrocarbons (as CH ₄)	0.003	0.005	0.002	- 0.005	0.003	- 0.01

^aData are for coal combustion in a unit suited to cofiring of refuse-derived and fossil fuels.

4.1.5 NITROGEN OXIDES (NOX)

FROM REFERENCE "A", TABLE 15, (EXHIBIT 4-5) UNDER THE RDF-FIRED SPREADER STOKER TYPE,

UNCONTROLLED NOX EMISSION IN LB/1.0E6 BTU
= 0.02 TO 0.63

CONVERT LB/1.0E6 TO LB/TON,

.02 LB/1.0E6 BTU X 6164 BTU/LB X 2000 LB/TON = 0.25 LB/TON

0.63 LB/1.0E6 BTU X 6164 BTU/LB X 2,000 LB/TON = 7.76 LB/TON

THEREFORE,

UNCONTROLLED TOTAL NOX EMISSION IN LB/TON
= 0.25 TO 7.76

4.0 LB/TON IS SELECTED FOR NOX EMISSION FACTOR AND IS REPRESENTATIVE OF THE MEDIAN VALUES OF THE DATA BASES USED.

Table 15

Uncontrolled NOx Emissions at Refuse-Burning Facilities*

Type of Facility	NOx Emissions			
	Concentrations (ppmv, dry)+		Emission Rates grams/GJ (lb/10 ⁶ Btu)++	
	Low	High	Low	High
Mass Burning Refractory Wall	53	165	4.3 (.01)	30 (.07)
Mass Burning Waterwall	74	262	30 (.07)	180 (.42)
RDF Fired Spreader Stoker	79	427	8.6 (.02)	270 (.63)
Rotary Kiln	111	196	56 (.13)	99 (.23)

* Data obtained from Appendix B

+ Concentrations corrected to 12% CO₂

++ Rates based on HHV of refuse "as-fired"

4.1.6 LEAD (PB)

FROM REFERENCE "A", TABLE 42, (EXHIBIT 4-6.1)
ESP CONTROLLED PB EMISSION IN LB/1.0E6 BTU
= 1.91E-5 TO 1.8E-3

CONVERT LB/1.0E6 TO LB/TON,
 $1.91E-5 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON}$
= 0.000235 LB/TON

$1.8E-3 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON}$
= 0.0222 LB/TON

THEREFORE,
ESP CONTROLLED PB EMISSION IN LB/TON
= 0.000235 TO 0.0222

FROM REFERENCE "E",
TABLES 82-09-05.2.5, 8-09-05.2.6, 82-09-05.2.7, AND 82-09-05.2.8
(EXHIBITS 4-6.2, 4-6.3, 4-6.4 AND 4-6.5 RESPECTIVELY) SHOW THE
DEVELOPMENT OF PB EMISSION FACTOR. FROM TABLE 82-09-05.2.8,
CONTROLLED PB EMISSION = 2.995 TO 12.328 LB/1000 TON
= 0.003 TO 0.0123 LB/TON

ALTHOUGH THE REFERENCE "A" DATA INDICATES THE 0.0014 LB/TON CONTROLLED
EMISSION FACTOR (GIVEN IN THE AUTHORITY'S INITIAL SUBMITTAL) HAS BEEN
ACHIEVED, IN VIEW OF THE REFERENCE "E" DATA, IT IS PRUDENT TO INCREASE THE
0.0014 LB/TON PREDICTION BY AN ORDER OF MAGNITUDE TO 0.014 LB/TON.
REFERENCE TO MAXIMUM AMBIENT AIR QUALITY IMPACTS, DISPLAYED IN TABLE 5-11,
PAGE 69 OF REFERENCE F, INDICATES THAT THE 10-FOLD INCREASE IN PB EMISSIONS
WILL NOT JEOPARDIZE MAINTENANCE OF AMBIENT AIR QUALITY STANDARDS AS REGARDS
PB.

Table 42
Estimated Total Heavy Metal Emission Rates (#/10⁶ Btu)
For Refuse-Fired Units

Element	Baghouse	ESP
Antimony (Sb)	$5.32 \times 10^{-8} - 7.78 \times 10^{-6}$	$1.48 \times 10^{-6} - 3.5 \times 10^{-1}$
Arsenic (As)	$2.75 \times 10^{-9} - 1.13 \times 10^{-7}$	$1.10 \times 10^{-7} - 9.11 \times 10^{-6}$
Beryllium (Be)	$7.13 \times 10^{-11} - 1.43 \times 10^{-9}$	$4.81 \times 10^{-9} - 6.42 \times 10^{-8}$
Cadmium (Cd)	$4.5 \times 10^{-8} - 3.73 \times 10^{-6}$	$1.8 \times 10^{-6} - 1.67 \times 10^{-4}$
Chromium (Cr)	$9.49 \times 10^{-9} - 1.21 \times 10^{-7}$	$3.8 \times 10^{-7} - 2.17 \times 10^{-5}$
Copper (Cu)	$7.32 \times 10^{-8} - 1.10 \times 10^{-6}$	$2.54 \times 10^{-6} - 1.16 \times 10^{-4}$
Lead (Pb)	$8.74 \times 10^{-7} - 1.75 \times 10^{-5}$	$1.91 \times 10^{-5} - 1.8 \times 10^{-3}$
Manganese (Mn)	$4.26 \times 10^{-9} - 1.01 \times 10^{-6}$	$4.69 \times 10^{-7} - 7.4 \times 10^{-5}$
Mercury (Hg)	$3.4 \times 10^{-5} - 2.16 \times 10^{-4}$	$3.4 \times 10^{-5} - 2.16 \times 10^{-4}$
Molybdenum (Mo)	$6.52 \times 10^{-9} - 2.3 \times 10^{-5}$	$3.46 \times 10^{-8} - 1.39 \times 10^{-4}$
Nickel (Ni)	$9.39 \times 10^{-11} - 1.67 \times 10^{-7}$	$1.88 \times 10^{-8} - 1.33 \times 10^{-5}$
Selenium (Se)	$7.44 \times 10^{-11} - 1.49 \times 10^{-4}$	$6.45 \times 10^{-8} - 4.19 \times 10^{-4}$
Tin (Sn)	$8.68 \times 10^{-8} - 1.43 \times 10^{-5}$	$1.61 \times 10^{-6} - 6.48 \times 10^{-4}$
Vanadium (V)	$7.18 \times 10^{-10} - 1.55 \times 10^{-7}$	$1.08 \times 10^{-7} - 6.97 \times 10^{-6}$
Zinc (Zn)	$8.14 \times 10^{-6} - 1.63 \times 10^{-5}$	$6.98 \times 10^{-5} - 4.40 \times 10^{-3}$

Source: Appendix C

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EXHIBIT 4-6.2

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TABLE 82-09-05.2.5
Emission Factors for TSP & HCl Based on Total Feed Material

UNCONTROLLED*					CONTROLLED**			
Category	I	II	III	Coal	I	II	III	Coal
<u>T S P</u> lb/ton	25	20	134	128	0.125	0.100	0.670	0.640
<u>HCl</u> lb/ton	1.4	NA	3.2	0.4	0.140	NA	0.320	0.040

Category Definitions

- I - Mass-fired MSW Combustion w/o Heat Recovery
- II - Mass-fired MSW Combustion with Heat Recovery
- III - RDF Combustion with Heat Recovery

T S P Total Suspended Particulates
HCl Hydrochloric Acid

Emissions given in lb of emission per ton of total feed:
MSW for Categories I & II
RDF for Category III

* Reference: An Evaluation of Emission Factors For
Waste-to-Energy Systems - Executive Summary
by G.M. Rinaldi, T.R. Blackwood,
D.L. Harris & K.M. Tackett
Monsanto Research Corp. Dayton, Ohio
Table 6 for TSP Uncontrolled Emissions)
Table 13 for HCl Uncontrolled Emissions)
29 May 1979
USEPA Contract No. 68-03-2550, Task II

** Assume Controlled Emissions as follows:
99.5% Efficiency for TSP
90.0% " " HCl

NA - No data available

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TABLE 82-09-05.2.6
Concentrations of Trace Elements in Uncontrolled Particulate Emissions

UNCONTROLLED CONCENTRATIONS ppm							
Element	Category I	Category II		Category III		Coal	
Antimony	- ^a	260 -	620	0.4 -	10	7 -	20
Arsenic	- ^a	50 -	70	20 -	80	20 -	120
Barium	- ^a	270 -	540	- ^a		- ^a	
Bromine	- ^a	420 -	2,400	- ^a		- ^a	
Cadmium	- ^a	380 -	820	0.3 -	1.4	0.6 -	1.0
Chlorine	- ^a	>10,000		- ^a		- ^a	
Chromium	- ^a	50 -	560	5 -	20	6 -	8
Cobolt	- ^a	10 -	100	0.6 -	2.0	0.4 -	1.5
Copper	- ^a	420 -	590	10 -	50	6 -	7
Iron	- ^a	970 -	1,090	700 -	2,410	2,350 -	2,800
Lead	- ^a	11,600 -	17,500	1,220 -	2,930	340 -	380
Manganese	- ^a	420 -	1,400	10 -	20	20 -	40
Nickel	- ^a	- ^a		3 -	20	6 -	20
Selenium	- ^a	<90		10 -	40	10 -	50
Silver	- ^a	110 -	200	- ^a		- ^a	
Tin	- ^a	2,600 -	5,000	50 -	150	20 -	30
Zinc	- ^a	>10,000		860 -	3,770	180 -	560

^a Data Not Available

Reference: An Evaluation of Emission Factors For
Waste-to-Energy Systems - Executive Summary
by G.M. Rinaldi, T.R. Blackwood,
D.L. Harris & K.M. Tackett
Monsanto Research Corp., Dayton, Ohio
(Tables 14, 15, 16 & 17)
29 May 1979
USEPA Contract No. 68-03-2550, Task II

Category Definitions: See Table 82-09-05.2.5

ppm = parts per million

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TABLE 82-09-05.2.7
Concentrations of Trace Elements in Controlled Particulate Emissions

C O N T R O L L E D C O N C E N T R A T I O N S ppm				
Element	Category I	Category II	Category III	Coal
Antimony	610 - 12,600	460 - 1,000	2 - 180	10 - 150
Arsenic	80 - 510	50 - 100	140 - ^a 740	20 - ^a 680
Barium	40 - 1,700	270 - 540	- ^a	- ^a
Bromine	320 - 6,700	350 - 1,200	- ^a	- ^a
Cadmium	520 - 2,300	670 - 1,150	0.2 - ^a 10	2 - ^a 8
Chlorine	99,000 - 330,000	>10,000	- ^a	- ^a
Chromium	70 - 1,800	130 - 260	60 - 100	30 - 40
Cobalt	2 - 30	5 - 50	4 - 40	3 - 30
Copper	970 - 6,800	620 - 800	50 - 280	30 - 40
Iron	1,700 - 18,000	2,000 - 2,130	6,940 - 17,300	13,200 - 18,200
Lead	50,000 - 155,000	18,100 - 34,200	4,470 - 18,400	1,050 - 1,790
Manganese	170 - 5,700	140 - ^a 490	110 - 240	100 - 140
Nickel	40 - 440	- ^a	20 - 190	30 - 40
Selenium	10 - 120	<30	20 - ^a 430	30 - ^a 40
Silver	40 - 2,000	50 - 110	- ^a	- ^a
Tin	8,500 - 15,100	1400 - 5000	260 - 870	30 - 270
Zinc	47,000 - 240,000	>10,000	4,360 - 17,200	910 - 3340

^a Data Not Available

Reference: See Table 82-09-05.2.6

Category Definitions: See Table 82-09-05.2.5

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TABLE 82-09-05.2.8

Controlled Emissions of Trace Elements

C O N T R O L L E D E M I S S I O N S		lb/1000 ton
Element	Category II	Category III
Antimony	0.046-0.10	0.0013-0.121
Arsenic	0.005-0.01	0.094-0.496 _a
Barium	0.027-0.054	- _a
Bromine	0.035-0.120	- _a
Cadmium	0.067-0.115	0.0001-0.0067 _a
Chlorine	>1	- _a
Chromium	0.013-0.026	0.040-0.067
Cobalt	0.0005-0.005	0.0027-0.027
Copper	0.062-0.080	0.034-0.188
Iron	0.200-0.213	4.650-11.591
Lead	1.810-3.420	2.995-12.328
Manganese	0.014-0.049 _a	0.074-0.161
Nickel	-	0.013-0.127
Selenium	<0.003	0.013-0.288 _a
Silver	0.005-0.011	-
Tin	0.140-0.500	0.174-0.583
Zinc	>1	2.921-11.524

Controlled Emissions in lb/1000 tons is product of data shown in Tables 82-09-05.2.5 and 82-09-05.2.7

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RESOURCE RECOVERY FACILITY DESIGN NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.8

Controlled Emissions of Trace Elements

C O N T R O L L E D E M I S S I O N S		lb/1000 ton
Element	Category II	Category III
Antimony	0.046-0.10	0.0013-0.121
Arsenic	0.005-0.01	0.094-0.496 _a
Barium	0.027-0.054	- _a
Bromine	0.035-0.120	- _a
Cadmium	0.067-0.115	0.0001-0.0067 _a
Chlorine	>1	- _a
Chromium	0.013-0.026	0.040-0.067
Cobalt	0.0005-0.005	0.0027-0.027
Copper	0.062-0.080	0.034-0.188
Iron	0.200-0.213	4.650-11.591
Lead	1.810-3.420	2.995-12.328
Manganese	0.014-0.049 _a	0.074-0.161
Nickel	-	0.013-0.127
Selenium	<0.003	0.013-0.288 _a
Silver	0.005-0.011	-
Tin	0.140-0.500	0.174-0.583
Zinc	>1	2.921-11.524

Controlled Emissions in lb/1000 tons is product of data shown in Tables 82-09-05.2.5 and 82-09-05.2.7

4.1.7 BERYLLIUM (BE)

FROM REFERENCE "A", TABLE 42, PAGE 206, (EXHIBIT 4-7.1)

ESP CONTROLLED BE EMISSION IN LB/1.0E6 BTU

$$= 4.81\text{E-}9 \text{ TO } 6.42\text{E-}8$$

CONVERT LB/1.0E6 BTU TO LB/TON,

$$4.81\text{E-}9 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON}$$

$$= 0.593\text{E-}6 \text{ LB/TON}$$

$$6.42\text{E-}8 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON}$$

$$= 0.792\text{E-}6 \text{ LB/TON}$$

THEREFORE,

ESP CONTROLLED BE EMISSION IN LB/TON

$$= 0.0593\text{E-}6 \text{ TO } 0.792\text{E-}6 \text{ LB/TON}$$

FROM REFERENCE "A", TABLE 40, PAGE 200, (EXHIBIT 4-7.2)

UNCONTROLLED BE EMISSION = 1.08 MICROGRAM/MJ (AVERAGE)

3.00 MICROGRAM/MJ (PEAK)

$$= 2.51\text{E-}6 \text{ LB/1.0E6 BTU (AVERAGE)}$$

$$= 7.00\text{E-}6 \text{ LB/1.0E6 BTU (PEAK)}$$

CONVERT LB/1.0E6 BTU TO LB/TON.

$$2.51\text{E-}6 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON}$$

$$= 31.0\text{E-}6 \text{ LB/TON}$$

$$7.00\text{E-}6 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON}$$

$$= 86.5\text{E-}6 \text{ LB/TON}$$

FROM REFERENCE "E", TABLE 82-09-05.2.4,

(EXHIBIT 4-7.3)

ESP CONTROLLED BE EMISSION = 4E-4 LB/1000 TON

$$= 0.4\text{E-}6 \text{ LB/TON}$$

9.0E-6 LB/TON IS SELECTED FOR BE EMISSION FACTOR BASED ON CONSIDERATION OF THE DATA BASES USED.

Table 42

Estimated Total Heavy Metal Emission Rates ($\#/10^6$ Btu)
For Refuse-Fired Units

Element	Baghouse	ESP
Antimony (Sb)	$5.32 \times 10^{-8} - 7.78 \times 10^{-6}$	$1.48 \times 10^{-6} - 3.5 \times 10^{-1}$
Arsenic (As)	$2.75 \times 10^{-9} - 1.13 \times 10^{-7}$	$1.10 \times 10^{-7} - 9.11 \times 10^{-6}$
Beryllium (Be)	$7.13 \times 10^{-11} - 1.43 \times 10^{-9}$	$4.81 \times 10^{-9} - 6.42 \times 10^{-8}$
Cadmium (Cd)	$4.5 \times 10^{-8} - 3.73 \times 10^{-6}$	$1.8 \times 10^{-6} - 1.67 \times 10^{-4}$
Chromium (Cr)	$9.49 \times 10^{-9} - 1.21 \times 10^{-7}$	$3.8 \times 10^{-7} - 2.17 \times 10^{-5}$
Copper (Cu)	$7.32 \times 10^{-8} - 1.10 \times 10^{-6}$	$2.54 \times 10^{-6} - 1.16 \times 10^{-4}$
Lead (Pb)	$8.74 \times 10^{-7} - 1.75 \times 10^{-5}$	$1.91 \times 10^{-5} - 1.8 \times 10^{-3}$
Manganese (Mn)	$4.26 \times 10^{-9} - 1.01 \times 10^{-6}$	$4.69 \times 10^{-7} - 7.4 \times 10^{-5}$
Mercury (Hg)	$3.4 \times 10^{-5} - 2.16 \times 10^{-4}$	$3.4 \times 10^{-5} - 2.16 \times 10^{-4}$
Molybdenum (Mo)	$6.52 \times 10^{-9} - 2.3 \times 10^{-5}$	$3.46 \times 10^{-8} - 1.39 \times 10^{-4}$
Nickel (Ni)	$9.39 \times 10^{-11} - 1.67 \times 10^{-7}$	$1.88 \times 10^{-8} - 1.33 \times 10^{-5}$
Selenium (Se)	$7.44 \times 10^{-11} - 1.49 \times 10^{-4}$	$6.45 \times 10^{-8} - 4.19 \times 10^{-4}$
Tin (Sn)	$8.68 \times 10^{-8} - 1.43 \times 10^{-5}$	$1.61 \times 10^{-6} - 6.48 \times 10^{-4}$
Vanadium (V)	$7.18 \times 10^{-10} - 1.55 \times 10^{-7}$	$1.08 \times 10^{-7} - 6.97 \times 10^{-6}$
Zinc (Zn)	$8.14 \times 10^{-6} - 1.63 \times 10^{-5}$	$6.98 \times 10^{-5} - 4.40 \times 10^{-3}$

Source: Appendix C

Table 40

Observed Metal Emission Factors for Facilities Burning Coal, Oil, Refuse
and Coal/Refuse Mixtures
($\mu\text{g}/\text{MJ}$) as Fired

Metal	Oil-Fired				Coal-Fired (Tang)+				Coal-Fired (SS) *				Coal/Refuse-Fired				Refuse-Fired		
	Low	High	Avg.		Low	High	Avg.		Low	High	Avg.		Low	High	Avg.		Low	High	Avg.
As	< 0.2	49	25		20	3400	680		100	540	260		20	1300	200		16	1763	469
Be	< 0.2	< 0.3	< 0.3		7.9	40	19		7.3	15	11		< 0.85	26	9.0		< .08	3	1.08
Cd	---	---	91		8.5	1900	430		2.5	22	12		3.5	110	27		150	< 1900	865
Cr	2	55	29		210	1100	540		29	2200	930		18	4100	1200		1.5	1200	499
Cu	2	180	91		250	4100	1400		28	220	130		41	< 1600	370		85	1866	870
Hg	0.6	2	1.3		0.09	35	22		---	---	< 3.2		< 5.5	< 28	16		17	390	157
Mn	1	10	5.5		150	740	400		17	770	330		32	< 490	240		11	3350	1900
Mo	2	72	36		360	4300	2300		---	---	---		---	---	---		27	8987	3043
Ni	200	360	230		120	730	450		28	230	110		18	58	32		2.7	764	286
Pb	20	65	43		140	17,000	5100		21	7600	1900		380	20,000	4900		5600	16,000	9531
Sb	---	---	20		7.2	1600	320		---	---	< 37		< 4.5	< 77	25		18	2060	936
Se	0.3	16	8.2		15	1400	330		14	37	26		30	89	50		8	250	95
Sn	---	---	---		---	---	120		---	---	< 0.82		1.4	< 140	81		3.4	8017	2218
V	20	880	450		240	1300	610		< 37	790	400		< 25	670	270		3.1	153	63
Zn	3	200	100		490	39,000	8400		38	13,000	3300		440	18,000	4900		4500	91,160	33,916

Source: Appendix C, Tables C1b-C6b

+ Tangential

* Spreader Stoker

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TABLE 82-09-05.2.4
Comparison of Average Non-Criteria Pollutant Metal Emissions* from MSW Combustion

Group	Element	Symbol	"C" Washington D.C. SWRC #1 Cycl. Col./ESP 0.9 lb/ton			"D" Nicosia Trey Scrub'r		"E" Braintree ESP 2.7 lb/ton		"G" Alexandria Wet Baffle 5.6 lb/ton	
			**Fly Ash	Suspended		8 lb/ton		Inlet	Outlet	**Fly Ash	Suspended
I	Arsenic	As	59	310	(0.28)	200	120	57	(0.15)	40	210
I	Barium	Ba	3,200	990	(0.89)	220	400	340	(0.92)	2,800	890
I	Cadmium	Cd	185	1,900	(1.71)	1,500	1,100	480	(1.29)	42	1,100
I	Chromium	Cr	780	870	(0.78)	105	270	200	(0.54)	1,330	490
I	Lead	Pb	NR	78,000	(70.20)	69,000	NR	NR		40,000	97,000
I	Mercury	Hg	NR	NR		NR	NR	0.31	(8x10 ⁻⁴)	NR	NR
I	Selenium	Se	12	39	(0.03)	49	< 25	38	(1x10 ⁻⁴)	3.4	23
I	Silver	Ag	220	1,000	(0.90)	110	165	79	(0.21)	85	390
II	Antimony	Sb	580	2,400	(2.16)	1,600	2,200	1,600	(4.32)	270	2,400
II	Beryllium	Be	NR	NR		NR	< 0.15	< 0.16	(4x10 ⁻⁴)		
II	Cobalt	Co	27	5	(0.0045)	2	38	17	(0.05)	12	
II	Copper	Cu	950	1,500	(1.35)	1,700	1,800	1,600	(4.32)	980	2,000
II	Manganese	Mn	2,100	410	(0.37)	270	770	330	(0.89)	4,300	1,500
II	Molybdenum	Mo	NR	NR		NR	43	37	(0.10)	NR	NR
II	Nickel	Ni	NR	170	(0.15)	79	NR	NR		740	200
II	Thallium	Tl	NR	NR		NR	1.8	1.6	(0.004)	NR	NR
II	Vanadium	V	NR	NR		NR	39	24	(0.06)	135	22
II	Zinc	Zn	240,000	140,000	(126)	110,000	> 10,000	> 10,000	(> 27)	10,800	120,000

Group I metals are classified Non-Criteria Pollutants by USEPA & CDOHS

Group II metals are classified Non-Criteria Pollutants by CDOHS only

USEPA = United States Environmental Protection Agency

CDOHS = California Department of Health Services

NR = Not Reported

* Metal emissions are given in ppm concentration of metal in total particulate emissions

ppm = parts per million unless noted

() = lb of metal emitted/1000 ton MSW

** Collected Fly Ash

"C", "D" & "E" denote references to literature. (See page v).

4.1.8 MERCURY (HG)

FROM REFERENCE "A", TABLE 42, PAGE 206, (EXHIBIT 4-8.1)

ESP CONTROLLED HG EMISSION IN LB/1.0E6 BTU

$$= 3.4E-5 \text{ TO } 2.16E-4$$

CONVERT LB/1.0E6 BTU TO LB/TON,

$$3.4E-5 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON}$$

$$= 0.000419 \text{ LB/TON}$$

$$2.16E-4 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 20000 \text{ LB/TON}$$

$$= 0.00266 \text{ LB/TON}$$

THEREFORE,

ESP CONTROLLED HG EMISSION IN LB/TON

$$= 0.000419 \text{ TO } 0.00266 \text{ LB/TON}$$

FROM REFERENCE "B", PAGE 292, (EXHIBIT 4-8.2)

CONTROLLED HG EMISSION IN LB/TON = 0.0064

0.003 LB/TON IS SELECTED FOR HG EMISSION FACTOR AND IS

REPRESENTATIVE OF THE MEDIAN VALUES OF THE DATA BASES USED.

Table 42

Estimated Total Heavy Metal Emission Rates (#/10⁶ Btu)
For Refuse-Fired Units

Element	Baghouse	ESP
Antimony (Sb)	5.32×10^{-8} - 7.78×10^{-6}	1.48×10^{-6} - 3.5×10^{-1}
Arsenic (As)	2.75×10^{-9} - 1.13×10^{-7}	1.10×10^{-7} - 9.11×10^{-6}
Beryllium (Be)	7.13×10^{-11} - 1.43×10^{-9}	4.81×10^{-9} - 6.42×10^{-8}
Cadmium (Cd)	4.5×10^{-8} - 3.73×10^{-6}	1.8×10^{-6} - 1.67×10^{-4}
Chromium (Cr)	9.49×10^{-9} - 1.21×10^{-7}	3.8×10^{-7} - 2.17×10^{-5}
Copper (Cu)	7.32×10^{-8} - 1.10×10^{-6}	2.54×10^{-6} - 1.16×10^{-4}
Lead (Pb)	8.74×10^{-7} - 1.75×10^{-5}	1.91×10^{-5} - 1.8×10^{-3}
Manganese (Mn)	4.26×10^{-9} - 1.01×10^{-6}	4.69×10^{-7} - 7.4×10^{-5}
Mercury (Hg)	3.4×10^{-5} - 2.16×10^{-4}	3.4×10^{-5} - 2.16×10^{-4}
Molybdenum (Mo)	6.52×10^{-9} - 2.3×10^{-5}	3.46×10^{-8} - 1.39×10^{-4}
Nickel (Ni)	9.39×10^{-11} - 1.67×10^{-7}	1.88×10^{-8} - 1.33×10^{-5}
Selenium (Se)	7.44×10^{-11} - 1.49×10^{-4}	6.45×10^{-8} - 4.19×10^{-4}
Tin (Sn)	8.68×10^{-8} - 1.43×10^{-5}	1.61×10^{-6} - 6.48×10^{-4}
Vanadium (V)	7.18×10^{-10} - 1.55×10^{-7}	1.08×10^{-7} - 6.97×10^{-6}
Zinc (Zn)	8.14×10^{-6} - 1.63×10^{-5}	6.98×10^{-5} - 4.40×10^{-3}

Source: Appendix C

TABLE 10 FLUORIDE EMISSIONS

Incinerator	ppm	Ref.
Merhausen	20*	15
Berlin	4.8	31
Braintree	2.8	4
Berlin	5	12
Zurich	12	7
Düsseldorf	10	7
Average	6.4	
Std. Dev.	3.91	

*Corrected to 125 °C.

Based on these data 6.5 ppm or 0.06 lb/ton (0.03 kg/Mg) has been chosen as a conservative estimate of fluoride emissions.

CONTROLS

Fluoride emission control is normally not required on municipal incinerators except in conjunction with acid gas control. Some of the fluoride appears to be associated with the particulate matter and therefore will be removed by the particulate control device while some is apparently present as a gas and would be removed in the acid gas scrubber. Very little fluoride removal data are available but it appears that the fluoride may be removed a little more efficiently than the hydrochloric acid.

TRACE METALS, LEAD, MERCURY, BERYLLIUM

EMISSIONS

Some of the lead in the municipal waste is emitted with the fly ash from a municipal incinerator. The amount of lead emitted will depend upon the efficiency of the particulate control system. Some reported values of lead emissions for incinerators using electrostatic precipitators for particulate control are shown in Table 11. We have chosen 34,200 µg/g (0.034 lb/lb) of particulates or 0.012 lb/ton (0.006 kg/Mg) of refuse burned as a reasonable estimate of the lead emissions.

TABLE 11 LEAD EMISSIONS

Incinerator	$\frac{\mu\text{g Pb}}{\text{g of Particulates}}$	gr/dscf	$\frac{\text{lb}}{\text{ton}}$	Ref.
Braintree		0.0024	(5.8)	4
Nashington, D.C.	78,000			36
Various	10,100-78,200			7
Hamilton	5,700			6
German	20,100			6
Average	31,700			
Std. Dev.	25,100			

Trace amounts of mercury have been found in the emissions from municipal incinerators. Values reported in the literature are shown in Table 12. Based on the listed data, an emission of 2.4×10^{-4} gr/dscf (0.55 mg/dscm) or 0.0064 lb/ton (0.0032 kg/Mg) of refuse burned was chosen as a conservative estimate of total mercury emissions.

TABLE 12 MERCURY EMISSIONS

Incinerator	$\frac{\mu\text{g Hg}}{\text{g of Particulates}}$	gr/dscf	$\frac{\text{lb}}{\text{ton}}$	Ref.
Braintree		6.1×10^{-6} particulate	(.014)	4
		2.8×10^{-5} vapor	(.55)	
Hamilton	300			6
Germany	133			6
Cont., Belgium		6.4×10^{-5} vapor	(.014)	37
Average	216	1.6×10^{-4}	(.037)	

Few data giving emissions of beryllium from municipal incinerators were found. The only reference to beryllium emissions was for the Braintree incinerator [4] where less than 0.15 µg/g of emitted particulates was reported. Using this data, based on the particulate emissions previously cited, the emissions of beryllium are estimated to be less than 5.6×10^{-8} lb/ton (2.8×10^{-8} kg/Mg) of refuse burned.

Trace quantities of a large number of other metals have been found in the fly ash from municipal incinerators. Most of them are present in very small quantities and are of little environmental concern. Concentrations of the more toxic metals are presented in Table 13.

CONTROLS

The trace metals are minor and variable constituents of the waste. Most of the metals except for mercury appear to concentrate in the bottom ash or fly ash. Data presented by Law [38], factored for the difference in efficiency between a baffle chamber and an ESP (95 percent), indicate that most of the mercury is emitted, less than 3 percent of the volatile metals (such as lead, cadmium and zinc) are emitted and less than 1 percent of the nonvolatile metals (such as barium, chromium, and copper) are emitted.

The data indicate that an effective particulate control system is about equally effective in controlling the trace metals. It is sometimes stated that a fabric filter's high efficiency for fine particulates makes it more efficient than other devices in collecting trace metals, but there is inadequate data to substantiate such superiority.

4.1.9 CHLORIDES (AS HCL)

FROM REFERENCE "B", PAGE 291, (EXHIBIT 4-9.1)

UNCONTROLLED HCL EMISSION IN LB/TON = 3.4 (200 PPM)

FROM REFERENCE "D, TABLE 82-09-05.2.5

(EXHIBIT 4-9.2) UNCONTROLLED HCL = 3.2

USE 3.5 LB/TON RDF.

is equivalent to approximately 16 ppm as a reasonable value for total hydrocarbon emissions for this type of incinerator.

TABLE 8 HYDROCARBON EMISSIONS

Incinerator	HC %	lb/Ton	ppm	Aldriches ppm	Organic Ac. co ppm	Ref.
Various	0.151	1.5				8
Various	0.281	0.12				7
Resin-type			11.3	1.1		8
Resin-type			10	0.1	1	10
Resin-type			1.5	0.25	1	10
Various				2.6	54	31
Various		25.5-42.5	0.15-1.06			6
Various	0.176	0.221				33
Various	0.0021	0.001				7
Various				2.3	50.5	28
Average	(0.2320)	14.4	16.2	1.11	24.1	
Std. Dev.	(0.15)	7.0	14.8	.95	25.2	

* Total hydrocarbons

CONTROLS

To the authors' knowledge, no municipal incinerator uses any type of add-on control to reduce hydrocarbon emissions and there are no published correlations between design or operating parameters and hydrocarbon emissions; however, it is reasonable to expect that measures used to control CO will control hydrocarbons even more effectively.

HYDROCHLORIC ACID

EMISSIONS

Flue gases from municipal incinerators normally contain hydrochloric acid as a by-product of the combustion of PVC, other chlorinated plastics, and sodium chloride found in the waste. Hydrochloric acid emissions are not regulated by the U.S. EPA, but most states require the emissions to be reported and control regulations are under consideration in several states. It has been reported that only about half of the chloride in the waste is converted to hydrochloric acid [28] and some of the evolved HCl may be removed on the ash particles [34] as the flue gases pass through the boiler and electrostatic precipitator. Emissions of hydrochloric acid reported in the literature are found in Table 9. Considering these data, we feel that 200 ppm or 3.4 lb/ton (1.7 kg/Mg) is a reasonable estimate of the hydrochloric acid emissions.

CONTROLS

Wet scrubbers were commonly used on municipal incinerators in the past for particulate control,

TABLE 9 HYDROCHLORIC ACID EMISSIONS

Incinerator	lb/Ton	HC %	ppm	Ref.
Various	1.8	(0.9)		8
Overhead			900**	19
Overhead			111	30
Overhead			237	31
Overhead			116	29
Overhead	4.2	(2.1)	213	35
Overhead	4.2	(2.1)	230	35
Overhead	9.0	(2.8)	261	35
Overhead	4.0	(2.2)	254	35
Various			61-1260**	6
Overhead			273	3
Overhead			79	4
Overhead			226	28
Average	3.55	(1.78)	200	
Std. Dev.	1.01	(0.50)	67	

**Corrected to 25°C

**Data point is 111 ppm as measured at 110°C

and more recently for gas cooling ahead of ESPs, and the acid control they gave was incidental. These scrubbers were incapable of meeting current particulate emission standards and heat recovery boilers have largely replaced water quenching so scrubbers became uncommon on municipal incinerators. Acid gas control has been required in West Germany and Japan for several years and is now being required by several local and state agencies, most notably in California.

Wet scrubbers are being used for acid gas control on municipal incinerators in West Germany in conjunction with electrostatic precipitators, and are common on hazardous waste incinerators; however, corrosion and waste water disposal problems have restricted their use on municipal incinerators. Where acid gas control is required, dry scrubbers are now commonly used. Of the seventeen scrubbing systems we are aware of that were installed in Germany and Japan in 1980 and 1981, eleven were dry scrubbers.

FLUORIDES

EMISSIONS

Traces of hydrogen fluoride from the combustion of fluorinated plastics or similar materials appear in the flue gas from municipal incinerators. There are no federal regulations limiting the emissions of fluorides from municipal incinerators, however the PSD regulations require that the fluoride emissions be estimated and reported. The emissions of fluorides from municipal incinerators reported in the literature are shown in Table 10.

HAYDEN-WEGMAN/CAROLLO
engineers

EXHIBIT 4-9.2

October 25, 1983

RESOURCE RECOVERY FACILITY DESIGN
NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.5
Emission Factors for TSP & HCl Based on Total Feed Material

UNCONTROLLED*					CONTROLLED**			
Category	I	II	III	Coal	I	II	III	Coal
T S P lb/ton	25	20	134	128	0.125	0.100	0.670	0.640
HCl lb/ton	1.4	NA	3.2	0.4	0.140	NA	0.320	0.040

Category Definitions

- I - Mass-fired MSW Combustion w/o Heat Recovery
- II - Mass-fired MSW Combustion with Heat Recovery
- III - RDF Combustion with Heat Recovery

T S P Total Suspended Particulates
HCl Hydrochloric Acid

Emissions given in lb of emission per ton of total feed:
MSW for Categories I & II
RDF for Category III

* Reference: An Evaluation of Emission Factors For
Waste-to-Energy Systems - Executive Summary
by G.M. Rinaldi, T.R. Blackwood,
D.L. Harris & K.M. Tackett
Monsanto Research Corp. Dayton, Ohio
Table 6 for TSP Uncontrolled Emissions)
Table 13 for HCl Uncontrolled Emissions)
29 May 1979
USEPA Contract No. 68-03-2550, Task II

** Assume Controlled Emissions as follows:
99.5% Efficiency for TSP
90.0% " " HCl

NA - No data available

4.1.10 FLOURIDES (AS HF)

FROM REFERENCE "A", TABLE 20, (EXHIBIT 4-10)

UNCONTROLLED HF EMISSION IN LB/1.0E6 BTU

= 0.003 TO 0.004

CONVERT LB/1.0E6 BTU TO LB/TON,

$0.003 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON}$

= 0.037 LB/TON

$0.004 \text{ LB/1.0E6 BTU} \times 6164 \text{ BTU/LB} \times 2000 \text{ LB/TON}$

= 0.0493 LB/TON

THEREFORE,

UNCONTROLLED HF EMISSION IN LB/TON

0.04 LB/TON IS SELECTED FOR HF EMISSION FACTOR AND IS REPRESENTATIVE
OF THE MEDIAN VALUES OF THE DATA BASES USED.

Table 20

Uncontrolled Emissions of SO₂, HCl and HF at Refuse-Burning Facilities

Type of Facility	Concentrations (ppmv, dry)+						Emission Rates grams/GJ++ (lbs/10 ⁶ Btu)					
	SO ₂		HCl		HF		SO ₂		HCl		HF	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Mass-Burning Refractory Wall	47	131	76	665	3.0	13	32 (.074)	360 (.84)	8.6 (.02)	430 (1.0)	0.9 (.002)	4.3 (.01)
Mass-Burning Waterwall	12	442			NA	NA	17 (.040)	310 (.720)			NA	NA
Rotary Kiln	48	118			NA	NA	26 (.06)	69 (.16)			NA	NA
RDF-Fired Spreader Stoker	162	472	610	654	11	15	130 (.300)	770 (1.790)	160 (.37)	190 (.44)	1.3 (.003)	1.7 (.004)

NA = Not Available

+ Corrected to 12% CO₂

++ Rates based on HHV of fuel "as-fired"

Source: Appendix B

4.1.11 SULFURIC ACID MIST (H₂SO₄)

IN THE DEVELOPMENT OF SO₂ EMISSION FACTOR, WE HAVE ASSUMED THAT ALL SULFUR CONTENT IN RDF IS COMPLETELY CONVERTED TO SO₂.

THEREFORE, THERE SHALL BE NO SULFUR LEFT TO FORM SULFURIC ACID MIST.

HOWEVER REFERENCE "B", PAGE 293 (EXHIBIT 4-11) STATES

UNCONTROLLED H₂SO₄ EMISSION = 0.04 LB/TON

CONTROLLED H₂SO₄ EMISSION = $0.04 \times (1 - .99) = 0.0004$ LB/TON

THE BOILING POINT OF SULFURIC ACID IS 626°F. AT THE STACK EXIT GAS TEMPERATURE OF 450 °F, THE SULFURIC ACID THAT IS FORMED FROM SO₂, H₂O AND O₂ IS PRESUMED TO BE A LIQUID AEROSOL WHICH WOULD BE ADSORBED ON FLY ASH PARTICULATE AND COLLECTED AT AN EFFICIENCY OF 99%.

TABLE 13 CONCENTRATIONS OF SELECTED TRACE METALS IN MUNICIPAL INCINERATOR FLY ASH

Metal	Ref. 4	Ref. 3b	Ref. 1	Average	lb/Ton*	Kg/Mg
Arsenic	57	310	50-100	130	4.4×10^{-5}	(2.2×10^{-5})
Barium	240	990	270-540	540	1.8×10^{-3}	(0.9×10^{-3})
Cadmium	280	1900	670-1150	1100	3.8×10^{-3}	(1.9×10^{-3})
Chromium	200	870	130-260	360	1.2×10^{-3}	(0.6×10^{-3})
Copper	1600	1500	620-800	1100	3.9×10^{-3}	(1.9×10^{-3})
Nickel		170		170	5.9×10^{-5}	(2.9×10^{-5})
Zinc	11%	14%	1%	5.3%	1.9×10^{-2}	(0.9×10^{-2})

*Based on particulate emissions of 0.34 lb/Ton (0.17 Kg/Mg)

SULFURIC ACID MIST

EMISSIONS

Very little data is available on emissions of sulfuric acid mist from municipal incinerators. Data from Harrisburg [3] give 0.0014 or gr/scf (3.2 mg/scm) which is 1.6 percent of the SO₂ emission rate. On the basis of the 2.4 lb/ton (1.2 kg/Mg) rate previously established for SO₂ emissions, a sulfuric acid mist emissions rate of 0.04 lb/ton (0.02 kg/Mg) of refuse burned can be calculated.

CONTROLS

Sulfuric acid mist will be a vapor at high temperatures but, especially in the presence of moisture, will condense as an aerosol at lower temperatures. Most common pollution control systems will have low capture efficiencies but dry acid gas scrubbers (especially those utilizing fabric filters) should provide good control.

DIOXINS AND FURANS

EMISSIONS

Traces of polychlorinated dibenzo-*p*-dioxins and dibenzofurans have been identified in the emissions from a number of municipal incinerators abroad and in the U.S. The source or mechanism of formation of these compounds has not yet been discovered. Several theories have been proposed to account for their presence: they may be present in the feed and pass through the incinerator undestroyed; they may be formed from precursors such as chlorinated phenols, chlorinated benzenes, or

PCBs, present in the feed; or they may be formed by the reaction of traces of chlorine present in the feed with complex organics formed in the combustion process. Much of the published data on dioxin emissions are not quantitative and the quantitative data available, as shown in Table 14, are very scattered. Several reports reviewing the literature on dioxins have been published [45, 46], but most of the data cited in this paper were derived from original literature sources where available.

In general, the variability of the data makes averages derived from it statistically meaningless except possibly for tetrachlorodibenzo-*p*-dioxin (TCDD) which has received the most attention from the investigators. It can be observed that the emissions reported for the Dutch incinerators are considerably higher than the other reported emissions (TCDD = 54 vs. 5.8 ng/g for ESP fly ash and 100 versus 2 ng/g for stack particulates); that the more highly chlorinated isomers, particularly the hexa and hepta chloro isomers, are more plentiful than the tetrachloro isomers; that there is several times as much dioxin in the emitted particulate as in that collected in the ESP; and that there can be appreciable dioxins in the vapor phase. There is no indication of why the reported emissions from the Dutch and the U.S. incinerator are so high compared to the rest, however the preponderance of evidence seems to favor the lower numbers.

Considering the available data, we conclude that the best estimate of TCDD emissions possible is 1×10^{-9} to 5×10^{-7} lb/ton (0.5×10^{-9} to 2.5×10^{-7} kg/Mg) of refuse burned and that total dioxin emissions are possibly a factor of 10 higher. Data presented by Cavallaro [42] and others indicate that the concentration of the toxic isomer 2,3,7,8-TCDD will be about 5 percent of the total TCDD.

4.1.12 HYDROGEN SULFIDE, TOTAL REDUCED SULFUR, REDUCED SULFUR COMPOUNDS,

VINYL CHLORIDE AND ASBESTOS

BASED ON REFERENCE "B", PAGE 295, (EXHIBIT 4-12) NO EMISSIONS OF
HYDROGEN SULFIDE, TOTAL REDUCED SULFUR, REDUCED SULFUR
COMPOUNDS, VINYL CHLORIDE AND ASBESTOS ARE EXPECTED.

TABLE 16 POLYNUCLEAR AROMATIC
HYDROCARBON EMISSIONS

Incinerator	Ref.	($\mu\text{g}/\text{m}^3$)	(lb/ton^a)	(kg/Mg)	Ref.
Braintree		(20)	4×10^{-6}	(2×10^{-4})	4
Various	8,9		8.2×10^{-6}	(0.2×10^{-4})	9,1
Unknown	9,2		2×10^{-6}	(1×10^{-4})	9,2
Restingtons, England		(0.20)	8.8×10^{-6}	(8.8×10^{-4})	9,3
Various			80.1×10^{-6}	(20×10^{-4})	1
Average			10×10^{-6}	(5×10^{-4})	

^aCalculated

shown in Table 16. Considering the wide variation of the available data, we have selected an average value of 1×10^{-5} lb per ton (0.5×10^{-5} kg/Mg) of refuse burned or $30 \mu\text{g}/\text{g}$ of emitted particulates.

POLYCHLORINATED BIPHENYLS (PCBs)

PCBs have been found in trace amounts in several municipal incinerator emissions. These materials probably result from incomplete destruction of traces of PCBs found in the waste feed. Since the manufacture and distribution of PCBs is now prohibited, the amounts found in the refuse, and therefore the amount in the emissions, can be expected to decline in the future. The reported PCB emissions are shown in Table 17.

Considering these data, 5×10^{-6} gr/dscf (0.011 mg/dscm) or 1.3×10^{-4} lb/ton (0.65×10^{-4} kg/Mg) is a reasonably conservative value for PCB emissions from municipal incinerators.

TABLE 17 PCB EMISSIONS

Incinerator	lb/ton (kg/Mg)	gr/dscf (mg/dscm)	Ref.
Chicago IV	1.2×10^{-4} (0.6×10^{-4})	5.5×10^{-6} (0.013)	9,4
Dade Co		8.8×10^{-6} (0.017)	50
Braintree		1.6×10^{-6} (0.0037)	4

^a As Aroclor 1254^{bb} As deca-chlorobiphenyl

ASBESTOS

No data were found on the emissions of asbestos from municipal incinerators. Some asbestos may occur in municipal waste and small quantities may be suspended in the flue gas, but the particulate control equipment is expected to remove most of it and the emissions are expected to be insignificant.

VINYL CHLORIDE, H_2S , TRS*

No reports of the detection of these materials in the emissions from a municipal incinerator were found. Since these materials would be readily oxidized under the conditions prevailing in the incinerator, we conclude that there will be essentially zero emissions of these materials and that BACT is the standard combustion controls normally used on these units.

CONCLUSIONS

Published data on the emissions from municipal incinerators have been used to derive emission factors for a modern mass burning, waterwall municipal waste incinerator equipped with an electrostatic precipitator. These emission factors are summarized in Table 18.

TABLE 18 SUMMARY OF EMISSION FACTORS

Pollutant	Concentrations ppm or (gr/dscf)	lb/ton
Particulates	(0.02) ^a	6.38
Sulfur Dioxide	80	2.4
Nitrogen Oxides	75	1.6
Carbon Monoxide	750	1.9
Hydrocarbons	15	0.12
Hydrochloric Acid	200	3.4
Fluorides	8.5	0.06
Lead	(6.8×10^{-3}) ^b	0.012
Mercury	(2.4×10^{-3})	0.0042
Beryllium	(3.0×10^{-9}) ^c	9.7×10^{-8}
Sulfuric Acid Mist	(0.0023) ^a	0.04
Tetrachloroethylene-dichloro		7×10^{-6}
Polynuclear Aromatics		1.0×10^{-5}
Polychlorinated Biphenyls		1.3×10^{-4}

^aCorrected to 12% O_2

These factors have been used in several instances to provide the emissions estimates for proposed incinerators for use in permit applications and environmental impact reports.

State-of-the-art control systems have been identified for each emitted pollutant as an aid in identifying BACT and LAER. A summary of these systems is presented in Table 19. In general, we have concluded that while thermal nitrogen oxide reduction systems and fabric filters show promise as improved pollution control systems, there is yet insufficient data in the literature to prove that they will maintain the claimed efficiencies under normal incinerator operating conditions.

* Total reduced sulfur.

4.1.13 DIOXIN

THE EMISSION FACTOR WAS CALCULATED FOR THE TETRA HOMOLOGUE (CONTAINING FOUR CHLORINE ATOMS) TCDD WHICH CONTAINS THE ISOMER 2,3,7,8 - TCDD OF GREATEST TOXICITY AND CONCERN.

FROM REFERENCE "G", TABLE 3-2 (EXHIBIT 4-13), MASS EMISSION RATE FOR TCDD BASED ON THE ANALYSIS MADE FOR THE PROPOSED NEW YORK CITY BROOKLYN NAVY YARD 3000 TPD MASS BURN WATERWALL PLANT, ASSUMING THE WORST CASE CONDITION WHERE ALL DIOXIN ARE EMITTED IN GASEOUS FORM (EQUALLY UNCONTROLLED WHETHER AN ELECTROSTATIC PRECIPITATOR OR BAG HOUSE IS USED), IS GIVEN AT 1.07 ug/sec. THIS IS CALCULATED TO BE EQUIVALENT TO THE EMISSION FACTOR 8.5×10^{-8} LB/TON GIVEN IN TABLE 4-1 OF REFERENCE "F" AS FOLLOWS:

$$\frac{1.07 \frac{\text{ug}}{\text{sec}} \times \frac{\text{E-6 g}}{1 \text{ ug}} \times \frac{1 \text{ lb}}{453.6 \text{ g}}}{\text{}} = 0.07 \text{ E-6 lb/ton MSW}$$

$$\frac{3000 \text{ ton MSW}}{24 \times 60 \times 60 \text{ sec}} =$$

MSW @ 82% combustible.

$$\frac{0.07 \text{ E-6 lb}}{0.82 \times \text{ton MSW}} = \frac{8.5 \text{ E-8 lb}}{\text{ton Combustible}}$$

$$= 8.5 \text{ E-8 lb/ton RDF}$$

THE ISOMER 2,3,7,8 TCDD IS SHOWN IN EXHIBIT 4-13 TO BE
0.07 ug/sec, OR APPROXIMATELY 7% OF THE TOTAL TCDD MASS
EMISSION RATE OF 1.07 ug/sec. THEREFORE, USING 8.5×10^{-8}
LB/TON RDF (DERIVED FROM THE 1.07 ug/sec MASS EMISSION
RATE FOR TCDD) IS A CONSERVATIVE OVERSTATEMENT OF THE
EMISSION FACTOR FOR THE ISOMER 2, 3, 7, 8 TCDD.

TABLE 3-2

PREDICTED PCDF AND PCDD EMISSIONS FROM BNYRRF
(Assuming all PCDDs and PCDFs emitted
are in gaseous form)

	Concentration in Flue Gas (ng/Nm ³) (c)	Mass Emission Rate (ug/sec)
Tri-CDF	307.4 (a)	51.18
Tetra-CDF	92.2 (a)	15.35
Penta-CDF	26.6 (b)	4.43
Hexa-CDF	63.5 (a)	10.58
Hepta-CDF	7.7 (a)	1.28
<u>Octa-CDF</u>	<u>0.6 (a)</u>	<u>0.10</u>
Total-CDF	498.0	82.92
Tri-CDD	13.3 (a)	2.22
Tetra-CDD	6.5 (a)	1.07
Penta-CDD	10.7 (b)	1.79
Hexa-CDD	16.4 (a)	2.73
Hepta-CDD	7.8 (a)	1.30
<u>Octa-CDD</u>	<u>2.6 (a)</u>	<u>0.43</u>
Total-CDD	57.3	9.54
2,3,7,8 Tetra-CDD	0.42	0.07

NOTES:

Nm³ = Normalized cubic meters, 0°C and 1 atm pressure.

Flue gas flow rate = 166.5 Nm³/sec

(a) Calculated from data published by Redford et al. 1981.

(b) Calculated from data published by SFOEP, 1982.

(c) Corrected to flue gas conditions projected for BNYRRF; i.e. 10.5% CO₂ (dry basis) and 13.63% H₂O.

Question No. 2

Provide documentation that an electrostatic precipitator (ESP) will remove 99% of sulfuric acid mist at an exit gas temperature of 450 °F.

Response:

See paragraph 4.1.11 above.

Question No. 3

The emission factor for dioxins appears to be based on the emission factor for the Brooklyn Navy Yard project which will use a dry scrubber and baghouse for control. What is the emission factor when an ESP is used as the only control device.

Response:

See paragraph 4.1.13 above.

SECTION II

BEST AVAILABLE CONTROL TECHNOLOGY

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SECTION II

BEST AVAILABLE CONTROL TECHNOLOGY

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PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE-TO-ENERGY FACILITY
REPORT ON AIR QUALITY IMPACTS ANALYSIS
RESPONSE TO FLORIDA DER SUFFICIENCY REVIEW

1. BEST AVAILABLE CONTROL TECHNOLOGY ISSUES

This Section II of the Supplemental Report addresses the issues of Best Available Control Technology (BACT) as raised by FDER in Questions 4, 5 and 6 of their August 23, 1985 Interoffice Memorandum and also by National Park Service's Southeast Regional Service, as presented in their four-page Technical Review, transmitted by National Park Service August 16, 1985 letter to FDER and submitted by FDER to the Authority along with FDER's questions.

2. FDER QUESTIONS ON BACT

FDER questions 4, 5 and 6 addressing the BACT issues, are replicated herewith for reference as follows:

Question No. 4:

Wet scrubbers were not evaluated in the BACT because they produced an "aesthetically undesirable water vapor plume." Provide all the appropriate evaluations of wet scrubbers for the proposed BACT.

Question No. 5:

The proposed BACT compares an ESP to a dryscrubber and baghouse. This is not a valid comparison. Submit the necessary data comparing a baghouse to an ESP and a dryscrubber with a baghouse to scrubber with an ESP.

Question No. 6:

A BACT economic analysis which evaluates unit cost per ton of pollutant

removed should include all the pollutants; for example, dry scrubbers should address acid, SO₂ etc. Resubmit the economic data for all of the control systems which are to be evaluated.

3. EXPANDED BACT ANALYSIS

By way of responding to the FDER questions, the BACT analysis has been expanded to encompass six air pollution control alternatives as follows:

3.1 Alternative 3-3

Electrostatic Precipitator

A four-field ESP is being specified capable of controlling effluent particulate matter (PM) emissions to 0.025 grains/DSCF @ 12% CO₂. Because of anticipated deterioration of performance as the facility ages, the BACT analysis conservatively assumes in-service PM emissions at 0.03 grains/DSCF @ 12% CO₂.

Cost development for this alternative is given in Table 3-3 (Sheet 1 and 2).

A partial listing of refuse - burning facilities equipped with ESPs is shown on Exhibit II-1, Table 30) taken from the May 24, 1984 issue of the CARB report.

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TABLE 3 - 3 (Sheet 1 of 2)

ELECTROSTATIC PRECIPITATOR SYSTEM COSTS
 700 TPD UNIT

1. EMISSION LIMIT, GRAINS/DSCF @ 12% CO2	0.03
2. REMOVAL EFFICIENCY, PERCENT	99.00
3. PARTICULATE REMOVED, TPY (NOTE 1)	5861
4. CONSTRUCTION COST	\$2,300,000
5. BONDING FACTOR (NOTE 2)	1.6
6. CAPITAL COST (5 X 4)	\$3,680,000
7. CAPITAL RECOVERY FACTOR (20 YEARS TERM AT 11%)	0.12558
8. ANNUAL CAPITAL COST (7 X 6)	\$462,000
9. OPERATING AND MAINTENANCE COST	
A. ELECTRICITY (2.9 MILLION KWH @ 5 CENTS)	\$145,000
B. WATER	\$0
C. LABOR (2 MEN: 1/2 MEN PER SHIFT @ \$30,000)	\$60,000
D. MAINTENANCE @ 2% OF CONSTRUCTION COST	\$46,000
E. LIME, 0 TPY @ \$150/TON	\$0
F. WASTE HANDLING & DISPOSAL (5861 TPY TSP @ \$10/TON)	\$59,000
G. REHEAT STEAM (0 MMBTUH @ \$6/MMBTU)	\$0
TOTAL OPERATING & MAINTENANCE COST	\$310,000
10. TOTAL ANNUAL COST	\$772,000

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TABLE 3 - 3 (Sheet 2 of 2)

ELECTROSTATIC PRECIPITATOR SYSTEM COSTS (SHEET 2 OF 2)
700 TPD UNIT

11. UNIT COST:

PER TON MSW (260,000 TPY)	\$2.97
PER TON RDF (182,000 TPY)	\$4.24
PER TON PARTICULATE (5861 TPY)	\$131.72

NOTE:

1. PARTICULATE REMOVED ANNUALLY BY ELECTROSTATIC PRECIPITATOR SYSTEM
= 21400 TPY UNCONTROLLED TSP X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .99 EFFICIENCY = 5861 TPY
2. INCLUDES BUSINESS RISK & EFFICACY INSURANCE; DEBT SERVICE OPERATING
& RENEWAL & REPLACEMENT FUNDS, INTEREST DURING CONSTRUCTION AND
FINANCING COSTS.

Table 30

Partial Listing of Refuse-Burning Facilities Equipped with Electrostatic Precipitators

Facility	Capacity (T/D)	Furnace Type	Gas Flow m ³ /min (ACFM)	Gas Temp. °C (°F)	SCA	Input KVA	Gas Velocity M/S (ft/sec)	Design Efficiency g/Km ³ , (gr/scf)	Tested Efficiency g/Km ³ , dry* (gr/scf)	
									Performance	Later
Montreal, Canada	4 x 300	WW	3,170 (112,000)	280 (536)	161	35	1.68 (5.5)	0.23 (0.0875)	[1970]** .03 (0.0133)	[1971]** .18 (0.0799)
Southwest Brooklyn, New York	1 x 250	R	3,707 (131,000)	288 (550)	149	47	1.34 (4.4)	0.24 (0.093)	[1970] .26 (0.114)	[1971] .33 (0.146)
South Shore, New York	1 x 250	R	3,849 (136,000)	316 (600)	147	33	1.68 (5.5)	0.24 (0.093)	[1970] .13 (0.056)	NR
Dade County, Florida (early facility)	1 x 300	R	8,094 (286,000)	299 (570)	175	48	1.19 (3.9)	0.25 (0.094)	[1970] .06 (0.027)	
Chicago Northwest, Illinois	4 x 4	WW	3,113 (110,000)	232 (450)	182	40	.88 (2.9)	0.13 (0.05)	[1971] .05-.07 (0.02-0.03)	[1975] .07 (0.03)
Braintree, Massachusetts	2 x 120	WW	906 (32,000)	316 (600)	182	19	.95 (3.1)	0.22 (0.086)	[1970] .25 (0.108)	[1978] .19 (0.083)
Washington, D.C.	6 x 250	R	3,702 (130,800)	288 (550)	204	77	1.25 (4.1)	0.53 (0.2)	[1972] .13 (0.0548)	NR
Harrisburg, Pennsylvania	2 x 360	WW	2,830 (100,000)	210 (410)	200	40	1.07 (3.5)	0.24 (0.093)	[1973] .13-.15 (0.055-0.065)	[1974] .09-.20 (0.039-0.083)
Quebec, Canada	4 x 250	WW	2,830 (100,000)	260 (500)	NR	NR	NR	0.26 (0.106)	[1974] .22 (0.095)	NR
Saugus, Massachusetts	2 x 600	WW	3,195 (112,913)	198 (389)	NR	NR	NR	NR	[1980] .025	NR
Kure, Japan	2 x 165	Rotary WW	943 (33,333)	222 (432)	NR	NR	NR	NR	[1981] .030	
Albany, New York	2 x 300	SS WW	1,799 (63,579)	184 (364)	NR	NR	NR	NR	[1982] 0.027	
Hamilton, Ontario, Canada	2 x 300	SS WW	1,695 (59,900)	255 (492)	NR	NR	NR	NR		[1979] .16
Pinellas, Florida	2 x 1000	WW	5,207 (184,000)	238 (462)	NR	NR	NR	NR	[1983] .025	
Resource Recovery Dade County, Florida	4 x 750	SS WW	13,756 (486,000)	237 (459)	NR	NR	NR	NR	[1983] 0.05	

WW = Waterwall
R = Refractory lined
NR = Not reported
SS = Spreader stoker

* Concentrations corrected to 12% CO₂
** [Year of test]

3.2 Alternative 3-4

Bag Filter with Cyclone Collector

The specific response to FDER Question 5, the Bag Filter (BF) with Cyclone Collector (CC) system is now shown as Alternative 3-4. This system is capable of controlling effluent PM emissions to 0.01 grains/DSCF @ 12% CO₂. The Cyclone Collector is installed upstream of the bag Filter in order to arrest incandescent particles from passing into the Bag Filters and burning holes in the bags.

Although the Bag Filter system is theoretically more efficient, it has limited experience in municipal waste-to-energy combustion systems, much of which has been bad. Bag blinding and bag failures (e.g. pin holes and tears) have been experienced at these installations.

Cost development for the Bag Filter with Cyclone Collector Alternative is given in Table 3-4 (Sheets 1 and 2).

A partial listing of bag filter facilities on refuse-burning plants is shown on Exhibit II-2 (Table 31) taken from the May 24, 1984 issue of the CARB report.

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TABLE 3 - 4 (Sheet 1 of 2)

BAG FILTER WITH CYCLONE COLLECTOR SYSTEM COSTS
 700 TPD UNIT

1. EMISSION LIMIT, GRAINS/DSCF @ 12% CO ₂	0.01
2. REMOVAL EFFICIENCY, PERCENT	99.90
3. PARTICULATE REMOVED, TPY (NOTE 1)	5915
4. CONSTRUCTION COST	\$2,070,000
5. BONDING FACTOR (NOTE 2)	1.6
6. CAPITAL COST (5 X 4)	\$3,312,000
7. CAPITAL RECOVERY FACTOR (20 YEARS TERM AT 12%)	0.13388
8. ANNUAL CAPITAL COST (7 X 6)	\$443,000
9. OPERATING AND MAINTENANCE COST	
A. ELECTRICITY (3.08 MILLION KWH @ 5 CENTS)	\$155,000
B. WATER	\$0
C. LABOR (4 MEN: 1 MAN PER SHIFT @ \$30,000)	\$120,000
D. MAINTENANCE @ 3% OF CONSTRUCTION COST	\$62,000
E. LIME, 0 TPY @ \$150/TON	\$0
F. WASTE HANDLING & DISPOSAL (5915 TPY TSP @ \$10/TON)	\$59,000
G. REHEAT STEAM (0 MMBTUH @ \$6/MMBTU)	\$0
TOTAL OPERATING & MAINTENANCE COST	\$396,000
10. TOTAL ANNUAL COST	\$839,000

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TABLE 3 - 4 (Sheet 2 of 2)

BAG FILTER WITH CYCLONE COLLECTOR SYSTEM COSTS
700 TPD UNIT

11. UNIT COST:

PER TON MSW (260,000 TPY)	\$3.23
PER TON RDF (182,000 TPY)	\$4.61
PER TON PARTICULATE (5915 TPY)	\$141.84

NOTE:

1. PARTICULATE REMOVED ANNUALLY BY CYCLONE COLLECTOR AND BAGFILTER SYSTEM
= 21400 TPY UNCONTROLLED TSP X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .999 EFFICIENCY = 5915 TPY
2. SAME AS TABLE 3-3

Partial Listing of Fabric Filter Applications
to Refuse-Burning Facilities

Location of Facility (Ref)	Capacity (MT/D)+	Gas Flowrate (m ³ /min)	Gas Temp. (°C)	Air-to-Cloth Ratio (m ³ /min-m ²)	TSP Outlet Concentration grams/Nm ³ (grains/dscf)	Δ P (cm, w.g.)	Application
Pasadena, California (429)	NA	8.5	230	1.4	0.002 (0.008)	10 - 15	MSW Slip-stream
Sas Fe, Switzerland (430)	36	422	260	0.76		6 - 12	MSW Full-scale
E. Bridgewater,* Massachusetts (431)	330	2500	260	0.6	0.04 (0.02)	5 - 8	(closed) Full-scale
Nashville, Tennessee (432)	NA			1.2	0.002 (0.008)	NR	Slip-stream
Saugus, Massachusetts (433)	1360	1132	209	NR	0.020 (0.008)	10 - 15	Slip-stream on one unit
Gallatin,** Tennessee (434)	76	676	171	(Apitron) 10.0	0.071 (0.029)	13 - 40	Full-scale
Framingham, Massachusetts (435)	453	4500	176		0.049 (0.02)	13	Full-scale
Tsushima, Japan (436)	136	1091	93 - 160	NR	(0.01)	NR	Full-scale
Malmo, Sweden (437)	456	3100	392	NR	guaranteed 0.059 (0.02)	Reported higher than anticipated	Full-scale
Susanville, California (438)	87	715	215	1.61	design 0.02 (0.01)	design 10 - 15	Full-scale
City of Hamm, West Germany (439)	961	4x1383.9	171	NR	under construction (1984)	NR	MSW Full-scale

NR -- Not reported

* East Bridgewater facility is currently not in operation.

** Apitron unit was removed due to operation problems.

3.3 Alternative 3-5

Dry Scrubber & Electrostatic Precipitator

In specific response to FDER Question 5, the Dry Scrubber and ESP alternative was developed and costs thereof are displayed in Table 3-5 (Sheet 1 and 2).

In addition to removal of particulates, this system is intended to effect acid gas control. A 70% collection efficiency is anticipated for SO_2 emissions and a 90% collection efficiency for both HCl and HF.

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TABLE 3 - 5 (Sheet 1 of 2)

DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM COSTS
 700 TPD UNIT

1. EMISSION LIMIT, GRAINS/DSCF @ 12% CO2	0.03
2. REMOVAL EFFICIENCY, PERCENT	99.00
3. PARTICULATE REMOVED, TPY (NOTE 1)	5861
4. CONSTRUCTION COST	\$5,300,000
5. BONDING FACTOR (NOTE 4)	1.6
6. CAPITAL COST (5X4)	\$8,480,000
7. CAPITAL RECOVERY FACTOR (20 YEARS TERM AT 12%)	0.13388
8. ANNUAL CAPITAL COST (7X6)	\$1,135,000
9. OPERATING AND MAINTENANCE COST	
A. ELECTRICITY (3.76 MILLION KWH @ 5 CENTS)	\$188,000
B. WATER (80 GPM @ \$0.7/1000 GAL)	\$18,000
C. LABOR (8 MEN; TWO PER SHIFT @ \$30,000)	\$240,000
D. MAINTENANCE	\$106,000
E. LIME, 2200 TPY @ \$150/TON	\$300,000
F. WASTE HANDLING & DISPOSAL (5861 TPY TSP; +2200 TPY LIME; 863 TPY SO2 & HCL; AT \$10/TON) (NOTE 2)	\$87,000
G. REHEAT STEAM (5 MMBTUH @ \$6/MMBTU)	\$262,000
TOTAL OPERATING & MAINTENANCE COST	\$1,201,000
10. TOTAL ANNUAL COST	\$2,336,000

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TABLE 3 - 5 (Sheet 2 of 2)

DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR

11. UNIT COST:

PER TON MSW (260,000 TPY)	\$8.98
PER TON RDF (182,000 TPY)	\$12.84
PER TON PARTICULATE (5861 TPY)	\$398.57
PER TON PARTICULATE & ACID GAS (6724 TPY)	\$347.41

NOTE:

1. PARTICULATE REMOVED ANNUALLY BY DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM

= 21400 TPY UNCONTROLLED TSP X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .99 EFFICIENCY = 5861 TPY
2. DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM ALSO REMOVE ACID GAS, SO₂ REMOVED ANNUALLY BY DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM = 2957 TPY UNCONTROLLED SO₂ X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .7 EFFICIENCY = 573 TPY

HCL REMOVED ANNUALLY BY DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM = 1150 TPY UNCONTROLLED SO₂ X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .9 EFFICIENCY = 287 TPY

HF REMOVED ANNUALLY BY DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM
= 13.2 TPY UNCONTROLLED SO₂ X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .9 EFFICIENCY = 3 TPY

TOTAL ACID GAS REMOVED = 863 TPY
3. TOTAL PARTICULATE & ACID GAS REMOVED = 6724 TPY
4. SAME AS NOTE 2, TABLE 3-3.

Dry Scrubber installations, followed mainly by ESP's, but also by Bag Filters (referred to as Fabric Filters) have been installed in Europe and Japan, as shown in Exhibit II-3. Aside from the Framingham, MA installation of a Dry Scrubber/Fabric Filter on a non-heat recovery incinerator (see Exhibit II-2), there are presently no other such installations in the United States, although several are being planned.

DRY SCRUBBER INSTALLATIONS

<u>Japan</u>			<u>West Germany</u>		
<u>Name</u>	<u>Type</u>	<u>Year</u>	<u>Name</u>	<u>Type</u>	<u>Year</u>
Yokamama City #1	<u>FF</u>	78	Pineburg	ESP	74
Yokamama City #2	ESP	80	Hamburg	ESP	77
Yokamama City #3	ESP	79	Vienna	N/A	78
Ohnojo	ESP	80	Hamburg	ESP	79
Chiba	N/A	81	Munich	ESP	80
Nanto	ESP	81	Dusseldorf	ESP	80
Sayai City	ESP	80	Oberhausen	<u>FF</u>	78
Senda1 City	ESP	80	Dusseldorf	ESP	80
Yokamama	ESP	84	Dusseldrof	ESP	N/A
Yokamama	ESP	80	Hamm	<u>FF</u>	84
Nishisonogi-gun	ESP	82	Dusseldorf	ESP	84
Yokamama	ESP	80			
Shrouka	ESP	82			
Kamakuta	ESP	81			
Tshushima	<u>FF</u>	83			

Key: ESP - Electrostatic Precipitator
 FF - Fabric Filter
 N/A - Not Available

3.4 Alternative 3-6

Dry Scrubber & Bag Filter

The Dry Scrubber & Bag Filter alternative submitted with the Authority's original application has been revised and is included herewith. The revised costs for this alternative are displayed in Table 3-6 (Sheets 1 and 2).

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TABLE 3 - 6 (Sheet 1 of 2)

DRY SCRUBBER AND FILTER SYSTEM COSTS
 700 TPD UNIT

1. EMISSION LIMIT, GRAINS/DSCF @ 12% CO ₂	0.01
2. REMOVAL EFFICIENCY, PERCENT	99.9
3. PARTICULATE REMOVED, TPY (NOTE 1)	5915
4. CONSTRUCTION COST	\$5,000,000
5. BONDING FACTOR (NOTE 4)	1.6
6. CAPITAL COST (5 X 4)	\$8,000,000
7. CAPITAL RECOVERY FACTOR (20 YEARS TERM AT 13%)	0.14235
8. ANNUAL CAPITAL COST (7 X 6)	\$1,139,000
9. OPERATING AND MAINTENANCE COST	
A. ELECTRICITY (4.27 MILLION KWH @ 5 CENTS)	\$213,000
B. WATER (80 GPM @ \$0.7/1000 GAL)	\$18,000
C. LABOR (8 MEN; TWO PER SHIFT @ \$30,000)	\$240,000
D. MAINTENANCE	\$120,000
E. LIME, 2,200 TPY @ \$150/TON	\$300,000
F. WASTE HANDLING & DISPOSAL (59 TPY TSP; +2000 TPY LIME; +863 TYP SO ₂ & HCL; AT \$10/TON) NOTE 2)	88,000
G. REHEAT STEAM (5 MMBTUH @ \$6/MMBTU)	\$262,000
TOTAL OPERATING & MAINTENANCE COST	<u>\$1,241,000</u>
10. TOTAL ANNUAL COST	\$2,380,000

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TABLE 3 - 6 (Sheet 2 of 2)

DRY SCRUBBER AND BAG FILTER SYSTEM COSTS
700 TPD UNIT

11. UNIT COST:

PER TON MSW (260,000 TPY)	\$9.15
PER TON RDF (182,000 TPY)	\$13.08
PER TON PARTICULATE (5915 TPY)	\$402.37
PER TON PARTICULATE & ACID GAS (6778 TPY)	\$351.14

NOTE:

1. PARTICULATE REMOVED ANNUALLY BY DRY SCRUBBER AND BAGFILTER SYSTEM
= 21400 TPY UNCONTROLLED TSP X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .999 EFFICIENCY = 5915 TPY
2. DRY SCRUBBER AND BAGFILTER SYSTEM ALSO REMOVE ACID GAS,
SO2 REMOVED ANNUALLY BY DRY SCRUBBER AND BAGFILTER SYSTEM
= 2957 TPY UNCONTROLLED SO2 X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .7 EFFICIENCY = 573 TPY
HCL REMOVED ANNUALLY BY DRY SCRUBBER AND BAGFILTER SYSTEM
= 1150 TPY UNCONTROLLED SO2 X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .9 EFFICIENCY = 287 TPY
HF REMOVED ANNUALLY BY DRY SCRUBBER AND BAGFILTER SYSTEM
= 13.2 TPY UNCONTROLLED SO2 X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .9 EFFICIENCY = 3 TPY
TOTAL ACID GAS REMOVED = 863 TPY
3. TOTAL PARTICULATE & ACID GAS REMOVED = 6778 TPY
4. SAME AS NOTE 2, TABLE 3-3.

3.5 Alternative 3-7

ESP & Wet Scrubber

In response to FDER Question 4, two wet scrubber alternatives were developed. Alternative 3-7 provides a wet scrubber downstream of an ESP and Alternative 3-8 provides a wet scrubber downstream of a Bag Filter, the latter described further in paragraph 3.6 below.

Costs for the ESP/Wet Scrubber alternative are displayed in Table 3-7 (Sheets 1 and 2) Particulate matter and acid gas collection efficiencies for the ESP/Wet Scrubber system are designed to correspond to respective efficiencies for these emissions provided in the Dry Scrubber/ESP alternative.

Temperature of the stack gases for the Wet Scrubber alternatives approximate 150°F whereas for the Dry Scrubber alternatives, the temperature is about 250°. To compensate for the lower temperature gases, the Wet Scrubber alternatives provide for additional reheat of stack gases relative to the reheat used in the Dry Scrubber systems.

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TABLE 3 - 7 (Sheet 1 of 2)

WET SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM COSTS
 700 TPD UNIT

1. EMISSION LIMIT, GRAINS/DSCF @ 12% CO2	0.03
2. REMOVAL EFFICIENCY, PERCENT	99.00
3. PARTICULATE REMOVED, TPY (NOTE 1)	5861
4. CONSTRUCTION COST	\$5,220,000
5. BONDING FACTOR (NOTE 4)	1.6
6. CAPITAL COST (5X4)	\$8,480,000
7. CAPITAL RECOVERY FACTOR (20 YEARS TERM AT 13%)	0.14235
8. ANNUAL CAPITAL COST (7X6)	\$1,207,000
9. OPERATING AND MAINTENANCE COST	
A. ELECTRICITY (3.6 MILLION KWH @ 5 CENTS)	\$180,000
B. WATER (80 GPM @ \$0.7/1000 GAL)	\$29,000
C. LABOR (9 MEN; 2.25 PER SHIFT @ \$30,000)	\$270,000
D. MAINTENANCE	\$104,000
E. LIME, 2200 TPY @ \$150/TON	\$330,000
F. WASTE HANDLING & DISPOSAL (5861 TPY TSP; +2200 TPY LIME; 863 TPY SO2 & HCL; AT \$10/TON) (NOTE 2)	\$89,000
G. REHEAT STEAM (10 MMBTUH @ \$6/MMBTU)	\$524,000
TOTAL OPERATING & MAINTENANCE COST	\$1,526,000
10. TOTAL ANNUAL COST	\$2,733,000

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TABLE 3 - 7 (Sheet 2 of 2)

DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR

11. UNIT COST:

PER TON MSW (260,000 TPY)	\$10.51
PER TON RDF (182,000 TPY)	\$15.02
PER TON PARTICULATE (5861 TPY)	\$466.30
PER TON PARTICULATE & ACID GAS (6724 TPY)	\$406.45

NOTE:

1. PARTICULATE REMOVED ANNUALLY BY DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM

= 21400 TPY UNCONTROLLED TSP X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .989 EFFICIENCY = 5861 TPY
2. DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM ALSO REMOVE ACID

GAS, SO₂ REMOVED ANNUALLY BY DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR
SYSTEM = 2957 TPY UNCONTROLLED SO₂ X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .7 EFFICIENCY = 573 TPY

HCL REMOVED ANNUALLY BY DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR
SYSTEM = 1150 TPY UNCONTROLLED SO₂ X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .9 EFFICIENCY = 287 TPY

HF REMOVED ANNUALLY BY DRY SCRUBBER AND ELECTROSTATIC PRECIPITATOR SYSTEM
= 13.2 TPY UNCONTROLLED SO₂ X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .9 EFFICIENCY = 3 TPY

TOTAL ACID GAS REMOVED = 863 TPY
3. TOTAL PARTICULATE & ACID GAS REMOVED = 6724 TPY
4. SAME AS NOTE 2, TABLE 3-3.

3.6 Alternative 3-8

Bag Filter & Wet Scrubber

Table 3-8 (Sheet 1 and 2) provide the cost development for the Bag Filter/Wet Scrubber alternative. Since the Wet Scrubber is installed downstream of the Bag Filter, a Cyclone Collector must be provided upstream of the Bag Filter, as was done for Alternative 3-4. Particulate matter and acid gas collection efficiencies for the Bag Filter/Wet Scrubber System are designed to correspond to respective efficiencies for these emissions provided in the Dry Scrubber/Bag Filter alternative.

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TABLE 3 - 8 (Sheet 1 of 2)

WET SCRUBBER AND BAG FILTER SYSTEM COSTS
 700 TPD UNIT

1. EMISSION LIMIT, GRAINS/DSCF @ 12% CO ₂	0.01
2. REMOVAL EFFICIENCY, PERCENT	99.9
3. PARTICULATE REMOVED, TPY (NOTE 1)	5915
4. CONSTRUCTION COST	\$4,990,000
5. BONDING FACTOR (NOTE 4)	1.6
6. CAPITAL COST (5 X 4)	\$7,984,000
7. CAPITAL RECOVERY FACTOR (20 YEARS TERM AT 14%)	0.15099
8. ANNUAL CAPITAL COST (7 X 6)	\$1,206,000
9. OPERATING AND MAINTENANCE COST	
A. ELECTRICITY (4.07 MILLION KWH @ 5 CENTS)	\$204,000
B. WATER (80 GPM @ \$0.7/1000 GAL)	\$29,000
C. LABOR (9 MEN; 2.25 PER SHIFT @ \$30,000)	\$270,000
D. MAINTENANCE (INCL. BAG REPLACEMENT)	\$122,000
E. LIME, 2200 TPY @ \$150/TON	\$330,000
F. WASTE HANDLING & DISPOSAL (5915 TPY TSP; +2200 TPY LIME; +863 TPY SO ₂ & HCL; AT \$10/TON) (NOTE 2)	\$90,000
G. REHEAT STEAM (10 MMBTUH @ \$6/MMBTU)	\$524,000
TOTAL OPERATING & MAINTENANCE COST	\$1,569,000
10. TOTAL ANNUAL COST	\$2,775,000

PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE-TO-ENERGY FACILITY
"REPORT ON AIR QUALITY IMPACTS ANALYSIS"
OCTOBER 5, 1985

TABLE 3 - 8 (Sheet 2 of 2)

WET SCRUBBER AND BAG FILTER SYSTEM COSTS
700 TPD UNIT

11. UNIT COST:

PER TON MSW (260,000 TPY)	\$10.67
PER TON RDF (182,000 TPY)	\$15.25
PER TON PARTICULATE (5915 TPY)	\$469.15
PER TON PARTICULATE & ACID GAS (6778 TPY)	\$409.41

NOTE:

1. PARTICULATE REMOVED ANNUALLY BY DRY SCRUBBER AND BAGFILTER SYSTEM
= 21400 TPY UNCONTROLLED TSP X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .999 EFFICIENCY = 5915 TPY
2. DRY SCRUBBER AND BAGFILTER SYSTEM ALSO REMOVE ACID GAS,
SO2 REMOVED ANNUALLY BY DRY SCRUBBER AND BAGFILTER SYSTEM
= 2957 TPY UNCONTROLLED SO2 X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .7 EFFICIENCY = 573 TPY
HCL REMOVED ANNUALLY BY DRY SCRUBBER AND BAGFILTER SYSTEM
= 1150 TPY UNCONTROLLED SO2 X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .9 EFFICIENCY = 287 TPY
HF REMOVED ANNUALLY BY DRY SCRUBBER AND BAGFILTER SYSTEM
= 13.2 TPY UNCONTROLLED SO2 X 0.83 AVAILABILITY X 1 UNIT/3 UNITS
X .9 EFFICIENCY = 3 TPY
TOTAL ACID GAS REMOVED = 863 TPY
3. TOTAL PARTICULATE & ACID GAS REMOVED = 6778 TPY
4. SAME AS NOTE 2, TABLE 3-3.

4. COMPARATIVE BACT ANALYSIS

Table 3.9 summarizes salient cost and performance factors for the six alternatives evaluated for the BACT analysis.

For each of the alternatives, the following information is displayed:

- 1) Alternative No.
- 2) Capsule System Description
- 3) Interest Rate
- 4) Construction Cost
- 5) Annual Capital Cost
- 6) Annual O & M Cost
- 7) Total Annual Cost
- 8) Unit Costs
 - a) Per Ton MSW
 - b) Per Ton RDF
 - c) Per Ton Fly Ash
Including Acid Gas Products

In addition, an Incremental Analysis (9) is performed to evaluate incremental benefits of the more advanced and costlier systems relative to the baseline, taken to be Alternative 3-3, the Electrostatic Precipitator.

A unique approach was used in the analysis in order to provide a basis for factoring System Reliability in evaluating alternative technologies. This was done by assigning different interest rates to alternative systems based on a judgement as to relative riskiness of the technology, considering its track record. This is akin to a Standard & Poors or Moody rating being assigned to capital projects which, along with market forces, determines interest rates on a bond issue.

For example an interest rate of 11% was used to calculate Annual Capital Cost for the proven ESP technology, whereas 12% was used for Bag Filter technology. When the risk of Bag Filter operation was compounded by the

complexity of a Dry Scrubber addition, interest rate for the alternative rose to 13%. With a Wet Scrubber addition to the Bag Filter, an appropriate interest rate was judged to be 14% and so forth.

5. UNIT COSTS

Unit cost are useful in comparing alternatives, particularly in line item 8c, where comparison are made for cost portion of pollutant removed including acid gas as well as particulate matter.

6. RANKINGS

Based on the data, ranking of alternatives are developed as follows:

<u>Rank #</u>	<u>Alternative</u>	<u>System Description</u>
1	3-3	ESP
2	3-4	BF
3	3-5	Dry Scr./ESP
4	3-6	Dry Scr./BF
5	3-7	ESP/Wet Scr.
6	3-8	BF/Wet Scr.

7. INCREMENTAL ANALYSIS

Incremental analysis was performed to determine incremental cost for:

- (a) Improved particulate matter (PM) collection of the BF relative to the ESP and
- (b) Improved PM and acid gas collection of the Dry Scr/ESP alternative relative to the PM collection of the BF alone.
- (c) Improved PM and acid gas collection of the Dry Scr./ESP alternative relative to the PM collection of the ESP alone.

For case (a), the BF Alternative 3-4 is seen to have the capabilities of

collecting an additional 54 TPY of PM at an incremental annual cost of \$67,000 relative to Alternative 3-3. This affords a unit cost of \$1240.74 for each ton of additional PM and compares unfavorably to the \$131.72 per ton PM unit cost for ESP alone (Alternative 3-3).

For case (b), the Dry Scrubber/ ESP Alternative 3-5 is seen to have the capabilities of collecting an additional 809 TPY of combined PM and acid gas products at an annual cost of \$1,497,000 relative to Alternative 3-4. This affords a unit cost of \$1,850.43 for each ton of additional PM and acid gas collected and compares unfavorable to the \$141.84 per ton PM unit cost for the BF Alternative 3-4.

For case (c), the Dry Scrubber ESP Alternative 3-5 is seen to have the capabilities of collecting an additional 863 TPY of combined PM and acid gas products at an incremental annual cost of \$1,564,000 relative to Alternative 3-3. This affords a unit cost of \$1812.28 for the acid gas collected and may be difficult to justify since the Air Quality Analysis shows that acid gas concentrations in ambient air pose no danger to public health.

8. BACT, CALIFORNIA VS. FLORIDA

The BACT analysis, required by PSD review, addresses energy, economic and environmental impacts for alternative emission control strategies. BACT is defined in the 40 CFR 52.21 as "An emission limitation based on the maximum degree of reduction of each pollutant emitted which the Department, taking into account, energy environmental and economic impacts and other costs, production processes and available methods, system, and techniques, for control of each pollutant".

Although the stagnant ambient air conditions of California may give case for CARB's definition of BACT to include scrubbers and bag filters, it has not been demonstrated that they are needed in well-ventilated Florida environs. A moderate approach to defining BACT for a locality should take into account background levels, planned new facilities and meteorological conditions. This in fact has been done in the Air Quality

Analysis performed with the conclusion that emissions from the proposed facility will not adversely impact ambient air quality.

TABLE 3-9

BACT ANALYSIS OF ALTERNATIVE AIR POLLUTION CONTROL SYSTEMS
FOR 700 TPD RDF-FIRED SPREADER STOKER BOILER

1. Alternative No.	3-3	3-4	3-5	3-6	3-7	3-8
2. APC System Descr.	ESP	BF	Dry Scr/ESP	Dry Scr/BF	ESP/Wet Scr.	BF/Wet Scr.
3. Interest Rate **	11%	12%	12%	13%	13%	14%
4. Construction Cost	\$2,300,000	\$2,070,000	\$5,300,000	\$5,000,000	\$5,220,000	\$4,990,000
5. Annual Capital Costs	462,000	443,000	1,135,000	1,139,000	1,207,000	1,206,000
6. Annual O & M	310,000	396,000	1,201,000	1,241,000	1,526,000	1,569,000
7. Total Annual Cost	772,000	839,000	2,336,000	2,380,000	2,733,000	2,775,000
8. Unit Costs:						
a) Per Ton MSW	\$2.97/Ton	\$3.23/Ton	\$8.98/Ton	\$9.15/Ton	\$10.51/Ton	\$10.67/Ton
b) Per Ton RDF	\$4.24/Ton	\$4.61/Ton	\$12.84/Ton	\$13.08/Ton	\$15.02/Ton	\$15.25/Ton
c) Per Ton Fly Ash*	\$131.72/Ton	\$141.84/Ton	\$347.41/Ton	\$351.14/Ton	\$406.45/Ton	\$409.41/Ton
9. Incremental Analysis	Rank #1	Rank #2	Rank #3	Rank #4	Rank #5	Rank #6
A. Total Annual Cost	\$772,000	\$839,000	\$2,336,000	\$2,380,000	\$2,733,000	\$2,775,000
B. Total Annual Cost of Next Lowest #Rank	-	772,000	839,000	2,336,000	2,380,000	2,733,000
C. = (A - B)	-	\$67,000	\$1,497,000	\$44,000	\$353,000	\$42,000
D. Fly Ash* Collected	5,861 TPY	5,915 TPY	6,724 TPY	6,778 TPY	6,724 TPY	6,778 TPY
E. Fly Ash* Collected in Next Lowest# Cost Rank	-	5,861 TPY	5,915 TPY	6,724 TPY	6,778 TPY	6,724 TPY
F. (D - E)	-	54 TPY	809 TPY	54 TPY	-54 TPY	54 TPY
G. = (A - B) ÷ (D - E)	-	\$1,240.74/Ton	\$1,850.43/Ton	\$814.81/Ton	-\$6,537.04/Ton	\$777.77/Ton
H. Total Annual Cost of 2nd Next Lowest# Rank	-	-	\$772,000			
I. Fly Ash* Collected in 2nd Next Lowest #Rank	-	-	5,861 TPY			
J. = (A - H)	-	-	\$1,564,000			
K. = (D - I)	-	-	863 TPY			
L. = (A - H) ÷ (D - I)	-	-	\$1,812.28 Ton			

* Including Acid Gas Fly Ash

** Interest Rate Proportioned to Technology Risk

BACT = Best Available Control Technology

ESP = Electrostatic Precipitator

BF = Bag Filter

Scr. = Scrubber

SECTION III
RESPONSE TO
FDER QUESTIONS 7, 8, 9, & 10

ON

- (7) HOSPITAL WASTE
- (8) ANNUAL EMISSIONS
- (9) AIR QUALITY RECEPTORS
- (10) TECHNICAL & ADMINISTRATIVE REVIEW PROTOCOL

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III-i

PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE - TO - ENERGY FACILITY
REPORT ON AIR QUALITY IMPACTS ANALYSIS
RESPONSE TO FLORIDA DER SUFFICIENCY REVIEW

QUESTION NO. 7 - ON HOSPITAL WASTE:

Will any hospital waste or "red bag" waste be incinerated at this facility? If so, please quantify the amounts, composition, and the source of these materials.

Response:

As noted in *Vol. I - Application, Chapter 3 Page 3.2, Paragraph 1:

"Pathological, biological and other hazardous wastes will not be processed at this facility."

QUESTION NO. 8 - ON ANNUAL EMISSIONS:

Verify and correct, if necessary, the tons per year emissions contained in the air permit application.

Response:

The only correction required is to the Lead emissions as explained in Section I, page I-19 of this Supplemental Report. Table 4-1 from *Vol. I - Application is included herewith as Exhibit III-1 on page III-2 of this Section III of the Supplemental Report.

*Palm Beach County, Florida Solid Waste Resource Recovery Facility
Application for Power Plant Site Certification dated April, 1985.

TABLE 4-1 (Revised as of October 18, 1985)

CONTROLLED EMISSION FACTORS DEVELOPMENT FOR RDF FIRED SPREADER STOKER FURNACES

(ANNUAL AVERAGE BASED ON 1800 TPD RDF FIRED)

POLLUTANT	LBS/TON RDF	LBS/HR	TONS/YEAR	GM/SEC @ 1800 TPD	G /SEC @ 2100 TPD
CARBON MONOXIDE	12.0	900.	3942.	113.	132
NITROGEN DIOXIDE	4.0	300.	1314.	37.8	44.1
SULFUR DIOXIDE	9.0	675.	2957.	85.1	99.3
CHLORIDES	3.5	263.	1150.	33.1	38.6
VOLATILE ORGANIC COMPOUNDS	.20	15.0	65.6	1.89	2.21
PARTICULATE MATTER	.65	48.8	214.	6.14	7.16
SULFURIC ACID MIST	.0004	.030	.131	.0038	.0044
FLUORIDES	.04	3.00	13.2	.38	.44
LEAD	.014	1.05	4.6	.132	.154
MERCURY	.003	.225	.98	.0284	.0331
BERYLLIUM	9.0 E-06	6.8 E-04	3.0 E-03	8.5 E-05	9.9E-5
2,3,7,8-TCDD	8.5 E-08	6.4 E-06	2.8 E-05	8.0 E-07	9.3E-7

QUESTION NO. 9 - ON AIR QUALITY RECEPTORS:

Tables 5-9 A through F of appendix 10.1.5 contain results of the highest, second high modeled concentrations for the proposed facility. These results include values at a distance of 730 meters from the center of the facility. The modeled runs, however, do not include any receptors at this distance. Please explain.

Response:

It is noted in Vol. IV - Air Quality, Appendix 10.1.5 on Prevention of Significant Deterioration, page 56, paragraph 5.6 of the Report on Air Quality Impacts Analysis, (Revised March, 1985) that a series of computer runs were made for screening purposes. The results of these runs were not documented other than to note that (5.6.1) maximum impacts were identified at distances of 571, 926, 1046 and 1615 meters from the proposed source based on atmospheric stability.

An initial series of runs of the ISCST and ISCLT models were made for 26 concentric rings distances from the source for every 6° azimuth. The closest rings were those indicated above as distances of maximum impact based on the screening model. These runs did not, however, include the closest boundary distance of 730 meters. The results of these runs have been compiled and submitted to the FDER. At the suggestion of the FDER, a second series of computations were made specifically, to develop the impacts at 730 meters (closest point of the source to its boundary line). These data were not documented in appendices because of the massive paper volume, but rather, the outputs were used by the computer to create the tabular listings of Tables 5-9A through F directly. The closest boundary line ring of 730 meters was also used in the model runs that included three (3) existing local sources. These data were restricted azimuth intervals in 1° increments ± 5° downwind of the source on centerline bearing over the proposed facility. These data were made available in the complete Appendices.

QUESTION NO. 10 - ON TECHNICAL & ADMINISTRATIVE REVIEW PROTOCOL:

EPA informed us very recently that The Power Plant Act is not totally compatible with their rules and they are going to rescind our delegation of sources subject to PSD PPS. The county needs to be informed of such and they must send a letter to me requesting that we perform the Technical and Administrative review for EPA so that they can issue a federal PSD permit.

Response:

Palm Beach County Solid Waste Authority is pleased to have the State of Florida Department of Environmental Regulation (FDER) perform the Technical and Administrative review of our Application. As requested, Authority Executive Director, Tim Hunt, Jr. will request this review in a letter to be addressed to the attention of Clair Fancy of the FDER.

SECTION IV

RESPONSE TO

NATIONAL PARK SERVICE REVIEW

SECTION IV

RESPONSE TO

NATIONAL PARK SERVICE

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SECTION IV
RESPONSE TO
NATIONAL PARK SERVICE

List of Exhibits

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RESPONSE TO
NATIONAL PARK SERVICE REVIEW

1. AIR QUALITY IMPACT

It is noted that the proposed facility is not mass burn but controlled burn of refuse derived fuel (RDF) in spreader stoker furnaces. Refuse will be prescreened for salvage material including metals. The project will have an ultimate design capacity for combusting 2100 TPD RDF, with an initial installation of two (2) 700 TPD furnace/boiler systems.

The suggested application of emission standards developed for the stagnant atmospheric conditions prevalent for the State of California to the well ventilated lower east coast of Florida may not be appropriate. Air pollution potential studies over a three to six year period (Zimmerman J. Forecasting Air Pollution Potential, Meteorological Aspects of Air Pollution, TRAINING COURSE MANUAL in AIR POLLUTION, 411, Feb. 1969 Revised.) have shown most of Florida, including Palm Beach County to have a zero potential for advisory days of high air pollution. Mean morning and afternoon mixing heights are estimated at 800 and 1375 meters respectively for Palm Beach as compared to 600 and 800 meters for coastal California (Holtzman, G.C. Mixing Heights, Wind Speeds and Potential for Urban Air Pollution Throughout the Contiguous United States, AP-101 NTIS:PB207103, 1972). The region is not subject to recirculation but rather, prevailing easterly winds. With respect to projected impacts from the proposed source on the Everglades National Park, it is noted that the park is southwest of the source at a distance of 120 km at its closest point. The 5-year average frequency northeast wind (required for impaction) is 4.17% with an annual average speed of 5.7 m/s. For impaction to occur therefore, steady state winds and stability would have to persist for more than 6 consecutive hours. The total percentage of northeast winds with stability classes 5 and 6 would represent less than 53 hours/year.

1.1 Ozone Levels

With relation to ozone levels, it has been noted in Volume I-Application, Chapter 2, Table 2.3-13, that if all the VOC from the proposed facility were converted to e.c. ozone, the highest second highest impact would be 3 ug/m^3 or less than 1.3% of the Air Quality Standard of 235 ug/m^3 and this impact would be within the facility boundaries.

1.2 Visibility

A visibility screening analysis has been performed based on the instructions for Level-1 Screening Analysis, as available in Latimer and Ireson, Workbook for Estimating Visibility Impairment, Draft, July 1980. The absolute values of the contrast parameters obtained were significantly less than the critical level of 0.1 for the distance of 120 km from the proposed facility (see Exhibit I).

1.3 SO₂ Impact

Annual impact analyses for SO₂ at a distance of about 53.7 km were less than 0.12 ug/m^3 for winds from an 048 - 036° sector. This represents approximately 10% of the concentration level considered as significant.

Projected impacts of SO₂ from the proposed facility on the Everglades National Park at a distance of 120 km on a bearing line of 228° were calculated assuming an exponential decrease in concentration with an exponential increase in downwind distance. For combined sources, a similar impact can be generated with the same assumption but based on impact concentrations at a distance of 9.796 km bearing 232° and 24.563 km bearing 249°, assuming these locations are in-line. The results of these analyses are presented in EXHIBIT II.

The highest projected impacts from the proposed facility are only 3.6%, 12.4% and 17.8% of the EPA designated significant impact levels for annual, HSH 24-hour and HSH 3-hour averaging periods respectively.

EXHIBIT I

SCREENING ANALYSIS
VISIBILITY LEVEL ONE

DIST. TO LVL. I AREA
120. KM
BCKGND VISUAL RANGE
40. KM
SIGMA Z AT STAB: F
100. M
MASS EMISSIONS: MTPD
0.531 QPAR
3.265 QNOX
7.348 QSO2

OPTICAL THICKNESS:
0.00885 PART
0.00925 NO2
0.00431 ASOL

CONTRAST PARAMETER:
-0.000883 CSKY
-0.000008 CTER
0.001581 CS/T



EXHIBIT II
SULFUR DIOXIDE
PROJECTED IMPACT ON EVERGLADES NATIONAL PARK
(Bearing 228°, 120 km)

YEAR	AVERAGING TIME	SIGNIF. IMPACT	CONCENTRATION (ug/m3)			CONTRIB. OF RDF %
			MAX. PSD ¹	PROPOSED RDF ²	RDF & EXISTING SOURCES ²	
1970	HSH 3-HR	25	25	2.78	43.0	6.5
	HSH 24-HR	5	5	0.33	7.7	4.4
	ANNUAL	1	2	0.025	2.3	1.1
1971	HSH 3-HR	25	25	4.46	17.3	25.7
	HSH 24-HR	5	5	0.58	18.1	3.2
	ANNUAL	1	2	0.023	1.6	1.4
1972	HSH 3-HR	25	25	2.96	8.2	36.2
	HSH 24-HR	5	5	0.55	5.9	9.4
	ANNUAL	1	2	0.036	1.8	2.0
1973	HSH 3-HR	25	25	2.70	11.2	24.1
	HSH 24-HR	5	5	0.35	4.8	7.3
	ANNUAL	1	2	0.023	1.8	1.3
1974	HSH 3-HR	25	25	0.89	1.6	56.9
	HSH 24-HR	5	5	0.62	3.7	16.7
	ANNUAL	1	2	0.028	1.8	1.5

NOTE 1 : Class I

NOTE 2 : Based exponential decay of concentration with downwind exponential increase of distance.

On the basis of these analyses, the proposed RDF source cannot be considered significant relative to the projected impact of sources already in existence.

2. BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

Best Available Control Technology (BACT) analysis and the related issues of pollutant emissions are covered in the following Sections of this Supplemental Report:

Section I Emission Factors

Section II Best Available Control Technology

3. COMPARATIVE EMISSIONS FOR
PALM BEACH AND BROWARD COUNTIES

Emission Factors for the proposed 3300 TPD mass burn facility for Broward County and the 1800 TPD RDF (annual average for ultimate design) plant at Palm Beach are derived from the Tons per Year emissions of pollutants from the listing given in the National Park Service review of the Palm Beach County Solid Waste Authority Power Plant Site Certification Application. These derived Emission Factors are displayed as follows:

	<u>Emission Factors (lb/ton)</u>	
	<u>Palm Beach</u>	<u>Broward</u>
SO ₂	9	5.7
NO _x	4	5.8
CO	12	0.92
PM	0.65	0.76
Lead	0.0014	0.3105
Flourides	0.0400	0.2590
Sulfuric Acid Mist	0.0004	0.0287

The Palm Beach Emission Factors for the pollutants listed are in agreement with the Emission Factors given in Table 4-1 of Reference "F". (See Section I, page I-1 of this Supplemental Report). With the exception of the Emission Factor for Lead, they are to remain unchanged. (See Section I, page I-19 for discussion of proposed revision to Lead Emission Factor).

A discussion of the Emission Factors of Palm Beach relative to those of interest to the National Park Service follows:

3.1 SO₂ Emission Factors

3.1.1 Palm Beach RDF System

Basis for the Palm Beach County SO₂ Emission Factor of 9.0 lb/ton is given in Section I, page I-14 of this Supplemental Report. The 9.0 lb/ton factor assumes all of the sulfur in the RDF fuel is completely converted to SO₂.

3.1.2 Broward Mass Burn System

In general, the SO₂ emissions data base for mass burn waterwall facilities indicates lower emissions relative to RDF systems. This is attributed to more of the sulfur in the refuse fuel remaining in the bottom ash instead of being converted to SO₂ stack emissions. Accordingly the 5.7 lb/ton Emission Factor for the proposed Broward County mass burn facility appears reasonable relative to the 9.0 lb/ton Emission Factor for the Palm Beach RDF spreader stoker plant.

3.2 NO_x Emission Factors

3.2.1 Palm Beach RDF System

Basis for the Palm Beach County NO_x Emission Factor of 4.0 lb/ton is given in Section I, page I-17 of this Supplemental Report. The

NO_x Emission Factor is derived from the RDF Fired Spreader Stoker emission rates given in Exhibit 4-5, page I-18 taken from Reference "A".

3.2.2 Broward Mass Burn System

In like manner, the NO_x Emission Factor for the Broward Mass Burn system may be derived from the mass burn waterwall emission rates, also given in Exhibit 4-5, as follows:

UNCONTROLLED NO_x EMISSION IN LB/1.0E6 BTU = 0.07 TO 0.42

Assuming 4,500 BTU/LB for Refuse, Convert LB/1.0E6 to LB/Ton

$0.07 \text{ LB/1.0E6 BTU} \times 4,500 \text{ BTU/LB} \times 2,000 \text{ LB/Ton} = 0.63 \text{ LB/Ton}$

$0.42 \text{ LB/1.0E6 BTU} \times 4,500 \text{ BTU/LB} \times 2,000 \text{ LB/Ton} = 3.78 \text{ LB/Ton}$

Therefore,

Uncontrolled Total NO_x Emission in LB/Ton = 0.63 to 3.78

The 5.8 LB/Ton Emission Factor proposed by Broward is a conservative overstatement of the emission levels that may be expected based on the data given in Exhibit 4-5 for the mass burn waterwall system.

3.3 CO Emission Factors

3.3.1 Palm Beach RDF System

Basis for the Palm Beach County CO Emission Factor of 12 lb/ton is given in Section I, pages I-6 and I-7 of this Supplemental Report.

3.3.2 Broward Mass Burn System

CO Emission Factors reported in the literature are generally, but not always, lower for mass burn systems relative to RDF. Exhibit III, taken from a recently published paper, illustrates some of the variations for stack tests performed at two RDF facilities (Hamilton and Albany) and two mass burn facilities (Chicago and Hampton). The exhibit shows that CO emissions is sensitive to O_2 concentrations, indicative of excess air variations. The Hampton II and III tests indicate that a wide divergence of CO emissions performance is possible on a mass burn system, shown in Exhibit III to be sensitive to O_2 concentrations. The Albany and Hampton III coinciding plot of test data illustrates that equally good CO emissions performance can be obtained with RDF and mass burn systems when proper combustion and air supply conditions are maintained.

In order to estimate a CO Emission Factor that may be appropriate for the Broward mass burn waterwall facility, reference is made to Exhibit 4-3.1 (Section I, page I-8), where the following is noted:

Uncontrolled CO Emission in LB/1.0E6 BTU = 0.15 to 2.0

Assuming 4500 BTU/LB for Refuse, convert LB/1.0E6 to LB/Ton

$0.15 \text{ LB/1.0E6 BTU} \times 4500 \text{ BTU/LB} \times 2000 \text{ LB/Ton} = 1.35 \text{ LB/Ton}$

$2.0 \text{ LB/1.0E6 BTU} \times 4500 \text{ BTU/LB} \times 2000 \text{ LB/Ton} = 18.00 \text{ LB/Ton}$

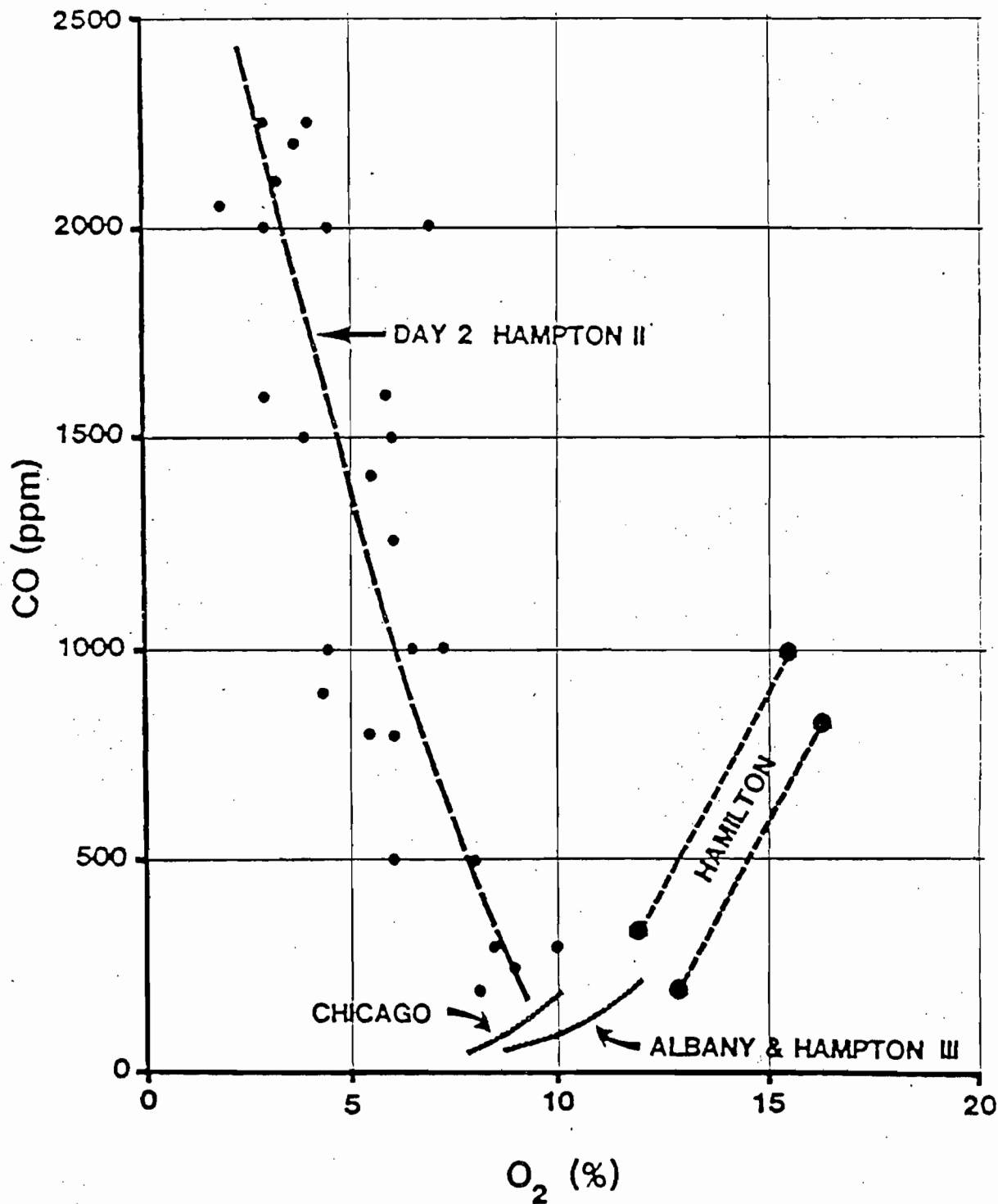
Therefore

Uncontrolled Total CO Emission in LB/Ton = 1.35 to 18.00

Whereas the 0.92 lb/ton Emission Factor (equivalent to 73 ppm) for CO emissions proposed by Broward County appears low, nevertheless this level of performance has been achieved under optimum

EXHIBIT III

CARBON MONOXIDE AND OXYGEN IN EMISSIONS FROM FIVE STACK TESTS



Source: "Best Available Control Technology For Polychlorinated Dibenzo-P-Dioxins And Polychlorinated Dibenzo-P-Furans from Municipal Waste Combustion" F. Hasselriis October, 1985

conditions of operation. See Exhibit III of this Section IV and also Exhibit 4-3.2 on page I-9 of Section I.

3.4 PM Emission Factors

3.4.1 Palm Beach RDF System

Basis for the Palm Beach County PM Emission Factor of 0.65 lb/ton is given in Section I, page I-2 of this Supplemental Report. The PM Emission Factor of 0.65 lb/ton derived from the RDF Fired Spreader Stoker emission rates given in Exhibit 4-1, page I-3 taken from Reference "A".

3.4.2 Broward Mass Burn System

In similar fashion, the PM Emission Factor for the Broward Mass Burn system may be derived from the mass burn waterwall emission rates, also given in Exhibit 4-1 as follows:

ASSUME THE BROWARD COUNTY AIR POLLUTION CONTROL SYSTEM WILL COLLECT SUFFICIENT PM SO AS NOT TO EXCEED A GUARANTEED GRAIN LOADING OF 0.03 GRAINS/DSCF AT 12% CO₂. THIS EMISSION LEVEL IS PRESUMED TO REPRESENT BACT FOR TSP.

FROM REFERENCE "A", TABLE 29, (EXHIBIT 4-1) UNDER MASS BURNING WATERWALL SYSTEMS,

UNCONTROLLED PM EMISSION IN GRAINS/DSCF, 12% CO₂ = 0.83 TO 2.05 = 1.44 (AVERAGE); % REMOVAL EFF. TO OBTAIN 0.03 GR/DSCF ASSUMING GRAIN LOADING OF 1.75 GR/DSCF = $100 (1 - \frac{0.03}{1.75}) = 98.3\%$

UNCONTROLLED PM EMISSION IN LB/1.0E6 BTU = 1.27 TO 7.32 = 4.30 (AVERAGE)

CONVERT LB/1.0E6 BTU TO LB/TON, $4.30 \text{ LB/1.0E6} \times 4500 \text{ BTU/LB} \times 2000$
 $\text{LB/TON} = 38.7 \text{ LB/TON}$

AFTER 98.3% REMOVAL BY ESP,

CONTROLLED PM EMISSION = $38.7 \times (1 - .983)$
= 0.658 LB/TON

The Broward County Emission Factor for PM calculated to be 0.658 lb/ton, which is slightly lower than the 0.76 lb/ton value shown on page IV-6 for Broward and compares favorably with the 0.65 lb/ton Emission Factor given on page IV-6 for Palm Beach.

3.5 Lead Emission Factors

3.5.1 Palm Beach RDF System

As noted above, based on analysis presented in Section I, page I-19 of this Supplemental Report, it is proposed that the 0.0014 lb/ton Lead Emission Factor given in the Authority's initial submittal be increased by an order of magnitude to 0.014.

3.5.2 Broward Mass Burn System

The Broward Lead Emission Factor, shown above as being 0.3105 lb/ton, has been discovered (see news item Exhibit IV) to be overstated and in error by a decimal point misplacement. After correcting for the decimal point misplacement the Lead Emission Factor would become 0.03105.

The Exhibit III news item states Broward Lead Emission Factor should be 0.027 lb/ton, which is in reasonable agreement with the 0.03105 lb/ton value derived from the 187 Tons per year emission data provided in the National Park Service Technical Review.

State demands new controls for incinerator

By ANDREW FROMAN

Herold Staff Writer

PORT LAUDERDALE — State environmental officials want Broward County to install tougher pollution controls on its first garbage-burning resource recovery plant, a move that could raise the plant's operating cost \$2.4 million a year.

The improvements could add more than \$40 million — about \$2 a year for every person in Broward County — to the cost of operating the \$187 million plant over its expected 20-year life.

But Tom Henderson, the director of the county's resource recovery program, said the state's recommendations are based in part on inaccurate information from his office. He hopes to convince the state that additional pollution controls aren't necessary.

County officials intend to build two resource recovery plants at a total cost of \$521 million. If operating costs are higher than expected, garbage rates will be increased.

"You have to swallow the price because the price of continuing to endanger the water aquifer (with landfills) is too high," said County Commissioner Nicki Grossman.

State officials said their recommendations are based on research of air pollution controls at plants in California, New York and New Jersey.

"The technology in resource recovery has really come along a lot further a lot faster than many other areas. It seems people are always finding improvements," said Clair Fancy, deputy director of the Florida Department of Environmental Regulation's Bureau of Air Quality Management.

Fancy said Broward should be able to lower hydrogen fluoride, sulphuric acid mist and lead emissions by using larger or additional pollution controls.

If the DER's recommendations are accepted by Gov. Bob Graham and the Cabinet, which issues construction permits for resource recovery plants, the new equipment would have to be installed before the first load of garbage is burned.

Operating the equipment would raise the cost of burning garbage by \$2 a ton or \$6,600 a day for the 3,300 tons of garbage to be processed every day at the county's first plant at U.S. 441 and State Road 84.

Henderson hopes to convince the state that the additional equipment isn't necessary. He said the DER's recommendations are based in part on inaccurate information supplied by his office in March. Lead emissions would be .027 pounds for each ton of refuse burned, not .27

pounds as estimated. A decimal point was misplaced, he said.

Since lead emissions will be only one-tenth as high as originally estimated, there might not be a need for additional pollution controls, Henderson said.

FROM H W PALM BEACH P. 1

10.16.1985 13:39

We would expect the Palm Beach Lead Emission Factor to be about one-half of the Broward Lead Emission Factor. This is due to the removal of the lead contained in the RDF rejects which thereby reduces the concentration of lead in the RDF that is to be combusted in the proposed Palm Beach RDF spreader stoker furnace/boiler systems.

To illustrate the basis for the statement that lead emissions for the RDF combustion system would be about one-half that of the mass burn system and of the order of magnitudes given above, reference is made to paragraph 3.4 above on PM Emission Factors for Palm Beach RDF and Broward mass burn systems and also to Exhibit 4-6.4, page I-23, Section I of this Supplemental Report.

From paragraph 3.4, PM Emission Factors are as follows:

Palm Beach RDF System - 0.65 lb/ton

Broward Mass Burn System - 0.76 lb/ton

From Exhibit 4-6.4, Lead concentrations in controlled particulate emissions for RDF (Category III) and mass burn (Category II) systems are given as follows:

RDF System: 4,470 - 18,400 ppm

Mass Burn System: 18,100 - 34,200 ppm

Assuming lead concentrations on PM to be at the upper ends of the respective ranges shown for RDF and mass burn systems, the Lead Emission Factors are then derived as follows:

Palm Beach RDF System

$0.65 \text{ lb/ton} \times 18,400 \text{ ppm} = 0.012 \text{ lb/ton.}$

Broward Mass Burn System

$$0.76 \text{ lb/ton} \times 34,200 \text{ ppm} = 0.026 \text{ lb/ton}$$

The Lead Emission Factors derived above are in good agreement with Lead Emission Factors now proposed.

3.6 Fluoride Emission Factors

3.6.1 Palm Beach RDF System

Basis for the Palm Beach County Fluoride (HF) Emission Factor of 0.040 is given in Section I, page I-36 of this Supplemental Report.

3.6.2 Broward Mass Burn System

From Reference "B", page 292 (EXHIBIT V) provides the data base for estimating the Fluoride (HF) Emission Factor for the Broward Mass Burn System. Exhibit IV suggest a Fluoride Emission Factor of 0.06 lb/ton whereas Broward chose a more conservative Factor of 0.259 lb/ton.

3.7 Sulfuric Acid Mist Emission Factors

3.7.1 Palm Beach RDF System

Basis for the Palm Beach County Sulfuric Acid Mist Emission Factor of 0.0004 is given in Section I, page I-38 of this Supplemental Report.

3.7.2 Broward Mass Burn System

Because Sulfuric Acid Mist emissions derive from SO₂ emissions and

EXHIBIT V

TABLE 10 FLUORIDE EMISSIONS

Incinerator	ppm	Ref.
Owenhausen	70*	15
Berlin	4.8	31
Braintree	2.8	4
Babylon	5	12
Zurich	12	7
Dusseldorf	10	7
Average	6.4	
Std. Dev.	3.91	

*Corrected to 125 CO₂

Based on these data 6.5 ppm or 0.06 lb/ton (0.03 kg/Mg) has been chosen as a conservative estimate of fluoride emissions.

CONTROLS

Fluoride emission control is normally not required on municipal incinerators except in conjunction with acid gas control. Some of the fluoride appears to be associated with the particulate matter and therefore will be removed by the particulate control device while some is apparently present as a gas and would be removed in the acid gas scrubber. Very little fluoride removal data are available but it appears that the fluoride may be removed a little more efficiently than the hydrochloric acid.

TRACE METALS, LEAD, MERCURY, BERYLLIUM

EMISSIONS

Some of the lead in the municipal waste is emitted with the fly ash from a municipal incinerator. The amount of lead emitted will depend upon the efficiency of the particulate control system. Some reported values of lead emissions for incinerators using electrostatic precipitators for particulate control are shown in Table 11. We have chosen 34,200 µg/g (0.034 lb/lb) of particulates or 0.012 lb/ton (0.006 kg/Mg) of refuse burned as a reasonable estimate of the lead emissions.

TABLE 11 LEAD EMISSIONS

Incinerator	µg/g of Particulates	gr/dscf	Ref.
Braintree		0.0024	(5.4)
Washington, D.C.	78,000		36
Various	18,100-34,200		1
Hanilton	5,700		6
Germany	20,100		6
Average	31,200		
Std. Dev.	25,100		

Trace amounts of mercury have been found in the emissions for municipal incinerators. Values reported in the literature are shown in Table 12. Based on the listed data, an emission of 2.4×10^{-4} gr/dscf (0.55 mg/dscm) or 0.0064 lb/ton (0.0032 kg/Mg) of refuse burned was chosen as a conservative estimate of total mercury emissions.

TABLE 12 MERCURY EMISSIONS

Incinerator	µg/g of Particulates	gr/dscf	Ref.
Braintree		6.1×10^{-4} particulate 2.4×10^{-4} vapor	(.014) (.55)
Hanilton	300		6
Germany	133		6
Cont., Belgium		6.4×10^{-5} vapor	(.014)
Average	216	1.6×10^{-4}	(.037)

Few data giving emissions of beryllium from municipal incinerators were found. The only reference to beryllium emissions was for the Braintree incinerator [4] where less than 0.15 µg/g of emitted particulates was reported. Using this data, based on the particulate emissions previously cited, the emissions of beryllium are estimated to be less than 5.6×10^{-5} lb/ton (2.8×10^{-5} kg/Mg) of refuse burned.

Trace quantities of a large number of other metals have been found in the fly ash from municipal incinerators. Most of them are present in very small quantities and are of little environmental concern. Concentrations of the more toxic metals are presented in Table 13.

CONTROLS

The trace metals are minor and variable constituents of the waste. Most of the metals except for mercury appear to concentrate in the bottom ash or fly ash. Data presented by Law [38], factored for the difference in efficiency between a baffle chamber and an ESP (95 percent), indicate that most of the mercury is emitted, less than 3 percent of the volatile metals (such as lead, cadmium and zinc) are emitted and less than 1 percent of the nonvolatile metals (such as barium, chromium, and copper) are emitted.

The data indicate that an effective particulate control system is about equally effective in controlling the trace metals. It is sometimes stated that a fabric filter's high efficiency for fine particulates makes it more efficient than other devices in collecting trace metals, but there is inadequate data to substantiate such superiority.

since the Palm Beach RDF SO_2 Emission Factor is 9 lb/ton relative to the Broward Masss Burn SO_2 Emission Factor of 5.7 lb/ton, as developed in paragraph 3.1 above, we would expect a proportional decrease in the Sulfuric Acid Mist Emission Factor for the Broward Mass Burn system relative to that for the Palm Beach RDF system.

This would be calculated as follows:

SULFURIC ACID MIST
EMISSION FACTOR

$$= \frac{5.7 \text{ LB/TON (BROWARD } \text{SO}_2 \text{ FACTOR)}}{9.0 \text{ LB/TON (PALM BEACH } \text{SO}_2 \text{ FACTOR)}}$$

$$\times 0.0004 \text{ LB/TON (PALM BEACH } \text{H}_2\text{SO}_4 \text{ FACTOR)}$$

$$= 0.00025 \text{ LB/TON (BROWARD } \text{H}_2\text{SO}_4 \text{ FACTOR)}$$

Our 0.00025 lb/ton estimate for the Broward Sulfuric Acid Mist Emission Factor is approximately one-hundredth of the 0.0237 lb/ton prediction (shown in the tabulation on page IV-6) derived from the tons per year data for Broward's Sulfuric Acid Mist emissions provided in the National Park Service Technical Review.

The boiling point of sulfuric acid is 626°F. At the stack exit gas temperature of 450°F, the sulfuric acid that is formed from SO_2 , H_2O and O_2 would be an acid liquid aerosol. The acid liquid aerosol that is not absorbed on fly ash particulate and collected in the electrostatic precipitator would pass into the stack. In order to determine sulfuric acid mist emissions, the stack gases would be isokinetically sampled. As the sampled gas/aerosol mixture is drawn through the sampling nozzle and passes through the sampling train, the gas/aerosol mixture is cooled and additional sulfuric acid is formed from the SO_2 , O_2 and H_2O in the

gas stream, with the already-formed sulfuric acid aerosol possibly acting as a seed. The quantity of sulfuric acid transformed from SO_2 , O_2 and H_2O in the sampling train may far exceed the sulfuric acid already formed before the sampled gas/aerosol mixture passed into the sampling nozzle. Thus the sulfuric acid concentration, as determined by analyzing the sulfuric acid in collection flasks of the sampling train, may not be representative of the concentration of sulfuric acid in the gas stream at the sampling nozzle. In-situ measurements of SO_2 and O_2 at the sampling nozzle locations may be used to correct and adjust for sulfuric acid formation in the sampling train, but it is not clear from the test data available if these corrections/adjustments were in fact part of the test sampling protocol. If they were not, the reported test results would necessarily be suspect as to its validity

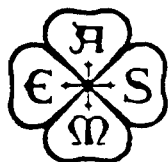
The chemistry of SO_2 precipitation to sulfuric acid mist is a complex, highly variable process whether the precipitation occurs within the plant furnace/boiler/air pollution control system, in a stack test sampling train or in the atmosphere (the "acid rain" phenomenon). Researchers in this field have shown wide divergence in findings and predictions. The second order of magnitude disparity between Emission Factor estimates made for Palm Beach and Broward County may indeed be considered good agreement in view of the present constraints on "state-of-the-art" comprehension of the subject.

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EMISSIONS AND EMISSION CONTROL IN MODERN MUNICIPAL INCINERATORS

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ABSTRACT

This paper presents a compilation of data on the mass burning of municipal wastes in waterwall incinerators. Emissions data from the literature are presented, with emphasis on typical emission rates for modern incinerators. The typical emission rates presented will be useful for predicting the expected emissions and environmental impacts of proposed municipal incinerators, thereby aiding in the determination of the applicability of various regulations and the necessity for the installation of control equipment. Control technology is briefly reviewed with emphasis on the best control technology available to reduce emissions which may be cited by regulatory authorities to set the Lowest Achievable Emission Rate (LAER), or the Best Available Control Technology (BACT).

INTRODUCTION

The incineration of municipal solid waste generates a number of air pollutants including particulate matter, hydrogen chloride, oxides of nitrogen and sulfur, carbon monoxide, hydrocarbons and small to trace quantities of many other materials. Battelle has compiled the emissions reported for a number of municipal incinerators. These data, for the most part, represent the emissions from incinerators mass-burning municipal refuse on a grate in a waterwall furnace using an electrostatic precipitator (ESP) for emissions control — Rinaldi's [1] category II incinerator — although other types

are occasionally cited. In general, there was no attempt to screen referenced data for adequacy or completeness. If sufficient data were available to convert the reported data to standard forms comparable with other presented data, the conversion was made; if not, the data are presented as reported in the original reference. The reader can then, if he chooses, make use of these data by applying "average" conversion factors with full knowledge of the probable accuracy of such a conversion. With these data, Battelle has used its best engineering judgment to make reasonably conservative estimates of the emissions from a modern waterwall municipal incinerator which may be used during the preliminary design and permitting activities to predict the emissions from a proposed incinerator and to aid in determining the applicability of various regulations and the necessity for installing control equipment.

Municipal incinerators are normally located near metropolitan areas to minimize the costs of waste transportation. Unfortunately, these areas are frequently "nonattainment" for at least one of the air pollutants for which the incinerator is a major source (normally SO_2 , NO_x , CO, and Particulates), thus forcing the incinerator operator to consider both the Emissions Offset Ruling, and Prevention of Significant Deterioration (PSD) regulations when applying for an air pollution permit.

Major facilities locating within nonattainment areas are required by the Emissions Offset Interpretive Ruling (40 CFR 51 Appendix S) to meet the Lowest Achievable Emission Rate (LAER) for those pollutants, for which the area is nonattain-

ment, which are emitted in significant quantities. (Refer to Table 1.) LAER is defined as the lowest of the most stringent limitation contained in any state implementation plan unless it can be shown to be unattainable or, the most stringent emission limitation achieved in practice by such category of source.

TABLE 1 SIGNIFICANT QUANTITIES FOR PSD AND EPA EMISSION OFFSET RULING

Pollutant	Quantity, Ton/yr
Carbon Monoxide	100
Nitrogen Oxides	40
Sulfur Dioxide	40
Particulates	25
Ozone	40
Lead	0.6
Asbestos	0.007
Beryllium	0.0004
Mercury	0.1
Vinyl Chloride	1
Fluorides	3
Sulfuric Acid Mist	7
Hydrogen Sulfide	10
Total Reduced Sulfur	10

Large incinerators, emitting over 100 tons (90 Mg) per year of a regulated pollutant, and constructed in an area which is an attainment area for some pollutants, are required by the PSD regulations to install the best available control technology (BACT) for each pollutant that is subject to regulation and which is emitted in significant quantities. BACT is defined as an emission limitation based on the maximum degree of reduction of each pollutant achievable for such source through application of available techniques taking into account energy, environmental and economic impacts, and other costs.

LAER can be established by the transfer of control technology from another class of source or from pilot tests if feasible [2]. As of early 1981, there was no record in EPA's LAER clearinghouse of any determination of LAER for a municipal incinerator; however, it is not mandatory that the clearinghouse be notified of such a determination.

To derive emission factors from the commonly reported pollutant concentrations in the stack gas, it is necessary to relate the flue gas flow rate to the waste burning rate. Flue gas flow rates from mass-

burning municipal incinerators reported in the literature are shown in Table 2.

TABLE 2. FLUE GAS RATES

Incinerator	Eg DFC Kg feed	dscfm Tph	W-PPC Kg feed	% CO ₂	Ref.
Harrisburg	5.89	2760	(5160)	9.3	3
Braintree		2440	(4550)	6.7	4
Chicago MW	6.180	2760	(5170)	9.6	5
Average		2650	(4910)	8.5	

An arbitrary conservative bias of about 15 percent has been built into all emission factor calculations by the choice of a flue gas rate of 3,000 dscfm/tp of feed (5,600 dscm/Mg). This rate was assumed to correspond to an 8 percent CO₂ concentration in the stack gas for the purpose of correcting the emissions to 12 percent CO₂, where required.

PARTICULATES

EMISSIONS

Particulate emissions reported in the literature for mass-burning municipal incinerators using electrostatic precipitators for particulate control are shown in Table 3 and Table 4. The federal new source performance standard for municipal incinerators is 0.08 gr/dscf (180 mg/dscm*) corrected to 12 percent CO₂; however, considering the trends in emissions control requirements over the past several years and recent bids by equipment vendors, a controlled particulate loading of 0.020 gr/dscf (46 mg/dscm) corrected to 12 percent CO₂ was selected as being, in our best engineering judgement, the lowest emission level that can be reliably obtained by a state-of-the-art electrostatic precipitator over the long term. It was also the lowest value that equipment vendors were willing to guarantee for a long period of time in a recent procurement; however, lower values could be guaranteed on a one time, new equipment performance test basis [17, 18]. On this basis, the incinerator will have a particulate emission rate of 0.34 lb/ton (0.17 kg/Mg).

CONTROLS

Maryland appears to have the most stringent emission limitation in the U.S. at 0.03 gr/dscf (69 mg/dscm) corrected to 12 percent CO₂, but in this

* Dry standard cubic meter.

TABLE 3 UNCONTROLLED PARTICULATE EMISSIONS AND
ESP EFFICIENCIES FOR MUNICIPAL INCINERATORS

Incinerator	Uncontrolled gr/dscf @ 12% CO ₂ (lb/Ton)	Controlled gr/dscf @ 12% CO ₂ (lb/Ton)	ESP Eff	Ref.
Harrisburg #1	1.14-2.08	0.058-.089	94.9-95.7	6
"	1.132-2.602 av 1.733 (20)	0.039-.083 av 0.0559	96.8	3
Harrisburg #2	1.14-2.62	0.046-.089	96.0-96.6	6
"	1.134-2.056 av 1.461	0.053-.084 av 0.069	95.3	3
Chicago MW	0.613-1.26 av 1.06 (23.4) (37.2)	0.027-.0634 av 0.0384 (0.55-1.15 av 0.788)	96.4 96.6	5 5 1
Braintree	0.866-1.126 av 0.973 (7.7-14.2 av 10.9) (15.3)	0.221-.256 av 0.236 (2.3-3.4 av 2.7)	73.0 75.2	4 4 1
Various European	3.38-9.75			7
Various	(30)			8
Nashville	1.196 1.406 1.141	0.024 0.0073 0.0211	98.0 99.5 98.2	6

gr/dscf x 2289 = mg/m³
lb/Ton x 0.5 = Kg/Mg

TABLE 4 CONTROLLED PARTICULATE EMISSIONS FROM MUNICIPAL INCINERATORS

Incinerator	Control	Year	gr/scf	Mg/scm
Baltimore 4	ESP*	76	.025b,9	57
Braintree	"		.108 ¹⁰ , .2b,11	247,860
Brooklyn SW	"		.073b,12, .015c,10	160,34
Chicago MW	"	71-75	.03b,10, .0229 ¹⁰ , .038ab,5 .05b,11	70,52.4,87.9 100
Dade Co. ME	"		.0272c,10	62.3
E. Bridgewater	FF**	75	.024b,9	55
Hamilton	ESP		.682b,13	1560
Harrisburg	"	73	.040 ¹⁰ , .045 ¹⁰ , .07b,11	91, 104, 200
Lexington	"		.050b	110
Montreal	"	70-71	.0133 ¹⁰ , .0799 ¹⁰	30.4, 183
Nashville	"	76	.0182b,9, .0175b,14, .0243b,14	41.7, 40.1, 55.6
Neuchatel, Switzerland	FF		.05b	100
N.Y. South Shore	ESP		.055c,10	129
Norfolk	"	76	.05b,9, .05b,11, .029b,6	100, 100, 66
Oberhausen	"		.0562b,15	129
Oceanside	"		.045b,10, .3b,10	100, 69
Ogden	"	74	.045b,9	100
Philadelphia EC	"	77	.047b,9	110
Philadelphia MW	"	76-79	.048b,9, .0168 ¹⁰ , .0247 ¹⁰ , .04b,16, .05b,16	110, 39, 57 90, 100
Quebec	"	70	.095a,10	220
Saugus	"	76	.049b,9, .025b,11	110, 57, 62
Washington, D.C.	"	73	.04b,9, .0578a,10	90, 132

(a) dry specified

(b) dry and 12 percent CO₂ specified

(c) 50 percent EA specified

* electrostatic precipitator

** fabric filter

case, it does not appear to set LAER as several incinerators have reported lower emissions. The lowest emission from a commercial incinerator that has been found to date is 0.018 gr/dscf (41 mg/dscm) corrected to 12 percent CO₂ reported for Nashville Thermal Transfer Unit 2 in 1977 [14]. This unit used a three-field electrostatic precipitator for particulate control.

Fabric filters are sometimes represented by regulating agencies as the technology that will allow incinerators to obtain particulate emissions below 0.01 gr/dscf corrected to 12 percent CO₂. We have conducted an extensive search for reports of the performance of fabric filters on municipal incinerators and were able to find only the following six pilot and two operating performance test reports. Deficiencies in some of the data and variations in operating procedures between tests make it difficult to compare the data and draw any general conclusions, however, all of the data obtained are reported to illustrate the extent of the data base.

1. Several short-term pilot tests of several types of fabric filter bags conducted at the Nashville incinerator in 1977 [19] gave emissions, apparently determined with a cascade impactor, of less than 0.001 gr/dscf (2.3 mg/dscm) at 12.9 percent CO₂. These short tests showed the emission levels that can be optimally obtained from a fabric filter; however, because of the short duration and the conditions and procedures used they are not considered to have demonstrated that those emissions can in fact be achieved in practice under normal operating conditions.

2. Unpublished results [20] from an EPA-sponsored test of a fabric filter at the Braintree, Massachusetts incinerator in 1979 gave emissions averaging 0.039 gr/dscf (89 mg/dscm) corrected to 12 percent CO₂ (0.010 to 0.096).

3. A one-bag filter test at the Pasadena, California incinerator in 1960 was reported [6] to have given 0.0009 gr/scf (2 mg/scm). Operational problems particularly with temperature excursions were reported.

4. Apitron [21] ran a small test of their electrostatically aided fabric filter on the Tonawanda, New York incinerator in 1978, producing emissions of about 0.0004 gr/dscf (0.83 mg/dscm) corrected to 12 percent CO₂. The results from this test were favorable, but the operability and economics of the system over a longer period of operation need to be demonstrated.

5. Teller Environmental Systems has run a 150 tons/day pilot (75 Mg/day) test of their chromato-

graphic dry scrubbing system using an electrostatic precipitator at Isogo Yokahama, Japan. Particulate emissions of 0.026 gr/dscf (59 mg/dscm) at 12 percent CO₂ have been reported [22]. They have also operated a 300 tons/day (150 Mg/day) dry scrubbing pilot plant with a baghouse on the Framingham, Massachusetts incinerator for about a year. They have recently revealed data showing emissions of 0.0067 gr/dscf (15 mg/dscm) [23].

Only three commercial installations of fabric filters on municipal incinerators are known. A unit on the East Bridgewater incinerator operated intermittently for several years, but is now shut down. Performance data on the unit are very sparse but an emission rate of 0.024 gr/dscf (55 mg/dscm) corrected to 12 percent CO₂ has been published [9]. Very little has been published about the units at Neuchatel, and Yverdon, Switzerland, except that the emissions at Neuchatel are approximately 0.05 gr/dscf (110 mg/dscm) corrected to 12 percent CO₂. RESCO has had a pilot unit operating at their Saugus incinerator for some time but have not yet released any data.

From these data, it appears that BACT is an ESP which should produce emissions of 0.025 gr/dscf (57 mg/dscm) corrected to 12 percent CO₂ or lower since several operating incinerators meet that level (Baltimore 4, Nashville 1, Saugus). Predicting LAER is more difficult in that only one municipal incinerator has ever reported a lower level (Nashville 2 at 0.018 gr/dscf (41 mg/dscm)). That emission rate was obtained during a test on a new clean precipitator and no further data are available to show whether that emission rate was maintained. Data from other sources indicate that efficiency is at a maximum for a new precipitator and deteriorates with time [10, 24]. A second similar precipitator and furnace at Nashville were found to be emitting 0.024 gr/dscf (55 mg/dscm) corrected to 12 percent CO₂ in a similar test. Many manufacturers of precipitators are willing to guarantee that their units will meet 0.018 gr/dscf (41 mg/dscm) initially but are normally not willing to extend the guarantee beyond the initial compliance test. At this time, there are few data to support LAER at a lower figure. The very low emissions achieved in the Nashville filter test were probably due to the choice of test conditions and procedures and are probably not achievable in commercial practice. Insufficient data are available from the Pasadena or Tonawanda tests to make any judgement as to the validity and applicability of that data. The 0.007 gr/dscf (15 mg/dscm) claimed for the Teller

system at Framingham could be used to set a lower standard if sufficient data became available to verify the figures and establish that the test conditions were appropriate.

SULFUR DIOXIDE

EMISSIONS

Sulfur dioxide emissions from refuse incineration are a function of the amount of sulfur in the refuse. An average municipal refuse has been found to contain approximately 0.12 percent sulfur on an as received basis. Not all of the sulfur in the refuse appears in the flue gas as SO_2 when the refuse is incinerated. Depending upon type of incinerator and the form of the sulfur in the waste, between 40 and 80 percent of the sulfur is retained in the ash [25, 26, 27]. Battelle feels that a 50 percent retention factor is reasonable for a mass-burning incinerator. On these bases an emission rate of 2.4 lb/ton (1.2 kg/Mg) of refuse burned can be calculated. From the previously mentioned flue gas flow rate, a concentration of 80 ppm* can be derived. The sulfur dioxide concentrations reported in the literature are shown in Table 5.

TABLE 5 SULFUR DIOXIDE EMISSIONS

Incinerator	lb/Ton	% S	actual ppm	ppm corr. to 12% CO_2	Ref.
Alhambra	1.9	(0.95)	88	105	25
Various			22-195		6
Bristolree			85-94	136	4
Babylon			36		12
Babylon			35.1	78	28
Roseville			38	85	29
Chicago SW			107	137	12
E Hamilton			185		12
Newport News			85.6	254	30
St. Brooklyn			17.0	43.4	30
Oceanside			30		30
Oberhausen				96	15
Duesseldorf				193	7
Babylon			87	103	31
Various	2.5	(1.2)			8
Various	2.0	(1.0)			1
Barrisburg			75		3
Baugus	2.0	(1.0)			17
Average	2.25	(1.12)	89.4	120.6	
Std. Dev.	.25	(0.12)	56.4	66.9	

CONTROLS

Since the sulfur dioxide typically emitted from the mass-burning of municipal waste is considerably

lower than emitted from most coals, sulfur dioxide controls have not been required on municipal incinerators; however, some state and local agencies most notably in California, are now requiring acid gas controls on new municipal incinerators. Acid gas controls (HCl & HF) have been required on municipal incinerators in West Germany and Japan for several years, but it is generally accepted that the refuse in these countries contains considerably more acid forming materials than the U.S. refuse.

Wet scrubbers typically using caustic for a scrubbing solution have been common in Germany, but most of the new installations both in Germany and Japan have been dry scrubbers using lime as an absorbant. Teller Environmental Systems and DB Gas Cleaning have supplied most of the dry scrubbers for municipal incinerators. Of the seventeen dry scrubber installations identified, the only one in the U.S. is the Teller Pilot plant at the Framingham incinerator. Only three of these systems have been in operation over two years. Since the facilities are so new, little information is available about their performance. Information supplied by the manufacturers indicate control efficiencies of 48 to 88 percent for SO_2 and 75 to 99 percent for HCl .

The ability of these scrubbers to reduce SO_2 and HCl emissions from municipal incinerators appears to have been demonstrated in practice but no performance test data of adequate quality to meet EPA standards, has been found to verify the performance of the systems. While the scrubber systems may still be constructed at LAER without verifiable performance data, operating costs (including amortization) of approximately \$3.00/ton of refuse burned or over \$1000**/ton of acid collected will probably preclude them from being established as BACT.

NITROGEN OXIDES

EMISSIONS

The emission of nitrogen oxides from combustion sources are due to either the conversion of nitrogen in the fuel to nitrogen oxides, or to the fixation of atmospheric nitrogen at high temperatures. Generally, the relatively low peak temperatures occurring in mass burning municipal incinerators limit the NO_x emissions to levels below those occurring in most other combustion sources. The emissions of NO_x reported in the literature are shown in Table 6.

*ppm v/v are used throughout the paper.

** Derived from [22].

TABLE 6 NITROGEN OXIDE EMISSIONS

Incinerator	lb/Ton	lb N ₂	actual ppm	ppm corr. to 12% CO ₂	Ref.
Various	3.0	(1.5)			8
Various	1.6	(0.8)			1
Braintree			94		4
Knoxville			106	160	29
Boston			35.8	78	31
Boston			28.9	64.6	28
Bozport Bay			39	151	30
St. Brownlyn			61.3	156	30
Greenfield			104		30
Overhousen				159	15
Various			8-177		6
Chicago W			179		12
E Hamilton			112		12
Barrisburg	2.66	(1.33)			12
Barrisburg			123		3
August	2.25	(1.12)			17
Average	2.38	(1.19)	88.7	129.4	
Std. Dev.	.52	(0.26)	27.1	41.6	

The nitrogen oxide emissions reported are quite variable. We feel that the Rinaldi [1] value of 1.6 lb/ton (0.8 kg/Mg) of refuse burned, which is equivalent to about 75 ppm in the flue gas, is a reasonable and conservative value for a modern waterwall incinerator.

CONTROLS

Since the NO_x levels are naturally comparatively low, the control of NO_x is not practiced on mass-burning municipal incinerators. Combustion modification techniques applicable to fossil fuel-fired boilers either are generally not applicable to the mass-burning situation or tend to cause higher CO emissions and unacceptable boiler corrosion. One of the add-on control systems available for fossil fuel-fired boilers has been tested in Japan [32]. The results of the test showed that the NO_x could be reduced by 60 percent by injecting NH₃ under precise control into the incinerator firebox. About 20 ppm of unreacted NH₃ remaining in the gas caused precipitates of ammonium salts to form in the economizer.

This test does not appear to establish that these reductions have been "achieved in practice" by a municipal incinerator as required in the regulations to establish LAER or BACT and therefore should not be used to establish BACT or LAER.

CARBON MONOXIDE

EMISSIONS

Carbon monoxide is a product of incomplete combustion and for municipal incineration depends

largely on the overfire air ratio, the design of the overfire air jets, and the combustion temperature. Values of CO reported in the literature are shown in Table 7. Considering these data, we have chosen a somewhat conservative 150 ppm as a reasonable estimate for a modern incinerator design using the combustion control measures now commonly used to control boiler tube wastage. This is equivalent to an emission rate of 1.9 lb/ton (0.95 kg/Mg) of refuse burned.

TABLE 7 CARBON MONOXIDE EMISSIONS

Incinerator	lb/Ton	lb C	actual ppm	ppm corr. to 12% CO ₂	Ref.
Various	35	(18)			8
Braintree			873*	1380	4
Knoxville			153	176	29
Bozport Bay			5.2-195		30
Various			6.1-179		6
August	0.17	(0.08)			17
Average			103.3	154	
Std. Dev.			67.9	-	

* Incineration problems reported

CONTROLS

The CO emissions from modern incinerators are usually limited to a few hundred ppm by combustion control measures designed to achieve good combustion and minimize boiler tube wastage. The maintenance of a minimum temperature and adequate turbulence (usually by means of overfire air jets) in the firebox — as required to control flame length, insure complete combustion, and reduce the corrosion of the boiler tubes — normally provides adequate control of CO and no additional controls are required.

HYDROCARBONS

EMISSIONS

Hydrocarbons appearing in the flue gas of an incinerator are products of incomplete combustion. They are mostly low-molecular-weight hydrocarbons, aldehydes, and organic acids with traces of high molecular-weight compounds also present. Values reported for hydrocarbon emissions from municipal incinerators are shown in Table 8. Older refractory wall incinerators frequently have higher HC and CO emissions than modern waterwall incinerators. Considering these data, we have chosen an emission rate of 0.12 lb/ton (0.06 kg/Mg) which

is equivalent to approximately 16 ppm as a reasonable value for total hydrocarbon emissions for this type of incinerator.

TABLE 8 HYDROCARBON EMISSIONS

Incinerator	THC		Aldehydes ppm	Organic Acids ppm	Ref.
	lb/Ton	ppm			
Various	(0.75)	1.5			8
Various	(0.06)	0.12			1
Braintree			11.3	1.3	8
Newport News			10	0.1	30
Oceanside			1.5	0.26	30
Babylon				2.6	31
Various		25.5-42.5	0.15-1.06		6
Unknown	(0.116)	0.221			33
Unknown	(0.002)	0.001			17
Babylon			2.3	50.5	28
Average	(0.7320)	.468	18.2	1.11	28.1
Std. Dev.	(0.35)	.70	14.4	.95	23.2

* Total hydrocarbons

CONTROLS

To the authors' knowledge, no municipal incinerator uses any type of add-on control to reduce hydrocarbon emissions and there are no published correlations between design or operating parameters and hydrocarbon emissions; however, it is reasonable to expect that measures used to control CO will control hydrocarbons even more effectively.

HYDROCHLORIC ACID

EMISSIONS

Flue gases from municipal incinerators normally contain hydrochloric acid as a by-product of the combustion of PVC, other chlorinated plastics, and sodium chloride found in the waste. Hydrochloric acid emissions are not regulated by the U.S. EPA, but most states require the emissions to be reported and control regulations are under consideration in several states. It has been reported that only about half of the chloride in the waste is converted to hydrochloric acid [28] and some of the evolved HCl may be removed on the ash particles [34] as the flue gases pass through the boiler and electrostatic precipitator. Emissions of hydrochloric acid reported in the literature are found in Table 9. Considering these data, we feel that 200 ppm or 3.4 lb/ton (1.7 kg/Mg) is a reasonable estimate of the hydrochloric acid emissions.

CONTROLS

Wet scrubbers were commonly used on municipal incinerators in the past for particulate control,

TABLE 9 HYDROCHLORIC ACID EMISSIONS

Incinerator	lb/Ton	lb Mg	ppm	Ref.
Various	1.8	(0.9)		8
Oberhausen*			900**	15
Oceanside			113	30
Babylon			237	31
Nashville			110	29
Unknown	4.2	(2.1)	213	35
Unknown	4.2	(2.1)	230	35
Unknown	4.0	(2.0)	261	35
Unknown	4.0	(2.0)	254	35
Various			63-1260**	6
Barrisburg			273	3
Braintree			79	4
Babylon			226	28
Average	3.55	(1.78)	200	
Std. Dev.	1.01	(0.50)	67	

*Corrected to 125 CO₂

**Data point eliminated as nonrepresentative

and more recently for gas cooling ahead of ESPs, and the acid control they gave was incidental.

These scrubbers were incapable of meeting current particulate emission standards and heat recovery boilers have largely replaced water quenching so scrubbers became uncommon on municipal incinerators. Acid gas control has been required in West Germany and Japan for several years and is now being required by several local and state agencies, most notably in California.

Wet scrubbers are being used for acid gas control on municipal incinerators in West Germany in conjunction with electrostatic precipitators, and are common on hazardous waste incinerators; however, corrosion and waste water disposal problems have restricted their use on municipal incinerators. Where acid gas control is required, dry scrubbers are now commonly used. Of the seventeen scrubbing systems we are aware of that were installed in Germany and Japan in 1980 and 1981, eleven were dry scrubbers.

FLUORIDES

EMISSIONS

Traces of hydrogen fluoride from the combustion of fluorinated plastics or similar materials appear in the flue gas from municipal incinerators. There are no federal regulations limiting the emissions of fluorides from municipal incinerators, however the PSD regulations require that the fluoride emissions be estimated and reported. The emissions of fluorides from municipal incinerators reported in the literature are shown in Table 10.

$$0.1 \times 10^{-4} \times \frac{0.0034}{2.4 \times 10^{-4}} = 0.16 \text{ lb/ton}$$

TABLE 10 FLUORIDE EMISSIONS

Incinerator	ppm	Ref.
Ottenshausen	20 ^a	15
Berlin	8.8	31
Braintree	2.8	4
Berlin	5	12
Zurich	12	7
Düsseldorf	10	7
Average	6.4	
Std. Dev.	3.9 ^a	

^aCorrected to 12% CO₂

Based on these data 6.5 ppm or 0.06 lb/ton (0.03 kg/Mg) has been chosen as a conservative estimate of fluoride emissions.

CONTROLS

Fluoride emission control is normally not required on municipal incinerators except in conjunction with acid gas control. Some of the fluoride appears to be associated with the particulate matter and therefore will be removed by the particulate control device while some is apparently present as a gas and would be removed in the acid gas scrubber. Very little fluoride removal data are available but it appears that the fluoride may be removed a little more efficiently than the hydrochloric acid.

TRACE METALS, LEAD, MERCURY, BERYLLIUM

EMISSIONS

Some of the lead in the municipal waste is emitted with the fly ash from a municipal incinerator. The amount of lead emitted will depend upon the efficiency of the particulate control system. Some reported values of lead emissions for incinerators using electrostatic precipitators for particulate control are shown in Table 11. We have chosen 34,200 µg/g (0.034 lb/lb) of particulates or 0.012 lb/ton (0.006 kg/Mg) of refuse burned as a reasonable estimate of the lead emissions.

TABLE 11 LEAD EMISSIONS

Incinerator	µg/g of Particulates	gr/dscf	lb/dscf	Ref.
Braintree		0.0024	(5.4)	4
Washington, D.C.	78,000			36
Various	18,100-34,200			1
Hamilton	5,700			6
German	20,100			6
Average	31,200			
Std. Dev.	25,100			

Trace amounts of mercury have been found in the emissions for municipal incinerators. Values reported in the literature are shown in Table 12. Based on the listed data, an emission of 2.4×10^{-4} gr/dscf (0.55 mg/dscm) or 0.0064 lb/ton (0.0032 kg/Mg) of refuse burned was chosen as a conservative estimate of total mercury emissions.

TABLE 12 MERCURY EMISSIONS

Incinerator	µg/g of Particulates	gr/dscf	lb/dscf	Ref.
Braintree		6.1×10^{-6} particulate	(.014)	4
		2.4×10^{-4} vapor	(.55)	
Hamilton	900			6
Germany	133			6
Gent, Belgium		6.4×10^{-5} vapor	(.014)	37
Average	216	1.6×10^{-4}	(.037)	

Few data giving emissions of beryllium from municipal incinerators were found. The only reference to beryllium emissions was for the Braintree incinerator [4] where less than 0.15 µg/g of emitted particulates was reported. Using this data, based on the particulate emissions previously cited, the emissions of beryllium are estimated to be less than 5.6×10^{-8} lb/ton (2.8×10^{-8} kg/Mg) of refuse burned.

Trace quantities of a large number of other metals have been found in the fly ash from municipal incinerators. Most of them are present in very small quantities and are of little environmental concern. Concentrations of the more toxic metals are presented in Table 13.

CONTROLS

The trace metals are minor and variable constituents of the waste. Most of the metals except for mercury appear to concentrate in the bottom ash or fly ash. Data presented by Law [38], factored for the difference in efficiency between a baffle chamber and an ESP (95 percent), indicate that most of the mercury is emitted, less than 3 percent of the volatile metals (such as lead, cadmium and zinc) are emitted and less than 1 percent of the nonvolatile metals (such as barium, chromium, and copper) are emitted.

The data indicate that an effective particulate control system is about equally effective in controlling the trace metals. It is sometimes stated that a fabric filter's high efficiency for fine particulates makes it more efficient than other devices in collecting trace metals, but there is inadequate data to substantiate such superiority.

TABLE 13 CONCENTRATIONS OF SELECTED TRACE METALS IN MUNICIPAL INCINERATOR FLY ASH

Metal	µg/g				lb/Ton*	Kg/Mg
	Ref. 4	Ref. 36	Ref. 1	Average		
Arsenic	57	310	50-100	130	4.4×10^{-5}	(2.2×10^{-5})
Barium	340	990	270-540	540	1.8×10^{-4}	(0.9×10^{-4})
Cadmium	480	1900	670-1150	1100	3.8×10^{-4}	(1.9×10^{-4})
Chromium	200	870	130-260	360	1.2×10^{-4}	(0.6×10^{-4})
Copper	1600	1500	620-800	1100	3.8×10^{-4}	(1.9×10^{-4})
Nickel		170		170	5.8×10^{-5}	(2.9×10^{-5})
Zinc	~1%	14%	1%	5.3%	1.8×10^{-2}	(0.9×10^{-2})

*Based on particulate emissions of 0.34 lb/Ton (0.17 Kg/Mg)

SULFURIC ACID MIST

EMISSIONS

Very little data is available on emissions of sulfuric acid mist from municipal incinerators. Data from Harrisburg [3] give 0.0014 or gr/scf (3.2 mg/scm) which is 1.6 percent of the SO₂ emission rate. On the basis of the 2.4 lb/ton (1.2 kg/Mg) rate previously established for SO₂ emissions, a sulfuric acid mist emissions rate of 0.04 lb/ton (0.02 kg/Mg) of refuse burned can be calculated.

CONTROLS

Sulfuric acid mist will be a vapor at high temperatures but, especially in the presence of moisture, will condense as an aerosol at lower temperatures. Most common pollution control systems will have low capture efficiencies but dry acid gas scrubbers (especially those utilizing fabric filters) should provide good control.

DIOXINS AND FURANS

EMISSIONS

Traces of polychlorinated dibenzo-*p*-dioxins and dibenzofurans have been identified in the emissions from a number of municipal incinerators abroad and in the U.S. The source or mechanism of formation of these compounds has not yet been discovered. Several theories have been proposed to account for their presence: they may be present in the feed and pass through the incinerator undestroyed; they may be formed from precursors such as chlorinated phenols, chlorinated benzenes, or

PCBs, present in the feed; or they may be formed by the reaction of traces of chlorine present in the feed with complex organics formed in the combustion process. Much of the published data on dioxin emissions are not quantitative and the quantitative data available, as shown in Table 14, are very scattered. Several reports reviewing the literature on dioxins have been published [45, 46], but most of the data cited in this paper were derived from original literature sources where available.

In general, the variability of the data makes averages derived from it statistically meaningless except possibly for tetrachlorodibenzo-*p*-dioxin (TCDD) which has received the most attention from the investigators. It can be observed that the emissions reported for the Dutch incinerators are considerably higher than the other reported emissions (TCDD = 54 vs. 5.8 ng/g for ESP fly ash and 100 versus 2 ng/g for stack particulates); that the more highly chlorinated isomers, particularly the hexa and hepta chloro isomers, are more plentiful than the tetrachloro isomers; that there is several times as much dioxin in the emitted particulate as in that collected in the ESP; and that there can be appreciable dioxins in the vapor phase. There is no indication of why the reported emissions from the Dutch and the U.S. incinerator are so high compared to the rest, however the preponderance of evidence seems to favor the lower numbers.

Considering the available data, we conclude that the best estimate of TCDD emissions possible is 1×10^{-9} to 5×10^{-7} lb/ton (0.5×10^{-9} to 2.5×10^{-7} kg/Mg) or refuse burned and that total dioxin emissions are possibly a factor of 10 higher. Data presented by Cavallaro [42] and others indicate that the concentration of the toxic isomer 2,3,7,8-TCDD will be about 5 percent of the total TCDD

TABLE 14 CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS EMITTED FROM MUNICIPAL INCINERATORS**

Incinerator	Dioxins					Total	Furans					Total	Ref.
	Cl ₂	Cl ₃	Cl ₄	Cl ₇	Cl ₈		Cl ₂	Cl ₃	Cl ₆	Cl ₇	Cl ₈		
Ontario	9	15	13	3	0.4	40.4							39
Netherlands	(130)*	(730)*	(1130)*	(1390)*	(780)*	(4160)	(280)*	(600)*	(1200)*	(1260)*	(300)*	(3640)*	40
Nashville	7.7		14	28	30	80							41
Milan 1	(2.5)*				(180)*						(31)*		42
	(11.7)**				(630)***						(550)***		42
	6.1				150						166		42
Milan 2	(0.2)*				(13)*						(0.9)*		42
					(100)***						(90)***		42
	1.1				35						22		42
Desio	(0.6)*				(35)*						(16)*		42
	(ND)***				(40)***						(51)***		42
	2.7				170						70		42
Busto	(0.6)*				(37)*						(70)*		42
	(0.8)				(11)***						(10)***		42
	0.1				0.6						0.12		42
Japan 1	4.8												43
Japan 2	8.5												43
Netherlands	2.4												43
Ontario 1	12												43
Ontario 2	9.3											100	43
Zurich	2*	8*	30*	60*	123*	220*	1*	4*	30*	40*	10*		44
Netherlands	100*	800*	1370*	1370*	310*	3950*	480*	960*	1130*	1600*	140*		44
"	54	182	326	288	106	956	111	196	361	177	18	863	44
U.S.	(40-120)***												45

*In fly ash from stack

**In fly ash from ESP unless otherwise noted

***In vapor phase

TCDD Summary				
ESP partic. ng/g	6-24	11	50	2x10 ⁻⁹
stack partic. ng/g*	2	1	100	7x10 ⁻¹⁰
stack partic. (ng/m ³)*10 ⁻¹	4-10	4	130	1x10 ⁻⁷
gaseous (ng/m ³)***	4-6	3	(80 USA)	4x10 ⁻⁸

TABLE 15 TCDD CONTENT OF MUNICIPAL INCINERATOR FLY ASH ng/g (ng/m³)

Incinerator	2,3,7,8-TCDD	Total TCDD	Σ	Ref.
Milan 1	0.29	6.1	4.8	42
Milan 2	0.065	1.1	5.9	42
Desio	0.14	2.7	5.2	42
Netherlands	(3.9)	(130)	5.2	41
Average	0.22	4.4	4.8	

concentration or about 5×10^{-10} lb/ton (2.5×10^{-10} kg/Mg) of refuse burned as shown in Table 15.

CONTROLS

There are at this time no proven means of reducing the emission of these materials although increases in particulate control efficiency should reduce dioxin emissions to the extent that the

dioxins are associated with the particulates. Some tests on power plants and power boilers co-firing refuse and coal have not shown any dioxin and there is speculation that more rigorous combustion conditions will reduce emissions. As yet, however, we have found no data to establish the effects of combustion temperature, residence time, or any other variable on the dioxin emissions.

POLYNUCLEAR AROMATIC HYDROCARBONS

Polynuclear aromatic hydrocarbons are common products of incomplete combustion of carbonaceous fuels and have been found in the emissions from many sources, including municipal incinerators. The various investigators did not identify the presence of the same compounds but pyrene, fluoranthene and benzoanthracene were major constituents in many cases. The published data are

TABLE 16 POLYNUCLEAR AROMATIC
HYDROCARBON EMISSIONS

Incinerator ^a	lb/s	(kg/s)	lb/Ton ^b	5g Mg	Ref.
Braintree		(20)	8x10 ⁻⁶	(2x10 ⁻⁶)	8
Various	0.6		0.3x10 ⁻⁶	(0.2x10 ⁻⁶)	83
Orthon	8.2		2x10 ⁻⁶	(1x10 ⁻⁶)	87
Burlington, England		(8.20)	0.8x10 ⁻⁶	(8.4x10 ⁻⁶)	88
Various			80.3x10 ⁻⁶	(20x10 ⁻⁶)	1
Average			10x10 ⁻⁶	(5x10 ⁻⁶)	

^aCalculated

shown in Table 16. Considering the wide variation of the available data, we have selected an average value of 1×10^{-5} lb per ton (0.5×10^{-5} kg/Mg) of refuse burned or 30 μ g/g of emitted particulates.

POLYCHLORINATED BIPHENYLS (PCBs)

PCBs have been found in trace amounts in several municipal incinerator emissions. These materials probably result from incomplete destruction of traces of PCBs found in the waste feed. Since the manufacture and distribution of PCBs is now prohibited, the amounts found in the refuse, and therefore the amount in the emissions, can be expected to decline in the future. The reported PCB emissions are shown in Table 17.

Considering these data, 5×10^{-6} gr/dscf (0.011 mg/dscm) or 1.3×10^{-4} lb/ton (0.65×10^{-4} kg/Mg) is a reasonably conservative value for PCB emissions from municipal incinerators.

TABLE 17 PCB EMISSIONS

Incinerator	lb/Ton (kg/Mg)	gr/dscf (mg/dscm)	Ref.
Chicago NW	1.2×10^{-4} (0.6×10^{-4})	5.5×10^{-6} (0.013)	89
Dade Co		4.8×10^{-6} (0.011)	90
Braintree		1.6×10^{-6} (0.0037)	8

^a As Aroclor 1254

⁸⁸ As decachlorobiphenyl

ASBESTOS

No data were found on the emissions of asbestos from municipal incinerators. Some asbestos may occur in municipal waste and small quantities may be suspended in the flue gas, but the particulate control equipment is expected to remove most of it and the emissions are expected to be insignificant.

VINYL CHLORIDE, H₂S, TRS^a

No reports of the detection of these materials in the emissions from a municipal incinerator were found. Since these materials would be readily oxidized under the conditions prevailing in the incinerator, we conclude that there will be essentially zero emissions of these materials and that BACT is the standard combustion controls normally used on these units.

CONCLUSIONS

Published data on the emissions from municipal incinerators have been used to derive emission factors for a modern mass burning, waterwall municipal waste incinerator equipped with an electrostatic precipitator. These emission factors are summarized in Table 18.

TABLE 18 SUMMARY OF EMISSION FACTORS

Pollutant	Concentrations ppm or (gr/dscf)	lb/Ton
Particulates	(0.02) ^a	0.38
Sulfur Dioxide	80	2.8
Nitrogen Oxides	75	1.6
Carbon Monoxide	150	1.9
Hydrocarbons	16	0.12
Hydrochloric Acid	200	3.8
Fluorides	8.5	0.06
Lead	(6.8×10^{-4}) ^a	0.012
Mercury	(2.4×10^{-4})	0.0068
Beryllium	(3.0×10^{-5}) ^a	5.1×10^{-8}
Sulfuric Acid Mist	(0.0023) ^a	0.04
Tetrachlorodibenzo-p-dioxins		1×10^{-8}
Polynuclear Aromatics		1.0×10^{-5}
Polychlorinated Biphenyls		1.3×10^{-4}

^aCorrected to 12% CO₂

These factors have been used in several instances to provide the emissions estimates for proposed incinerators for use in permit applications and environmental impact reports.

State-of-the-art control systems have been identified for each emitted pollutant as an aid in identifying BACT and LAER. A summary of these systems is presented in Table 19. In general, we have concluded that while thermal nitrogen oxide reduction systems and fabric filters show promise as improved pollution control systems, there is yet insufficient data in the literature to prove that they will maintain the claimed efficiencies under normal incinerator operating conditions.

^aTotal reduced sulfur.

TABLE 19 STATE-OF-THE-ART CONTROL SYSTEMS

Pollutant	Batt	LAFS
Particulates	ESP	ESP
Sulfur Dioxide	None	Dry or Wet Scrubber
Nitrogen Oxides	None	None
Carbon Monoxide	CC*	CC
Hydrocarbons	CC	CC
Chloroacetic Acid	None	Dry or Wet Scrubber
Fluorides	None	Dry or Wet Scrubber
Lead	ESP**	ESP**
Mercury	None	None
Beryllium	ESP**	ESP**
Sulfuric Acid Mist	None	Dry Scrubber
Dioxins	None	None
Polynuclear Aromatics	None	None
Polychlorinated Biphenyls	None	None
Asbestos	None	None
Vinyl Chloride	None	None
H ₂ S	None	None
Reduced Sulfur	None	None

*Standard modern combustion controls

**Controlled concurrently with particulates

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AN EVALUATION OF EMISSION FACTORS FOR
WASTE-TO-ENERGY SYSTEMS

Executive Summary

by

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FOREWORD

When energy and material resources are extracted, processed, converted, and used, the related pollutional impacts on our environment and even on our health often require that new and increasingly more efficient pollution control methods be used. The Industrial Environmental Research Laboratory - Cincinnati (IERL-Ci) assists in developing and demonstrating new and improved methodologies that will meet these needs both efficiently and economically.

This report contains a summary of emission factors for the combustion of refuse for the purpose of providing energy recovery or volume reduction. This study was conducted to provide an up-to-date compilation of these factors for use in planning and assessing the benefits and risks from this industry. Further information on this subject may be obtained from the Fuels Technology Branch, Energy Systems Environmental Control Division.

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ABSTRACT

The Industrial Environmental Research Laboratory (IERL) of the U.S. Environmental Protection Agency (EPA) has the responsibility for insuring that pollution control technology for stationary sources is available to meet the requirements of the Clean Air Act, the Federal Water Pollution Control Act, and the Resource Conservation and Recovery Act. The Fuels Technology Branch (FTB) of the IERL-Cincinnati has been assigned the responsibility for characterizing emissions from waste-to-energy systems. This report, prepared by Monsanto Research Corporation, is intended to supplement the document entitled "Compilation of Air Pollution Emission Factors" as a source of information concerning emission rates from solid waste combustion, since the latter does not incorporate the most recent technical data. Results presented herein will provide information to the EPA regional and program offices that is useful for decision-making regarding environmental research programs and the technological feasibility of compliance with existing or forthcoming regulations.

This state-of-the-art report, documented in a detailed final report which contains information on the data sources used and calculation procedures, was submitted by Monsanto Research Corporation in partial fulfillment of Contract No. 68-03-2550 under the sponsorship of the U.S. Environmental Protection Agency. This project was performed during the period November 1978 to May 1979. Mr. Harry Freeman of the Fuels Technology Branch at IERL-Cincinnati served as Project Officer.

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SECTION 1

INTRODUCTION

Generalized estimates of the magnitude of air pollution problems due to industrial sources can be made using derived numerical values known as "emission factors." An emission factor relates the mass of material released to some measure of source capacity, for example, grams emitted per quantity of fuel burned for combustion units. Thus, emissions data obtained from source testing, material balances, or engineering estimates can be reduced to numbers with a common basis for purposes of comparison. Such data, gathered for existing sources, can then be used to predict emission rates for systems either under development or under construction, indicating what air pollution control technology may be necessary to comply with applicable federal and state regulations.

Air pollutants generated by solid waste combustion include particulate matter and, in lesser amounts, hydrocarbons, oxides of nitrogen and sulfur, hydrogen chloride, polynuclear aromatic compounds, and trace elements. A literature search was conducted to generate emission factors from information compiled by other investigators. Results are presented herein for emissions of each particular pollutant from predetermined combustion categories. Although no uniform system of classification exists, all units were separated into three groups defined as follows for the purposes of this study.

- Category I: Mass-fired incineration in which the sole purpose is the reduction of the volume of municipal solid waste.
- Category II: Mass-fired incineration for both solid waste volume reduction and heat energy recovery for the generation of steam and/or electricity.
- Category III: Energy recovery from the combustion of refuse that has been upgraded in heating value by means such as selective removal of noncombustible material or addition of fossil fuel, i.e., coal, gas, or oil.

In the sections that follow, available data on combustion of coal only, in boilers suitable for the co-firing of refuse and fossil fuel (Category III), are presented for comparative purposes.

Water Wall

Category II is based
on Braintree Mass and
Chicago Ill Waste-Fire Generators

SECTION 2

EMISSIONS OF CRITERIA POLLUTANTS

PARTICULATES

Particulate emissions from combustion sources consist of particles of mineral matter and sometimes contain unburned combustible material. For this reason, earlier investigators of the environmental impact of incineration had speculated that the amount of particulate emissions could be related to the composition of the feed material, that is, the combustible fraction and/or ash content of that fraction. Data on these two feed characteristics for all three categories defined in Section I, as well as coal, are summarized in Table 1. The reported ash contents for Categories I and II differ only because of the specific data sources used in compiling Table 1; in general, average ash contents for these categories would be expected to be the same. However, the ash content of coal is typically greater than that of the combustible fraction of refuse, hence the difference between Category III and Categories I and II.

TABLE 1. TYPICAL COMBUSTIBLE FRACTIONS AND ASH CONTENTS OF FEED MATERIAL
(Percent by weight)

Category	Combustible fraction of feed material	Ash content of combustible fraction
I	71.6 - 85.7	1.6 - 10.8
II	79.1 - 81.6	2.5 - 7.1
III	100	12.7 - 18.8
Coal	100	11.7 - 20.2

The composition of municipal solid waste varies depending upon geographical location and time of year. In general, the combustible fraction consists of food waste; garden waste; paper products; plastic, rubber, and leather; textiles; and wood. The noncombustible material includes metals; glass and ceramics; and ash, rocks, and dirt. All the material for Category III is considered to be combustible because preprocessing techniques such as shredding, air classifying, screening, and magnetic separation of ferrous metals are usually practiced prior to feeding.

Emission Factors

Tables 2 through 5 provide data on uncontrolled particulate emissions for the three categories and coal combustion in a Category III boiler. The emission factors are given in four types of units, as follows:

- 1) grams of particulate per kilogram of combustible material fed (g/kg);
- 2) pounds of particulate per ton of combustible material fed (lb/ton);
- 3) grams of particulate per kilogram of combustible material fed, all divided by the ash content of the combustible fraction (g/kg/%A); and
- 4) pounds of particulate per ton of combustible material fed, all divided by the ash content of the combustible fraction (lb/ton/%A).

TABLE 2. EMISSION FACTORS FOR UNCONTROLLED PARTICULATES FROM CATEGORY I

Units ^a	Average	Range
g/kg	9.5	6.5 - 13
lb/ton	19	13 - 27
g/kg/%A	4.7	1.2 - 7.0
lb/ton/%A	9.4	2.5 - 14

^aBased on mass of combustible feed material.

TABLE 3. EMISSION FACTORS FOR UNCONTROLLED PARTICULATES FROM CATEGORY II

Units ^a	Average	Range
g/kg	14	6.9 - 23
lb/ton	29	14 - 45
g/kg/%A	4.0	1.4 - 6.4
lb/ton/%A	8.0	2.7 - 13

^aBased on mass of combustible feed material.

TABLE 4. EMISSION FACTORS FOR UNCONTROLLED PARTICULATE FROM CATEGORY III

Units ^a	Average	Range
g/kg	67	43 - 85
lb/ton	134	85 - 171
g/kg/%A	4.5	2.3 - 5.9
lb/ton/%A	9.0	4.7 - 12

^aBased on mass of combustible feed material.

TABLE 5. EMISSION FACTORS FOR UNCONTROLLED PARTICULATES FROM COAL COMBUSTION^a

Units ^b	Average	Range
g/kg	64	40 - 90
lb/ton	128	80 - 179
g/kg/%A	4.2	3.3 - 6.0
lb/ton/%A	8.4	6.6 - 12

^aData are for coal combustion in a boiler suited to cofiring of refuse-derived and fossil fuels.

^bBased on mass of combustible feed material.

One of the most significant findings of this study is that emission factors for uncontrolled particulates from Categories I, II, and III and from coal combustion are essentially the same when reported on a normalized basis, that is, mass emitted per mass of combustible material fed, divided by the ash content of the combustible fraction. Referring to Tables 2 through 5, the average particulate emission factors for Categories I, II, and III and coal combustion are 4.7, 4.0, 4.5, and 4.2 g/kg/%A, respectively. Another relevant conclusion regarding particulate emissions is that, for Category I, the grate type (i.e., reciprocating, rocking, traveling) did not have a significant influence on the amount of pollutant generated. In addition, uncontrolled particulate emissions from Category III exhibited no clear trend as a function of boiler load (60% - 100%) or percent of heat input (20% - 50%) in the form of refuse.

Table 6 presents emission factors for uncontrolled particulates from Categories I, II, and III and coal combustion which were calculated by dividing the mass of emissions by the mass of total feed material. This data is provided for information purposes since many of the emission factors directly reported in the literature are in these units, or there may be insufficient characterization of the source to calculate emission factors on the basis of Tables 2 through 5 of this report. The numbers in Table 6 for Category III and coal combustion are identical to those in Tables 4 and 5, respectively, because all the feed material is combustible. Table 6 differs from Tables 2 through 5 in that there is no apparent correlation among the emission factors for the various categories.

TABLE 6. EMISSION FACTORS FOR UNCONTROLLED PARTICULATES BASED ON TOTAL FEED MATERIAL

Category	Average		Range	
	g/kg	lb/ton	g/kg	lb/ton
I	13	25	8.6 - 18	17 - 36
~~II~~	10	~~(20)~~	5.6 - 15	~~11 - 30~~
III	67	134	43 - 85	85 - 171
Coal	64	128	40 - 90	80 - 179

Particulate Control Technology

Emission control equipment now used on incinerators has been designed primarily to remove particulates because that is the only criteria pollutant currently regulated by federal and state standards. Available techniques for particulate control include mechanical collection (using dry cyclones), wet scrubbing, and electrostatic precipitation. Collection efficiencies for each of these techniques as applied to municipal incineration are given in Table 7.

TABLE 7. COLLECTION EFFICIENCIES OF CONTROL SYSTEMS FOR PARTICULATE EMISSIONS FROM MUNICIPAL INCINERATION

Control system	Efficiency, percent
Mechanical collection (cyclones)	30 - 80
Wet scrubbing	
Wetted baffles	10 - 60
Settling chamber and water spray	30 - 60
Venturi scrubber	90 - 99+
Electrostatic precipitation	90 - 99+

The collection efficiency of dry cyclones is a function of stack gas flow rate and particle concentration, size, and density, a complete discussion of which can be found in Air Pollution, Third Edition, Volume IV: Engineering Control of Air Pollution. One generalization can be made: Only under ideal operating conditions can a dry cyclone attain a particulate control efficiency of 30 percent when applied to an incinerator.

The first two wet-scrubbing control systems listed in Table 7 are of the low-energy type, hence the low collection efficiencies. A wetted baffle system consists of one or more vertical plates which are flushed by water spray. A settling chamber is simply a large refractory-lined chamber wherein gravitational settling of coarse particulates occurs as the incinerator exhaust gas velocity is reduced. Spraying the walls and bottom of the chamber with water inhibits re-entrainment of collected particulates. The high pressure drops required for venturi scrubbing may make its operating costs noncompetitive relative to those for electrostatic precipitation.

Electrostatic precipitation is one of the most effective demonstrated techniques for control of particulate emissions from incineration. However, relative to other applications of electrostatic precipitation, removal efficiencies are limited because refuse incineration yields large volumes of gas containing particles of widely variable size and resistivity characteristics. In at least one case, mechanical difficulties with operation of an incinerator and its related support systems resulted in abnormally high particulate loadings which consequently caused an electrostatic precipitator to function at an efficiency well below its expected design value.

OTHER CRITERIA POLLUTANTS

Data are available in the open literature for the other criteria pollutants emitted from incineration: sulfur oxides, nitrogen oxides, and hydrocarbons. Emission factors for these compound classes, determined in the outlet gases from any particulate control device, are reported in Tables 8 through 11 using both metric and English units. These emission factors are based on the amount of pollutant released divided by the total feed material, not only the combustible fraction. Pertinent observations about each pollutant are discussed in the following sections. The incineration industry has not, to date, intentionally attempted to control any of the three gaseous pollutants.

TABLE 8. EMISSION FACTORS FOR OTHER CRITERIA
POLLUTANTS FROM CATEGORY I

Pollutant	Emission factor			
	Average		Range	
	g/kg	lb/ton	g/kg	lb/ton
Sulfur oxides (as SO ₂)	0.33	0.66	0.02 - 0.92	0.05 - 1.8
Nitrogen oxides (as NO ₂)	0.36	0.72	0.28 - 0.44	0.56 - 0.88
Hydrocarbons (as CH ₄)	0.17	0.34	0.004 - 0.80	0.008 - 1.6

TABLE 9. EMISSION FACTORS FOR OTHER CRITERIA
POLLUTANTS FROM CATEGORY II

Pollutant	Emission factor			
	Average		Range	
	g/kg	lb/ton	g/kg	lb/ton
Sulfur oxides (as SO ₂)	1.0	2.0	0.11 - 3.2	0.22 - 6.4
Nitrogen oxides (as NO ₂)	0.8	1.6	0.46 - 1.2	0.92 - 2.3
Hydrocarbons (as CH ₄)	0.06	0.12	0.013 - 0.12	0.027 - 0.24

TABLE 10. EMISSION FACTORS FOR OTHER CRITERIA
POLLUTANTS FROM CATEGORY III

Pollutant	Emission factor			
	Average		Range	
	g/kg	lb/ton	g/kg	lb/ton
Sulfur oxides (as SO ₂)	20	40	5.9 - 45	12 - 89
Nitrogen oxides (as NO ₂)	1.5	2.9	0.8 - 2.6	1.7 - 5.1
Hydrocarbons (as CH ₄)	0.003	0.005	0.001 - 0.005	0.002 - 0.01

TABLE 11. EMISSION FACTORS FOR OTHER CRITERIA
POLLUTANTS FROM COAL COMBUSTION^a

Pollutant	Emission factor			
	Average		Range	
	g/kg	lb/ton	g/kg	lb/ton
Sulfur oxides (as SO ₂)	32	64	18 - 52	35 - 104
Nitrogen oxides (as NO ₂)	2.1	4.2	1.7 - 2.9	3.4 - 5.9
Hydrocarbons (as CH ₄)	0.003	0.005	0.002 - 0.005	0.003 - 0.01

^aData are for coal combustion in a unit suited to cofiring of refuse-derived and fossil fuels.

Sulfur Oxides

Sulfur oxide emissions from Categories I and II are substantially lower than those from Category III or coal combustion. As shown in Table 12, the sulfur content of solid waste (Category II) is much less than that of coal or even coal mixed with up to 50 percent refuse by heat content (Category III). The data of Table 12 on the sulfur content of the various feed materials does in fact correlate well with the emission factors shown in Tables 8 through 11.

TABLE 12. TYPICAL SULFUR CONTENTS OF COMBUSTIBLE FRACTION OF FEED MATERIAL

Category	Sulfur content, percent by weight (as S)
I	^a
II	0.18 - 0.31
III	1.41 - 4.84
Coal	3.06 - 6.66

^aData not available.

Nitrogen Oxides

Emissions of nitrogen oxides (NO_x) from combustion sources are due to nitrogen in the fuel or reactions between atmospheric nitrogen and oxygen at high temperatures. Generally, the nitrogen content of refuse is low. Therefore, differences in NO_x emissions between Categories I and II as compared to Category III or coal combustion are the result of differences in furnace operating temperature. Nitrogen oxide emissions from Category I or II are lower because the large amount of excess air, as much as 200 percent, needed to introduce the solid waste into the furnace reduces the combustion zone temperature by dilution. Normalization of NO_x emissions for percent excess air was beyond the scope of this project.

Hydrocarbons

When any combustible solid, such as coal or refuse, is heated in the absence of oxygen, combustible gases are evolved. For example, unburned material on top of a grate-type fuel bed will be heated by combustion gases passing through from below, and volatile hydrocarbons will be released. In the case of incineration, a lesser mass of hydrocarbons is emitted than any other

criteria pollutant, as can be seen by inspection of Tables 2 through 5 and 8 through 11. The larger amount of hydrocarbons emitted from mass-fired incineration relative to co-firing or coal combustion may be due to the generation of formaldehyde from the combustion of more cellulose fiber present as wood chips or paper products.

SECTION 3

EMISSIONS OF NONCRITERIA POLLUTANTS

HYDROGEN CHLORIDE

Flue gases from solid waste combustion contain hydrogen chloride, a by-product of the combustion of polyvinyl chloride and other chlorinated plastics found in the feed. Hydrogen chloride emission factors for the three categories discussed herein, as well as for coal combustion, are presented in Table 13. Such emissions from the combustion of mass-fired or co-fired refuse are greater than those for coal alone. However, no generalizations can be made about the magnitude of the deviation because several factors exist which may influence hydrogen chloride emissions. For instance, hydrogen chloride may be absorbed by the alkaline constituents of ash in the combustion chamber. Alternatively, particulate control techniques which involve water sprays may be as much as 80 to 95 percent effective on the soluble chloride gas. The fly ash removed by electrostatic precipitation may absorb some hydrogen chloride.

TABLE 13. HYDROGEN CHLORIDE EMISSION FACTORS

Category	Emission factor			
	Average		Range	
	g/kg	lb/ton	g/kg	lb/ton
I	0.7	1.4	0.14 - 1.6	0.28 - 3.2
II	- ^a	- ^a	- ^a	- ^a
III	1.6	3.2	0.9 - 2.3	1.7 - 4.7
Coal	0.2	0.4	0.09 - 0.5	0.2 - 1.0

^aData not available.

TRACE ELEMENTS

Certain chemical compounds of the following trace elements are potentially toxic to humans if deposited in the lungs: antimony, arsenic, cadmium, chromium, lead, nickel, selenium, and tin. It is possible for these toxic substances to be released from the incineration process. Tables 14 through 17 comprise a summary

TABLE 14. CONCENTRATIONS OF TRACE ELEMENTS IN PARTICULATE EMISSIONS FROM CATEGORY I

Element	Concentration, ^a	
	ug/g or 10 ⁻⁶ lb/lb	
Antimony	610 -	12,600
Arsenic	80 -	510
Barium	40 -	1,700
Bromine	320 -	6,700
Cadmium	520 -	2,300
Chlorine	99,000 -	330,000
Chromium	70 -	1,800
Cobalt	2 -	30
Copper	970 -	6,800
Iron	1,700 -	18,000
Lead	50,000 -	155,000
Manganese	170 -	5,700
Nickel	40 -	440
Selenium	10 -	120
Silver	40 -	2,000
Tin	8,500 -	15,100
Zinc	47,000 -	240,000

^aData are for trace element content of particulates downstream of any pollution control device; i.e., controlled emissions.

TABLE 15. CONCENTRATIONS OF TRACE ELEMENTS IN PARTICULATE EMISSIONS FROM CATEGORY II

Element	Concentration, ug/g or 10 ⁻⁶ (lb/lb)		F
	Uncontrolled	Controlled	
Antimony	260 - 620	460 - 1,000	
Arsenic	50 - 70	50 - 100	
Barium	270 - 540	270 - 540	
Bromine	420 - 2,400	350 - 1,200	
Cadmium	380 - 820	670 - 1,150	
Chlorine	>10,000	>10,000	
Chromium	50 - 560	130 - 260	
Cobalt	10 - 100	5 - 50	
Copper	420 - 590	620 - 800	
Iron	970 - 1,090	2,000 - 2,130	
Lead	11,600 - 17,500	18,100 - 34,200	
Manganese	420 - 1,400	140 - 490	
Nickel	- ^a	- ^a	
Selenium	<30	<30	
Silver	110 - 200	50 - 110	
Tin	2,600 - 5,000	1,400 - 5,000	
Zinc	>10,000	>10,000	

^aData not available.

TABLE 16. CONCENTRATIONS OF TRACE ELEMENTS IN PARTICULATE EMISSIONS FROM CATEGORY III

Element	Concentration, ug/g or 10 ⁻⁶ lb/lb					
	Uncontrolled			Controlled		
Antimony	0.4	-	10	2	-	180
Arsenic	20	- ^a	80	140	- ^a	740
Barium		- ^a			- ^a	
Bromine		- ^a			- ^a	
Cadmium	0.3	- ^a	1.4	0.2	- ^a	10
Chlorine		- ^a			- ^a	
Chromium	5	-	20	60	-	100
Cobalt	0.6	-	2.0	4	-	40
Copper	10	-	50	50	-	280
Iron	700	-	2,410	6,940	-	17,300
Lead	1,220	-	2,930	4,470	-	18,400
Manganese	10	-	20	110	-	240
Nickel	3	-	20	20	-	190
Selenium	10	- ^a	40	20	- ^a	430
Silver		- ^a			- ^a	
Tin	50	-	150	260	-	870
Zinc	860	-	3,770	4,360	-	17,200

^a Data not available.

TABLE 17. CONCENTRATIONS OF TRACE ELEMENTS IN PARTICULATE EMISSIONS FROM COAL COMBUSTION

Element	Concentration, ug/g or 10 ⁻⁶ lb/lb					
	Uncontrolled			Controlled		
Antimony	7	-	20	10	-	150
Arsenic	20	- ^a	120	20	- ^a	680
Barium		- ^a			- ^a	
Bromine		- ^a			- ^a	
Cadmium	0.6	- ^a	1.0	2	- ^a	8
Chlorine		- ^a			- ^a	
Chromium	6	-	8	30	-	40
Cobalt	0.4	-	1.5	3	-	30
Copper	6	-	7	30	-	40
Iron	2,350	-	2,800	13,200	-	18,200
Lead	340	-	380	1,050	-	1,790
Manganese	20	-	40	100	-	140
Nickel	6	-	20	30	-	40
Selenium	10	- ^a	50	30	- ^a	40
Silver		- ^a			- ^a	
Tin	20	-	30	30	-	270
Zinc	180	-	560	910	-	3,340

^a Data not available.

of available information on the trace element content of particulates emitted from incineration, including data taken before and after pollution control devices for Categories II and III and for coal combustion.

Other investigators have determined that Category I incinerators operating in different geographic regions of the United States and serving different types of communities have similar trace element emissions. Also, no significant day-to-day or seasonal changes in particulate composition were observed at any one site. The major constituents of controlled particulate emissions from Category I incineration, in approximate decreasing order by concentration, are chlorine, zinc, lead, tin, and iron. The dominant presence of the first three of these elements is due to the abundance of the elements in the fuel as fired. This phenomenon is best shown for Category II, as can be seen from the relatively large concentrations of chlorine, lead, and zinc in Table 15.

Other significant observations can be drawn from the data for Category II. First, the maximum concentrations of all trace elements in the controlled particulate emissions from Category II are less than the corresponding values for Category I. Category II incinerators extract more heat energy from the exhaust stream than Category I incinerators. This added heat recovery may be sufficient to cool the stack gases to the point that volatile elements can condense and therefore be more efficiently removed by the particulate control devices.

The data for Category II also demonstrate the selective fractionation of volatile elements into fine particles, those most likely to escape any attempted control. Elements previously shown to occur primarily in the fine-particle regime, that is, less than two micrometers in diameter, are not collected by the control device; some of these elements are antimony, cadmium, and lead. Since the large particles are removed, the ratio of the weight of these elements to the total mass is increased. This increase in concentration has potentially negative implications for human health effects because fine particulates can more easily reach the lower respiratory tract.

Element fractionation discussed above for Category II is also evident in the data for Category III and for coal combustion. In the latter two cases, the effect can also be readily seen for three more volatile elements: arsenic, selenium, and zinc.

Another point of interest is a comparison of the trace element contents of uncontrolled particulate emissions for the three categories and for coal combustion. The composition of particulates from Category III, for which the fuel is a mixture of solid waste and coal, and from coal combustion are approximately the

same, with the possible exceptions of lead and zinc, which appear to a greater extent for Category III. This difference must be qualified, because the gas-phase emissions of these two elements, both of which are volatile, are not available.

Likewise, the apparently greater emissions from Category II relative to Category III must also be evaluated more closely. For example, consider the case for lead. The concentrations in uncontrolled particulates for Categories II and III are 11,600 to 17,500 $\mu\text{g/g}$ and 1,220 to 2,930 $\mu\text{g/g}$, respectively; these values differ by a factor of four to fourteen, depending upon which values are compared. From Tables 3 and 4, the uncontrolled particulate emission factors for Categories II and III are 6.9 to 23 g/kg and 43 to 85 g/kg, respectively; these values differ by a factor of two to twelve, but in the opposite direction from those described above for trace element concentration. Therefore, when compared on the basis of micrograms emitted per kilogram of material burned, trace elements emissions from the mass-fired incineration of solid waste with heat recovery are not significantly different than those from the combustion of refuse co-fired with coal. ✓

POLYNUCLEAR AROMATIC HYDROCARBONS AND POLYCHLORINATED BIPHENYLS

Polynuclear aromatic hydrocarbons are formed by the incomplete combustion of solid waste or other fuel material. Gases leaving an incinerator may contain polynuclear hydrocarbons both in the vapor phase and adsorbed on particulates. Emission factors for these compounds in stack gases downstream of any particulate control device are given in Tables 18 and 19 on the basis of mass emitted per mass of total material fed.

For Category I, more polynuclear hydrocarbons are emitted from small-sized furnaces because of poor combustion conditions relative to those in larger units. However, regardless of incinerator size, differing emission levels may be found during startup, normal operation, and shutdown. Wet scrubbing devices for particulate control at Category I incinerators have proven highly effective in reducing polynuclear hydrocarbon emissions; in one case, benzo(a)pyrene emissions were reduced by more than 95 percent.

Data on polynuclear hydrocarbon emissions from Category II is extremely limited. At one site, six compounds were observed in the gas phase: acenaphthylene, anthracene, fluoranthene, fluorene, phenanthrene, and pyrene. Fly ash collected by electrostatic precipitation contained acenaphthylene, anthracene, phenanthrene, and pyrene; however, all levels measured in both sample sets were below the range of reliable quantitative analysis.

TABLE 18. EMISSION FACTORS FOR POLYNUCLEAR AROMATIC HYDROCARBONS FROM CATEGORY I

Compound(s)	Emission factor	
	ug/kg	10 ⁻⁶ lb/ton
Benzo(a)anthracene and chrysene	3.1 ^a	6.2 ^a
Benzo(b)fluoranthene, benzo(j)fluoranthene, and benzo(k)fluoranthene	1.4 ^a	2.8 ^a
Benzo(ghi)perylene	1.4 - 1.8	2.8 - 3.6
Benzo(a)pyrene and benzo(e)pyrene	0.08 - 1.5	0.16 - 2.9
Coronene	0.17 - 1.4	0.34 - 2.8
Fluoranthene	2.5 - 7.3	5.0 - 15
Indeno(1,2,3-cd)pyrene	0.77 ^a	1.5 ^a
Perylene	0.77 ^a	1.5 ^a
Pyrene	4.6 - 6.8	9.2 - 14

^a Only one value reported.

TABLE 19. EMISSION FACTORS FOR POLYNUCLEAR AROMATIC HYDROCARBONS FROM CATEGORY III

Compound(s)	Emission factor	
	ug/kg	10 ⁻⁶ lb/ton
Benzo(a)pyrene, benzo(e)pyrene, and perylene	0.76	1.5 ✓
1,2-Benzofluorene and 2,3-benzofluorene	0.57	1.1
Fluoranthene	1.2	2.5 ✓
Fluorene	0.38	0.76 ✓
Pyrene	0.38	0.76 ✓

Data on polynuclear aromatic hydrocarbon emissions from Category III are shown in Table 19. In addition, benzo(a)pyrene, benzo(e)pyrene, and perylene have been detected in particulates, but the amounts were not reported. Data on polynuclear hydrocarbon emissions from the combustion of coal only in a Category III boiler were not available.

Polychlorinated biphenyls could not be detected in particulates from either Category II or III or in vapor samples from Category III.

SECTION 4

COMPARISON WITH AP-42 FACTORS

The U. S. Environmental Protection Agency's "Compilation of Air Pollutant Emission Factors," or Publication No. AP-42, has long been used as source material for data on emissions from fuel combustion, incineration, evaporation losses, and miscellaneous other sources. Tables 20 and 21 compare the emission factors, in metric and English units, respectively, for uncontrolled criteria pollutants from municipal, industrial, and commercial incinerators as reported in AP-42, and for Categories I, II, and III and coal combustion as determined in this study. The numerical values in Tables 20 and 21 were calculated using total feed material as the basis.

For particulates, sulfur oxides, and nitrogen oxides, values given in AP-42 and those reported herein for Categories I and II, the most directly comparable combustion processes, overlap. The emission factors for hydrocarbons given in AP-42 are significantly higher than those found during the current investigation. This may be so because the most recent data source cited in the AP-42 review of refuse incineration was published in June 1971, whereas this report is based on information released as recently as December 1978. During that time, changes may have occurred in refuse composition, incinerator operation, or capabilities of sampling and analysis techniques used to determine emissions, thus resulting in the difference mentioned above.

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TABLE 20. COMPARISON OF EMISSION FACTORS FOR UNCONTROLLED CRITERIA POLLUTANTS FROM INCINERATION AS REPORTED IN AP-42 AND THIS STUDY (metric units)

Category	Emission factor, g/kg			
	Particulates	Sulfur oxides	Nitrogen oxides	Hydrocarbons
Municipal, industrial, & commercial incineration (AP-42)	3.5 - 15	1.25	1 - 1.5	0.75 - 7.5
I	8.0 - 68	0.02 - 0.92	0.28 - 0.44	0.004 - 0.80
II	5.6 - 15	0.11 - 3.2	0.46 - 1.2	0.013 - 0.12
III	43 - 85	5.9 - 45	0.8 - 2.6	0.001 - 0.005
Coal Combustion	40 - 90	18 - 52	1.7 - 2.9	0.002 - 0.005

TABLE 21. COMPARISON OF EMISSION FACTORS FOR UNCONTROLLED CRITERIA POLLUTANTS FROM INCINERATION AS REPORTED IN AP-42 AND THIS STUDY (English units)

Category	Emission factor, lb/ton			
	Particulates	Sulfur oxides	Nitrogen oxides	Hydrocarbons
Municipal, industrial, & commercial incineration (AP-42) (1970)	7 - 30	2.5	2 - 3	1.5 - 15
I	17 - 36	0.05 - 1.8	0.56 - 0.88	0.008 - 1.6
II	11 - 30	0.21 - 6.4	0.92 - 2.3	0.027 - 0.24
III	85 - 171	12 - 89	1.7 - 5.1	0.002 - 0.01
Coal combustion	80 - 179	35 - 104	3.4 - 5.9	0.003 - 0.01

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NORTH SANTA CLARA COUNTY
SOLID WASTE MANAGEMENT AUTHORITY

AUTHORITY CONTRACT NO. 82-09

PROFESSIONAL SERVICES AGREEMENT
RESOURCE RECOVERY FACILITY DESIGN

Work Order No. 82-09-05

Summary Report
Assessment of Non-Criteria Pollutant Emissions

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NORTH SANTA CLARA COUNTY
SOLID WASTE MANAGEMENT AUTHORITY

Summary Report
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- M. "Public Health Aspects of Non-Criteria Pollutants Emitted from the Proposed San Francisco Resource Recovery Facility", E.T. Wei of University of California @ Berkeley, March 1982
- N. Record of Telephone Communication of December 1, 1982 with Daryl Mills, California Air Resource Board
- O. "An Overview: Dioxin Emission from Combustion Sources", A. Licata, Gibbs & Hill, Inc., ASME Solid Waste Processing Div. Mtg. Sept. 28, 1983.

NORTH SANTA CLARA COUNTY
SOLID WASTE MANAGEMENT AUTHORITY

Summary Report
Assessment of Non-Criteria Pollutant Emissions

1. Introduction

This Summary Report, in fulfillment of the Authority's Work Order No. 82-09-05, Item 2 quantifies emissions of non-criteria pollutants and estimates constituents anticipated in both fly ash and bottom ash.

Non-criteria pollutants are chemicals for which emission standards have not been fully developed, but are of interest because the ingestion of relatively small quantities may prove toxic to man and animal.

The non-criteria pollutant categories surveyed in this report are as follows:

- Trace Metals
- Hydrogen Chloride & Fluoride
- Sulfuric Acid Mist
- Hydrogen Sulfide
- Asbestos
- Aldehydes
- Carboxylic Acids
- Vinyl Chloride Monomers
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenyls
- Dioxins
- Furans
- Pesticides and Herbicides

Each of the categories are covered under identifying paragraph headings.

2. Trace Metals

a) Overview

Metallic substances are present in both the combustible and non-combustible fractions of municipal solid waste (MSW). When incinerated in mass or RDF combustion systems, the metals report to the fly ash and/or bottom ash, sometimes unpredictably.

b) Estimated Emissions
Impacting Air & Water Quality

Based on the material balance methodology presented in reference "A", factoring the laboratory analyses data for North Santa Clara County municipal solid waste (MSW) provided in reference "B", predictions were made of non-criteria pollutant metal emissions from both MSW and RDF combustion. These predictions are displayed in Tables 82-09-05.2.1 and 82-09-05.2.2 respectively. Predictions are given for:

- (1) Uncontrolled Flyash
- (2) Bottom Ash
- (3) Total Ash
- (4) Atmospheric Fly Ash, assuming air pollution controls operate at 99.5% efficiency.

The metal emissions are given for eight (8) Group I elements classified to be non-criteria pollutants by United States Environmental Protection Agency (EPA) and California Department of Health Services (CDOHS) and also for ten (10) Group II elements that only CDOHS has classified to be non-criteria pollutants. Emissions are stated in the following units:

$$\star \quad \frac{\text{lb of metal emitted (dry)}}{1000 \text{ tons MSW @ } 25\% \text{ H}_2\text{O}}$$

ppm parts per million, concentration of metal in ash category (1), (2), (3) or (4) above, uncorrected for ash products of acid gas control systems.

Both sets of units will be useful in evaluating predicted performance of facilities against both air and water quality standards that may be applicable in obtaining permits and environmental approvals.

The emission unit $\star$ is more applicable in determining compliance with air pollution standards whereas concentration (ppm) has greater bearing on water quality standards. Ground or surface water quality may be contaminated by leachate from disposed ash having high concentrations of toxic metals in the ash.

c) Air Quality Standards

Over the past few years there has been increasing concern about toxic elements in our air. Some chemical species of heavy metals (such as beryllium, cadmium, mercury and lead) are generally considered to be toxic to humans when deposited in the lungs. These substances are carried predominantly by particulates in the small micron size range (e.g. less than 2 microns). From a toxicological viewpoint, these particulates are of paramount concern because they can bypass the body's respiratory filters and penetrate deeply into the lungs where the human bloodstream can extract toxic species at a high rate (60 - 80%) from particulate deposited in the pulmonary region. Conversely, extraction efficiency from larger particulates, which deposit in nasopharyngeal and tracheobronchial regions and are eventually removed to the pharynx by ciliary action and swallowed, is low (about 5 - 15%). Reference "F".

EPA and/or the Bay Area Air Quality Management District (BAAQMD) have so far set maximum allowable emissions for lead, mercury and beryllium in new source performance standards requirements for incineration of waste materials. These requirements are:

	<u>EPA</u>	<u>BAAQMD</u>
Lead	None	15 lb/day
Mercury	3200 gm/day	3200 gm/day
Beryllium	None	10 gm/day

At 1000 TPD MSW throughput, predicted emissions for the North Santa Clara County waste combustion facility designs are well within the requirements, as follows:

	<u>MSW Combustion</u>	<u>RDF Combustion</u>
Lead	1.5 lb/day	0.5 lb/day
Mercury	9.07 gm/day	7.26 gm/day
Beryllium	0.02 gm/day	0.02 gm/day

Federal ambient air quality standards for locating major facilities within nonattainment areas are furthermore required by the Emission Offset Interpretive Ruling (40 CFR 51 Appendix S) to meet the Lowest Achievable Emission Rate (LAER) for those pollutants for which the area is nonattainment and are emitted in significant quantities. Significant quantities are defined for lead, mercury and beryllium as follows:

Lead	0.6 tons/yr
Mercury	0.1 tons/yr
Beryllium	0.0004 tons/yr

At 1000 TPD MSW (365,000 tons MSW per year) throughput, predicted annual emissions for the North Santa Clara County waste combustion facility design are within the "significant quantities" limits, as follows:

	<u>MSW Combustion</u>	<u>RDF Combustion</u>
Lead	0.27 tons/yr	0.09 tons/yr
Mercury	0.0036 tons/yr	0.0029 tons/yr
Beryllium	0.000008 tons/yr	0.000008 tons/yr

Predicted emissions for lead, mercury and beryllium are based on the data displayed in Tables 82-09-05.2.1 and 82-09-05.2.2. Predicted emissions for the other non-criteria metal emissions may likewise be compared with future EPA/BAAQMD standards for these emissions, once they are formulated.

d) Water Quality Standards

1. Federal Requirements

Pursuant to federal passage of the Resource Conservation and Recovery Act of 1976 (RCRA), United States Environmental Protection Agency (EPA) promulgated hazardous waste regulations (Reference "G") in May 1980. The regulations require the

operator of a waste-to-energy (WTE) facility to determine whether the ash products of combustion are hazardous. If they are, the facility operator must notify EPA that the facility is a generator of hazardous waste, and the waste must be manifested (tracked) and managed and ultimately disposed in an approved hazardous waste landfill.

A waste is considered hazardous if it is ignitable, corrosive, reactive or toxic, or if it is listed in the regulations (40 CFR 261.20). Since ash from a WTE facility is not listed as hazardous wastes, they are only subject to regulations if they have one of the four hazardous waste characteristics.

For the WTE facility ash, the most important characteristic is toxicity and is determined by a test, developed by EPA called the Extraction Procedure (EP). This test is designed to identify those toxics which might be leached from landfill and pollute ground or surface waters.

To determine toxicity in the EPA test, an ash sample is leached with an acetic acid solution of pH5 or below for 24 hours. If the leachate contains heavy metals or pesticides in concentrations greater than one hundred times those permitted by the National Interim Drinking Water Standards (40 CFR 261.24), then the ash is defined as hazardous and must be managed and disposed as a hazardous waste.

Preliminary EPA EP tests have indicated most ash from WTE facilities are not hazardous. They found bottom ash samples taken from the following WTE plants to be nonhazardous:

- (1) small modular combustor unit incinerator, rated 75 TPD burning residential waste only,
- (2) large mass burning incinerator with capacity of over 1000 TPD burning MSW only (no industrial waste) and
- (3) RDF incinerator, 300 TPD, burning RDF derived from MSW, commercial waste and selected industrial waste.

However the fly ash of both the large mass burning and RDF plants contained greater concentrations of cadmium and lead in the EP leachate than allowed by regulations.

In some WTE plants, the fly ash is automatically conveyed and mixed with bottom ash. If the fly ash is combined with the bottom ash within the process unit so that the toxic contaminants are diluted and the resulting mixture is nonhazardous, the combined ash would not be subject to RCRA (Subtitle C) regulations for manifest handling and disposal in an approved hazardous waste landfill.

Under RCRA's hazardous waste provisions, EPA itself must establish and enforce minimum federal standards for hazardous

waste management and disposal. A State may supplant EPA authority if it establishes and enforces a hazardous waste plan that is at least equivalent to the minimum federal standards.

11. State Requirements

For the past three years, the California Waste Management Board (CWMB) has assumed the lead role in resolving the uncertainties associated with the classification, handling and disposing of ash generated from the combustion of MSW at proposed waste-to-energy (WTE) facilities. CWMB's goals are to generate data to formulate the least costly, yet environmentally sound, management practices of handling and disposing of ash so as not to adversely impact ground and surface waters. CWMB has worked with two State of California regulatory agencies to resolve the ash disposal issues:

- (1) Department of Health Services (DOHS), which determines the hazardous/nonhazardous status of waste materials. In determining a hazardous/nonhazardous classification, the DOHS evaluates the concentrations in wastes of heavy metals and organic compounds known to have deleterious health effects.
- (2) State Water Resources Control Board (SWRCB), which regulates the disposal of all wastes to land to protect ground and surface water. The SWRCB classifies a waste based upon potential to degrade water quality. The parameters for classification include not only the soluble forms of the metals and organics evaluated by DOHS but also include soluble minerals, pH, alkalinity and several other water quality parameters. See Exhibit A.

A review of the current status of ash disposal requirements (References "H" & "I") being formulated for State of California WTE projects, indicates there are still uncertainties but that some of the issues are nearing resolution.

CWMB has estimated that the burning of MSW in the State's planned WTE plants will produce almost two million tons of ash annually that must be landfilled. If the ash is classified hazardous, CWMB predicts that six SB-1855 projects (Humboldt, Central Contra Costa, San Francisco, Alameda, Los Angeles County and San Diego) would spend \$68 million (in 1982 dollars to dispose of about 1800 tons per day of ash they will produce, amounting to more than \$100 per ton of ash). If the ash were classified as being nonhazardous costs would be reduced to about \$3.5 million a year (again in 1982 dollars, amounting to less than \$6 per ton of ash).

Because of the inability of the regulatory agencies to formulate definitive standards for classifying the ash, and the economic incentives to classify the ash as nonhazardous, in 1982, the DOHS issued a policy letter allowing for case - by -

case declassifications of ash at proposed WTE facilities based upon controlling the waste coming into the facility. Subsequent to the DOHS decision, several proposed projects: e.g. Fresno County Fresno-Clovis, Tri-Cities (Fremont, Union City and Newark), San Joaquin County (a private biomass-fired cogeneration project), Eureka, San Diego County, San Francisco, Long Beach and Modesto have received ash declassifications from DOHS but have experienced uncertain disposal requirements from Regional Water Quality Control Boards (RWQCB's). This uncertainty is based upon a lack of available data on the leaching characteristics of the ash in a landfill environment.

CWMB has proposed additional research to obtain the needed data on leaching characteristics of ash in the expectation that the research will support their contention that the wastes (MSW and MSW ash) are similar enough in leaching nature to manage in the same manner as nonhazardous materials.

iii. California Waste Extraction Test (WET)

In the meanwhile, CWMB has provided California Waste Extraction Test (WET) data which may serve as interim guidance on toxic metals allowed in ash (Reference I). The WET data is displayed in Table 82-09-05.2.3 and is intended to be used in lieu of the EPA Extraction Procedure.

The predicted concentrations for non-criteria metals in ash, displayed in Tables 82-09-05.2.1 and 82-09-05.2.2 may be checked against the Total Threshold Limit Concentration (TTLC) given in Table 82-09-05.2.3. TTLC concentration limits are set for the Nitric Acid Digestion Process proposed by CWMB. If ash samples pass this test, the ash is classified nonhazardous for toxic metals and there would be no need for the secondary test to determine Soluble Threshold Limit Concentrations.

Assuming composite ash samples (e.g. combined fly ash and bottom ash) will be allowed, a check of predicted non-criteria metal concentration for total ash (Column 3 in Tables 82-09-05.2.1 and 82-09-05.2.2) against respective TTLC's in Table 82-09-05.2.3 will indicate which of the metals have the potential to cause the ash sample to be classified hazardous. These are tabulated as follows:

	<u>Concentration (ppm)</u>		<u>RDF Combustion</u>
	<u>TTLC</u>	<u>MSW Combustion</u>	
Lead	1000	900	1100
Mercury	20	9.7	23
Antimony	500	187	626
Copper	250	2533	4708

Total ash concentration for RDF combustion are generally higher than for MSW combustion because weight of total ash is less for RDF combustion without commensurate reduction in the respective metal.

e) Literature Revue

A literature revue of non-criteria metals emissions from existing waste combustion facilities was performed in order to obtain the baseline data required to predict emissions for the proposed North Santa Clara County (NSCC) combustion facilities and then to compare measured emissions of existing waste combustion facilities with the emissions predicted for NSCC. The emission data, culled from the literature, is displayed in Tables 82-09-05.2.4 through 82-09-05.2.8. A discussion of these reference source tables and their relation to the metal emission estimates of tables 82-09-05.2.1 and 82-09-05.2.2 follows.

1. Table 82-09-05.2.4
Comparison of Average Non-Criteria
Pollutant Metal Emissions
From MSW Combustion

Fly ash emission data obtained on four MSW combustion plants are excerpted from the reference sources: "C" for MSW incinerators at Washington D.C. SWRC #1 and at Alexandria, VA; "D" for the MSW incinerator at Nicosia, East Chicago, IN; and "E" for the Braintree, MA MSW mass burn waterwall incinerator.

Reference "C" is the companion paper to reference "A" which set forth the material balance methodology used in part in developing non-criteria metal emission & concentrations predictions for the proposed North Santa Clara County combustion facilities.

Reviewing the data in Table 82-09-05.2.4 for each of the non-criteria metals at respective plants, there appears to be reasonably good agreement in the composition of the suspended particles (e.g. atmospheric fly ash emissions). Some of the differences are attributed to the pollution control devices provided and the collection efficiencies that can be expected at respective plants. The Nicosia incinerator has a spray chamber followed by a plate type scrubbing tower, resulting in a total suspended particulate (TSP) emission of 8 lb/ton MSW. The Alexandria incinerator has a water-spray baffle with somewhat better collection efficiency, resulting in a TSP of 5.6 lb/ton MSW. Both Braintree and Washington D.C. employ electrostatic precipitators (ESP's) resulting in improved collection efficiencies; e.g. TSP's of 2.7 and 0.9 lb/ton MSW for Braintree and Washington D.C. respectively.

The air pollution control train proposed for the North Santa Clara County project would be designed for a superior collection efficiency of 99.5% on even small size particulate (e.g. 2 microns and less) which characterizes many of the trace metals. Assuming uncontrolled MSW combustion particulate emissions approximate 40 lb/ton MSW, this would result in a TSP controlled emission of 0.2 lb/ton MSW.

The 0.2 lb/ton MSW emission level would be a 4.5-fold improvement over the Washington D.C. SWRC #1 plant as regards collection of total suspended particulates. The superior collection efficiency proposed for North Santa Clara County is to be achieved by use of fabric filter bag house air pollution controls in lieu of electrostatic precipitators used at the Washington DC plant. The fabric filter is particularly effective in collecting the small micron sized particles which characterize the metal emissions. See Figure 1, "Fractional Efficiency Curves for Conventional Air Pollution Control Devices".

11. Table 82-09-05.2.5
Emission Factors For TSP & HCl
Based on Total Feed Material

This table is based on data taken from Reference "J" report prepared by Monsanto Research Corporation under Contract to the Industrial Environmental Research Laboratory (IERL) of the U.S. Environmental Protection Agency (EPA) intended to supplement and update EPA's "Compilation of Air Pollution Emission Factors" as a source of information concerning emission rates from solid waste combustion. The reference report is purported to be state-of-the-art which would provide information to EPA regional and program offices that is useful for decision-making regarding environmental programs and the technological feasibility of compliance with existing or forthcoming regulations.

The table provides uncontrolled emission factors for total suspended particulates (TSP) for mass and RDF combustion facilities which are at odds with data developed by the California Air Resources Board (CARB) in a report issued on March 17, 1980. Comparative data is as follows:

	<u>Emission Factors (lb/ton MSW)</u>	
	<u>Category II</u>	<u>Category III</u>
	<u>MSW Combustion</u>	<u>RDF Combustion</u>
Reference "J"	20	134
CARB Report	43	38

It is our judgement that the emission factors given in the CARB report would be more representative of the combustion facility designs proposed for North Santa Clara County and therefore the CARB emission factors are used as the data base in estimating non-criteria metal emissions and concentrations.

The 20 lb/ton MSW uncontrolled emission factor suggested in Reference "J" for Category II MSW combustion is believed to be too low since it is an average of data obtained under non-representative test conditions rather than normal day-to-day operations. Facility operators will use lower than normal

excess air quantities when testing for particulate emissions compliance since furnace operations at low excess air will result in lower particulate emissions. Low excess air will however increase CO and HC emissions, but since statutory source emission regulations only require compliance with particulate emissions, the emphasis in the testing procedure in the past has been to operate the furnace so that particulate emissions are minimal, without concern about CO and HC emissions.

The 134 lb/ton MSW uncontrolled emission factor suggested in Reference "J", displayed in Table 83-09-05.2.5, for Category III RDF combustion is believed to be on the high side for converting trace metal concentrations, expressed in ppm, to actual metal emissions. The CARB estimate of 38 lb/ton MSW would be more appropriate for our purposes. The Reference "J" 134 lb/ton MSW emission factor is an average of tests performed on RDF spreader stoker furnaces that may have been undersized in furnace volume for the service. Accordingly, the carryover of particulate would be excessive. Furthermore, it would be expected, that much of the carryover is large particulate that could be collected in cyclone collectors installed upstream of the fabric filter bag houses, or it would fall out in the boiler passages or quench reactor towers upstream of the fabric filter bag houses. In any event, it is safe to assume that the bag houses would only see a total suspended particulate emission in the range of 38 lb/ton MSW (the CARB projection) rather than the 134 lb/ton MSW value given in Reference "J".

In reference "J", the MSW combustion system with heat recovery is designated Category II and the RDF combustion system with heat recovery is designated Category III. Both Categories II and III are of interest in comparing emission data observed by others with our predictions for the North Santa Clara County (NSCC) waste to energy project. Reference "J" includes emission data on MSW combustion without heat recovery (designated Category I) and also on coal combustion. The Category I and coal data is included in Table 82-09-05.2.5 and also in Tables 82-09-05.2.6 and 82-09-05.2.7. Category I data is of special interest since our predictions for NSCC emissions were based in part on a material balance methodology presented in reference "A" where experience in Category I combustion facilities was used as a basis of the analyses. There is sufficient agreement between Category I and II combustion to warrant this approach.

We believe too that much of the Category II test data from reference "J" is artificially low for reasons given above (e.g. facility operators for self-serving purposes using lower than normal excess air quantities when testing for particulate emissions since it will result in lower quantities of particulates emitted). Category I furnace operations generally require higher levels of excess air than does Category II for cooling the Category I refractory-lined furnaces to prevent

overheating. This additional air for cooling is not normally required in Category II waterwall furnace operations since here the furnace is cooled by direct radiation to the waterwalls. Thus the Category I test data reported may in fact be more representative for Category II normal operations than the Category II test data itself.

In subsequent discussion, we will provide a cross-check between predictions for NSCC emissions based in part on Category I combustion with emissions reported by others for Category II as well as Category III combustion.

Hydrogen chloride emission factors that are given in Table 82-09-05.2.5 are discussed below in paragraph 3 covering Hydrogen Chloride & Fluoride.

111. Table 82-09-05.2.6
Concentration of Trace Elements in
Uncontrolled Particulate Emissions

MSW Combustion (Category II) Systems

Comparison of trace metal uncontrolled concentrations for MSW combustion (Category II) systems displayed in Table 82-09-05.2.6, taken from reference "J" with the uncontrolled concentrations predicted for NSCC given in Table 82-09-05.2.1 indicates relatively good agreement, with several exceptions noted as follows:

- ° Antimony - Predictions for NSCC at 1200 ppm are about twice that given for the highest of the range (260-620) given in Table 82-09-05-2.6 and is attributable to the higher than usual concentrations found by Cal Recovery Systems in NSCC MSW combustibles. See Table 82-09-05.2.9.
- ° Barium - Predictions for NSCC at 1040 ppm are again about twice the highest of the range (270-540) given in Table 82-09-05.2.6. Here however, the disparity cannot be explained by Cal Recovery Systems data, since they found average concentrations for barium in NSCC MSW combustibles to be lower than reported by others. See Table 82-09-05.2.9. This supports the hypothesis that barium in NSCC MSW noncombustibles may contribute to the higher barium concentrations that are predicted.
- ° Cadmium - Predictions for NSCC at 88 ppm are about 25% of the lowest of the range (380-820) given in Table 82-09-05.2.6 and may be explained by Cal Recovery Systems data, since they report very low levels of cadmium in NSCC MSW combustibles.
- ° Cobalt - NSCC predictions for cobalt at 160 ppm are higher than the range (10-100) given in Table 82-09-05.2.6. The Cal Recovery Systems data on cobalt in MSW combustibles

indicates the cobolt level to be lower than reported by others. The higher cobolt concentrations that are predicted are surmised to be due to the cobolt in NSCC MSW noncombustibles.

- ° Lead - NSCC predictions for lead at 7360 ppm are somewhat lower than the range (11,600-17,500) given in Table 82-09-05.2.6. This is attributable to the lower than usual concentrations found by Cal Recovery Systems in NSCC MSW Combustibles, shown in Table 82-09-05.2.9.

RDF Combustion (Category III) Systems

Comparison of trace metal uncontrolled concentrations for RDF combustion (Category III) systems displayed in Table 82-09-05.2.6, taken from reference "J", with the uncontrolled concentration predictions for NSCC given in Table 82-09-05.2 indicates relatively good agreement for arsenic, lead and selenium but very poor agreement for antimony, cadmium, chromium, cobolt, copper, manganese, nickel and zinc. The disagreement is so great in concentrations given for antimony, cadmium, chromium, cobolt, copper, manganese & nickel, that the Category III data given in Table 82-09-05.2.6 for these metals is suspect of being in gross error.

Prediction of zinc concentration at 5,179 ppm in uncontrolled emissions in Table 82-09-05.2.2 is greater than the range (860-3,770) of Category III uncontrolled concentrations given in Table 82-09-05.2.6 for zinc. Yet in Table 82-09-05.2.9, Cal Recovery Systems shows zinc concentrations in NSCC combustibles fraction at about one-half that of the concentrations reported by others. The greater zinc concentration is attributed to the zinc in the noncombustibles fraction that is carried over into the RDF when processing MSW to RDF.

iv. Table 82-09-05.2.7 Concentration of Trace Elements in Controlled Particulate Emissions

MSW Combustion (Category II) Systems

Comparison of trace metal controlled concentrations for MSW combustion (Category II) systems displayed in Table 82-09-05.2.7, taken from reference "J", with the controlled concentrations predicted for NSCC given in Table 82-09-05.2.1 follows the pattern for the uncontrolled concentration comparison of specific metals discussed above in paragraph iii, with the exception of copper.

- ° Copper - Whereas copper uncontrolled concentrations predicted for NSCC showed good agreement with the range of data presented in Table 82-09-05.2.6 for uncontrolled concentrations of copper, the controlled concentrations of copper at 440 ppm predicted for NSCC fall below the range

of values (620-800) for controlled copper concentrations given in Table 82-09-05.2.7. An explanation for the observation may be the poor collection efficiency for copper particulates relative to the total suspended particulates in the air pollution control systems used at the plants which provided data sources for reference "J". In predicting NSCC controlled copper concentrations, displayed in Table 82-09-05.2.1, we expect a uniformly superior collection efficiency of 99.5% for all particulates including the copper.

RDF Combustion (Category III) Systems

Comparison of trace metal controlled concentrations for RDF combustion (Category III) systems displayed in Table 82-09-05.2.7, taken from reference "J", with the controlled concentrations predicted for NSCC given in Table 82-09-05-2.2 is compoundly difficult because of questionable accuracy of some of the data reported from reference "J". In general however, the agreement between the NSCC predictions are better for controlled concentrations than they are for uncontrolled concentrations. Further insights to the controlled concentrations differences will be brought out in discussion of controlled emissions of trace elements presented in the following paragraphs:

v. Table 82-09-05.2.8 Controlled Emissions of Trace Elements

The controlled emission data (expressed in the unit lb/1000 ton), displayed in Table 82-09-05.2.8, is developed from the data given in Tables 82-09-05.2.5 and 82-09-05.2.7. To obtain the controlled emission for a trace metal displayed in Table 82-09-05.2.8, the controlled emission factor for total suspended particulates (TSP) given in Table 82-09-05.2.5 is multiplied by respective trace metal controlled concentration, given in Table 82-09-05.2.7. An example for antimony in the MSW combustion (Category II) system is as follows:

$$\begin{aligned} & 0.100 \frac{\text{lb}}{\text{Ton}} \text{ (Controlled Emission Factor for TSP)} \\ & \times 460 \text{ ppm (Controlled Concentration for Antimony)} \\ & = 0.100 \frac{\text{lb}}{\text{ton}} \times \frac{460}{1,000,000} = \frac{0.046 \text{ lb}}{1000 \text{ tons}} \end{aligned}$$

The controlled trace metal emission data of Table 82-09-05.2.8 (derived from reference "J" as indicated above) is compared to emissions predicted for NSCC. The NSCC emission data is given in column (4) of Table 82-09-05.2.1 for MSW combustion (Category II) systems and column (4) of Table 82-09-05.2.2 for RDF combustion (Category III) systems.

The following is a discussion of both sets of data for the trace metal emissions being compared:

• Antimony - emissions predicted for NSCC for both MSW (Category II) and RDF (Category III) combustion systems at about 0.24 lb/1000 ton MSW are about twice the maximum emissions shown in Table 82-09-05.2.8. The NSCC predictions for antimony are believed to be both conservative and realistic in view of Cal Recovery Systems' findings that antimony concentration in NSCC MSW combustibles are about twice that reported by others.

• Arsenic - Emissions predicted for NSCC for MSW combustion (Category II) systems at 0.01 lb/1000 ton MSW is on the high side of that shown in Table 82-09-05.2.8. Our prediction is therefore believed to be both conservative and realistic. We would expect RDF combustion (Category III) emissions would be about the same as for the MSW combustion (Category II) systems, as predicted in Table 82-09-05.2.2. The range of emissions (0.094-0.496) shown for Category III arsenic emissions in Table 82-09-05.2.8 derived from reference "J" is unbelievably high and will be disregarded.

• Barium - The 0.21 lb/1000 ton emission predicted for NSCC for MSW combustion (Category II) systems given in Table 82-09-05.2.1 is somewhat higher than shown in Table 82-09-05.2.8 (e.g. 0.21 vis-a-vis range of 0.027-0.054). Since Table 82-09-05.2.9 indicates barium concentrations in NSCC MSW combustibles to be 110 ppm compared to 170 reported by others, the higher 0.21 lb/1000 lb emission predicted for barium is presumed to be due to the barium MSW noncombustibles. See discussion in paragraph iii and iv above for uncontrolled and controlled concentrations of barium.

Reference "J" provides no data on RDF combustion (Category III) systems to check against our 0.18 lb/1000 ton prediction for barium controlled emissions given in Table 82-09-05.2.2, Column (4).

• Cadmium - The 0.02 lb/1000 ton controlled emission predicted for NSCC for NSCC for MSW combustion (Category II) systems given in Table 82-09-05.2.1 is considerably below the range 0.067-0.115 shown in Table 82-09-05.2.8. This can be expected since Cal Recovery Systems found cadmium concentration in NSCC MSW combustibles to be less than one-third that reported by others.

We believe that effective removal of noncombustible from the MSW, as is proposed in the RDF Manufacturing facility, will further reduce cadmium emissions to a level of 0.013 lb/1000 ton for the RDF combustion (Category III) system. See Table 82-09-05.2.2. This is somewhat higher than the range (0.0001-0.0067) shown in Table 82-09-05.2.8, but our analysis of the data does not justify a lower prediction

than the 0.013 lb/1000 ton controlled emission rate given for cadmium in an RDF combustion (Category III) system.

• Chromium - The 0.08 lb/1000 ton controlled emission predicted for NSCC for MSW combustion (Category II) systems given in Table 82-09-05.2.1 is above the range (0.013-0.026) shown in Table 82-09-05.2.8. Although Cal Recovery Systems found chromium concentration in NSCC MSW combustibles to be about one-third that reported by others (see Table 82-09-05.2.0), we would expect noncombustibles in the MSW to also contribute to chromium emissions. The prediction for chromium emission at 0.08 lb/1000 ton is not considered excessive, but rather reasonably conservative, especially in view of the 0.040-0.067 range of controlled emissions for chromium shown in Table 82-09-05.2.8 for chromium in RDF combustion (Category III) system. Since we estimate that the noncombustible fraction of MSW can contribute as much chromium emissions as the MSW combustible fraction, our prediction for chromium controlled emissions in a RDF combustion (Category III) system is 0.04 lb/1000 ton.

• Cobalt - Assuming the cobalt in MSW noncombustibles contributes about twice the emissions of MSW combustibles, we predict controlled emissions for cobalt in a MSW combustion (Category II) system to be 0.03 lb/1000 tons. This level is above the 0.0005-0.005 range shown in Table 82-09-05.2.8. Although our prediction appears high relative to the reported range for Category II cobalt emissions, confidence in the 0.03 lb/1000 tons prediction is reinforced by the range of controlled emissions given for cobalt (0.0027-0.027) in an RDF combustion (Category III) system. Based on our assumptions, we predict controlled emissions for cobalt in a RDF combustion (Category III) system to be 0.016 lb/1000 tons. This prediction for the RDF combustion system follows from the 0.03 lb/1000 tons prediction for controlled emission of cobalt in a MSW combustion system. It is premised on most of the cobalt in the MSW noncombustibles being removed in the RDF manufacturing facility and not subjected to combustion. The 0.016 lb/1000 ton prediction falls in the 0.0027-0.027 range, given in Table 82-09-05.2.8 for the RDF combustion (Category III) system.

• Copper - The 0.09 lb/1000 ton copper controlled emission predicted for NSCC for MSW combustion (Category II) systems given in Table 82-09-05.2.1 is only slightly above the range (0.062-0.080) shown in Table 82-09-05.2.8. This may be attributable to the higher than usual concentration of copper in the NSCC MSW combustibles reported by Cal Recovery Systems. See Table 82-09-05.2.9.

The 0.046 lb/1000 ton for controlled emission predicted for RDF combustion (Category III) systems given in Table

82-09-05.2.2 is within the range (0.034 - 0.188) shown in Table 82-09-05.2.8, however at the low end of the range.

Predictions on copper controlled emissions for MSW and for RDF combustion systems corroborate each other and are deemed reasonable.

• Lead - Cal Recovery System reports lead concentrations in NSCC MSW combustibles to be considerably lower than reported by others (e.g. 50 vis-a-vis 330 ppm), as shown in Table 82-09-05.2.9. This accounts for our 1.50 lb/1000 ton prediction for lead controlled emissions being below the range (1.810 - 3.420) given for Category II systems in Table 82-09-05.2.8. Our 0.50 lb/1000 ton prediction for lead controlled emission in RDF combustion (Category III) systems is considerably below the range (2.995 - 12.323) given for Category III in Table 82-09-05.2.8, but nevertheless would be expected because about two-thirds of the lead in MSW is removed with the noncombustibles in the RDF manufacturing facility and is not subject to the combustion process.

• Manganese - There is a high concentration of manganese in the combustible fraction of NSCC MSW, as reported by Cal Recovery Systems. At the same time, large quantities of manganese can be expected in the MSW noncombustibles. Although, most of the manganese would report to the bottom ash, sufficient manganese would be emitted to approach the controlled emission level prediction (0.33 lb/1000 tons) for MSW combustion (Category II) systems, even with air pollution controls operating at an estimated 99.5% collection efficiency.

Manganese controlled emission for RDF combustion (Category III) systems is predicted to be 0.17 lb/1000 tons. This is only slightly above the range (0.074 - 0.161) given in Table 82-09-05.2.8 for the Category III systems and reinforces confidence in the 0.33 lb/1000 tons manganese controlled emission level predicted for MSW combustion (Category II) systems, despite the latter's disagreement with the range of values (0.014 - 0.049) given in Table 82-09-05.2.8.

• Nickel - Table 82-09-05.2.8 has no data relative to nickel controlled emissions for MSW combustion (Category II) systems and therefore we must forego a check on our 0.09 lb/1000 ton prediction given in Table 82-09-05.2.1.

Table 82-09-05.2.8 does however provide a range (0.013 - 0.127) of controlled emissions for nickel in a RDF combustion (Category III) system which checks well with our 0.04 lb/1000 tons prediction of controlled emission for nickel in a RDF Combustion (Category III) System. It further reinforces confidence in our 0.09 lb/1000 ton

prediction, given in Table 82-09-05.2.1 for cobalt controlled emissions in MSW combustion (Category II) systems, since the 0.09 lb/1000 ton prediction was our base for predicting the 0.04 lb/1000 tons value for controlled emission of nickel in RDF combustion systems.

- Selenium - Selenium controlled emissions for both MSW and RDF combustion (Category II and III) systems at 0.002 lb/1000 tons show good agreement with the range of data reported by others, as displayed in Table 82-09-05.2.8.
- Silver - Our controlled emission prediction for silver in a MSW combustion (Category II) system is 0.02 lb/1000 tons compared to the range (0.005 - 0.011) of values found by others displayed in Table 82-09-05.2.8. Although Cal Recovery Systems has not found excessive concentrations of silver in MSW combustibles, the amount of silver from the MSW noncombustibles could account for the 0.02 lb/1000 tons prediction.

Table 82-09-05.2.8 provides no data for controlled emissions of silver in RDF combustion (Category III) systems to compare with our prediction of 0.015 lb/1000 tons for the controlled emission of silver in RDF combustion (Category III) systems. The 0.015 lb/1000 tons prediction follows from our earlier 0.02 lb/1000 tons prediction for controlled emission of silver in MSW combustion (Category II) system. Both of our Category II and III predictions for silver are reasonable and data found by others (displayed in Table 82-09-05.2.8) is not sufficiently convincing to warrant any change therefrom.

- Zinc - Our predictions for controlled emissions of zinc in both MSW & RDF combustion (Category II and III) systems, 1.76 and 1.00 lb/1000 tons respectively, are on the low side compared to the range of values found by others displayed in Table 82-09-05.2.8. The Cal Recovery Systems report on low concentrations of zinc in MSW combustibles reinforces confidence in our predictions, even if they are somewhat lower than were found by others.

vi. Table 82-09-05.2.9
Metals in MSW Combustibles

Table 82-09-05.2.9 is a tabulation of metals in MSW combustibles comparing the concentrations of these metals reported by Cal Recovery Systems for NSCC waste with data found by others. The information reported by Cal Recovery systems is useful in developing and corroborating the metal concentration and emission predictions for the non-criteria pollutant metals given in Tables 82-09-05.2.1 and 82-09-05.2.2.

f. Mercury as a Special Case

Because mercury is a very volatile metal (e.g. boiling point = 675°F), it might be expected that very little, if any of the metal would remain in the bottom ash. That is practically all of the mercury will be volatilized and carried off with the gas products of combustion either as vapor or adhering to fly ash particulates.

Based on a survey of mercury emission data available from Braintree, MA.; Hamilton, Ontario Canada; Gent, Belgium and WTE plants in Germany, reference "K" concludes that a conservative estimate of total mercury emissions from MSW is 6.4 lb/1000 tons MSW burned.

Cal Recovery Systems reports (See Table 82-00-05.2.9) mercury concentration in NSCC MSW combustibles to be 2.1 ppm which is higher than the 1.2 ppm average reported by others.

Reference "L" reports mercury gaseous emissions to be about 40 times the mercury particulate emissions. This may account for the wide range of data on mercury emissions reported to date in the literature, since many of the researchers fail to distinguish between vapor and solids phase emissions. Reference "L" ventures an estimate of mercury particulate emissions at 0.16 lb/1000 tons which is based on tests at the Braintree, MA plant, where it is known that the electrostatic precipitator there has failed to come up to expectations. Using a 99.5% efficient fabric filter bag house air pollution control device, we predict mercury particulate emission of 0.02 lb/1000 tons for MSW combustion (Table 82-09-05.2.1) and 0.016 lb/1000 tons for RDF combustion (Table 82-09-05.2.2).

A pertinent observation in managing mercury emission from combustion processes is to note the environmental trade-offs. As seen by reference to discussion above (par. c on Air quality Standards and par. d on Water Quality Standards), the assumed 99.5% collection efficiency for air pollution controls may concentrate too much mercury in the total ash (bottom plus fly ash) and thereby jeopardize California water quality standards being met by failure to comply with allowable WET ash leachate threshold levels. As can be seen by reference to the predicted and allowable atmospheric emissions given in par. c on Air Quality Standards, there appears to be more tolerance for larger emissions of mercury to the atmosphere than it being further concentrated in the collected fly ash, particularly for the RDF combustion systems. A possible means of reducing the mercury concentration level in collected ash is to add the RDF rejects to the ash before disposing the mixture in the landfill.

3. Hydrogen Chloride and Fluoride

a) Hydrogen Chloride (HCl)

Data on HCl emissions are given in reference "C", "D", "J", "K", "L" and "M".

MSW or RDF combustion would generate HCl gas due to thermal reaction of sources of hydrogen in the waste with plastics containing chlorine such as polyvinyl chloride and with other chlorine -

containing components such as common salt (sodium chloride).

Weighted average of Cal Recovery Systems data on chlorine in NSCC MSW combustibles, as reported in reference "B", indicates relatively high concentration - 1.25% on a moisture and ash-free basis. This may be compared with the 0.84% concentration previously estimated by Hayden-Wegman/Carollo. The 0.84% value is obtained after correcting the data displayed in Table 2 of Summary Report 82-09-03-3 to delete moisture and ash so that comparison is performed on a uniform moisture and ash-free basis.

Table 83-09-05.2.5 includes data on uncontrolled and controlled HCl emissions from MSW combustion without heat recovery (Category I) systems and also for RDF combustion with heat recovery (Category III) systems as well as for combustion of coal. This data is based on information from reference "J". Data on MSW combustion with heat recovery (Category II) systems is not given, but it may be assumed to agree with the Category I systems. Reference "K" states that only about half of the chloride in the waste is converted to HCl. This statement would probably be more accurate for Category I and II combustion systems, but not as accurate for the Category III Systems where all of the chloride in the RDF is likely to be converted to HCl. The uncontrolled HCl emission data for Category III systems (3.2 lb/ton MSW) compared to that for Category I (1.4 lb/ton MSW) both displayed in Table 93-09-05.2.5, would appear to corroborate this.

Reference "K" concludes that a reasonable estimate of the hydrochloric acid emissions is 3.4 lb/ton equivalent to 200 ppm. This agrees reasonably well with the 3.4 lb/ton + 3.2 lb/ton estimate given in reference "L", although the variation off the average indicates higher levels than the 3.4 lb/ton average is possible and is probable for NSCC in view of Cal Recovery Systems data given in reference "B".

Controlled emissions of HCl is taken to be one-tenth of the uncontrolled emission, assuming the proposed quench tower/baghouse air pollution control equipment can achieve a HCl removal efficiency of 90%.

b. Hydrogen Fluoride (HF)

Data on HF emissions are given in reference "K", "L" and "M".

Very much like chlorine, the combustion process would chemically react hydrogen in the waste with fluorine from plastics and other sources to generate HF gas.

References "K", "L" and "M" predict uncontrolled emissions for HF to be in the range 0.06 to 0.10 lb/ton MSW or an average of 0.08 lb/ton MSW. This is less than the 3.4 lb/ton MSW uncontrolled emission estimate for HCl by a factor of about 40.

Weighted average of Cal Recovery Systems data on fluorine in NSCC

MSW combustibles as reported in reference "B", indicates a fluorine concentration of 0.007% on a moisture and ash free basis, this is less than the 1.25% concentration found for chlorine in NSCC MSW combustibles by a factor of about 180.

Assuming the high end of the estimated range for HF uncontrolled HF emissions, at 0.1 lb/ton MSW and assuming MSW combustion rate at 1000 tons per day, 365 days per year, the HF uncontrolled emissions is calculated to be 18.25 tons per year. Assuming a collection efficiency of 90%, controlled HF emissions would then be about 1.83 tons per year. This is less than the 3.0 tons per year maximum emission level permitted, which if exceeded, would mandate a prevention of significant deterioration (PSD) review.

Another analytical approach might be to assume that HF emissions would be less than HCl emissions by a factor of 180, equivalent to the ratio of the concentration of fluorine in MSW combustibles relative to chlorine, as reported by Cal Recovery Systems. Referring to Table 83-09-05.2.5, HCl controlled emissions is estimated at 0.140 lb/ton for Category I and possibly Category II combustion systems, whereas HCl controlled emissions is estimated at 0.320 lb/ton for Category III RDF combustion systems. Calculated tons per year of HF for the Category III RDF combustion system is then as follows:

$$\frac{0.320 \text{ lb}}{\text{ton}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \frac{1}{180} \times 365,000 \frac{\text{tons}}{\text{yr}} = 0.32 \frac{\text{tons}}{\text{yr}}$$

This is still less than the 3.0 tons per year maximum emission level permitted for fluorides and therefore the PSD review should be waived.

4. Sulfuric Acid Mist

Reference "K" states little data is available on emissions of sulfuric acid mist, but based on a measurement taken on the Harrisburg, PA mass burn waterwall furnace suggests it is 1.6% of the SO₂ emission rate. On the basis of a 2.4 lb/ton rate for SO₂, sulfuric acid emission rate of 0.04 lb/ton is calculated. Collection will occur at high efficiency (99.5%) at the baghouse where it will be neutralized by unreacted lime from the dry scrubber. Controlled emission rate for sulfuric acid mist would then be 0.04 lb/ton (1-0.995) = 0.0002 lb/ton.

Assuming 1000 tons per day MSW combustion rate, 365 days per year, the tons per year of sulfuric acid mist emitted is calculated as follows:

$$\frac{0.0002 \text{ lb}}{\text{ton}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times 365,000 \frac{\text{tons}}{\text{yr}} = 0.037 \frac{\text{tons}}{\text{yr}}$$

This is less than the 7.0 tons per year maximum emission level permitted for sulfuric acid mist and therefore the PSD review should be waived.

5. Hydrogen Sulfide, Reduced Sulfur & Reduced Sulfur Compounds

These compounds are oxidized by the combustion process to SO_2 and SO_3 which are collected by the proposed dry scrubber air pollution control equipment; SO_2 at 85% efficiency and SO_3 (which is a fine droplet) at 99.5% efficiency.

6. Asbestos

Reference "K" states no data were found for asbestos emissions. Reference "N" confirms that size of emitted asbestos particles are relatively large and are amenable to high efficiency collection (99.9% plus) in proposed dry scrubber/baghouse air pollution control equipment.

7. Aldehydes (RCHO)

Reference "L" estimates aldehydes atmospheric emissions as follows:

0.07 lb/ton MSW

This is equivalent to:

70 lb/1000 ton MSW

8. Carboxylic Acid (RCOOH)

Reference "L" estimates carboxylic acid (RCOOH) atmospheric emissions as follows:

0.15 lb/ton MSW

This is equivalent to:

150 lb/1000 ton MSW

9. Vinyl Chloride Monomers (VCM)

References "K", "L" and "M" all conclude that vinyl chloride monomers are combustible and would be oxidized to carbon dioxide, water and hydrogen chloride (HCl) gas in the furnace atmosphere. The HCl gas formed in the VCM combustion process is accounted for in paragraph 3 (a) above.

10. Polynuclear Aromatic Hydrocarbons (PAH)

Two reference sources, "K" and "J" provide emission data on polynuclear aromatic hydrocarbons (PAH).

Reference "K" notes that PAH are common products of incomplete combustion of carbonaceous fuels and have been found in the emissions from many sources, including MSW combustion facilities. Reference "K" does not identify all of the PAH compounds but states that pyrene, fluoranthene and benzoanthracene were major constituents in many cases. Considering

the wide variation at the available data, reference "K" has selected an average value of 10 lb/1000 tons MSW as being representative.

Reference "J" provides more specific emission data relative to PAH and points out the considerable reduction in PAH emissions in RDF combustion (Category III) systems relative to the MSW combustion without heat recovery (Category I) systems. No data is given on the MSW combustion with heat recovery (Category II) systems, although it may be expected to approximate the Category I emissions.

11. Polychlorinated Biphenyls (PCB)

Reference "K" reports PCB emissions having been found in trace amounts in several municipal waste-to-energy plants (e.g. Chicago NW, Dade County and Braintree). These emissions result from incomplete destruction of traces of PCB's found in the waste feed. Since the manufacture and distribution of PCB's is now prohibited, the amounts found in the refuse, and therefore the amount in the emissions, can be expected to decline in the future. Considering the available data, reference "K" suggests a reasonably conservative value for estimating PCB emissions to be 0.13 lb/1000 ton.

12. Dioxins and Furans

Traces of polychlorinated dibenzo-para-dioxins and dibenzofurans (dioxins and furans) have been identified in the emissions from a number of municipal incinerators abroad and in the U.S. (Reference "K").

Concern for these pollutants evolved in the late 1970's when analytic techniques were developed to measure these trace pollutants in the parts per trillion (10^{-12}) range. (Reference "M"). The measurement is not a simple task. It requires considerable sophistication to collect representative stack samples, extract dioxins from particulates, and separate dioxins from its isomers. The final identification of the 2,3,7,8-TCDD isomer (considered the most toxic of all dioxins and furans) is by gas chromatography-mass spectrometry and requires extremely skilled personnel.

Several theories have been proposed to account for the presence of dioxins and furans in the waste combustion plant emissions.

- ° they may be present in the feed and pass through the incinerator undestroyed,
- ° they may be formed from precursors such as chlorinated phenols, chlorinated benzenes or PCB's present in the feed or
- ° they may be formed by the reaction of traces of chlorine present in the feed with complex organics formed in the combustion process

a) Dioxins

Emission data, culled from the literature, is given as follows:

- Nashville, TN (Reference "M")

A single particulate sample collected from the stack of the municipal waste incinerator at Nashville, Tenn., by Dow Chemical Co. The level of 2,3,7,8-TCDD in this sample was reported to be 0.4 ng/g. (0.4×10^{-9} g/g).

- Northern Italy and Europe (Reference "M")

Sample of total TCDD obtained and analyzed in Northern Italy and Europe. Values ranged from 0.065 to 10 ng/g in the fly ash.

- EPA Data (Reference "M")

Recent EPA samples and analysis of gaseous and particulate) stack effluents from waste incinerators in the USA. The stack values ranged from not detectable to 3.5 ng/m³ (3.5×10^{-9} g/m³).

- Battelle Report (Reference "K")

Battelle analyzed data from Dow Chemical Company as well as the data reported from Ontario and Europe and concluded that the average content of 2,3,7,8-TCDD in fly ash was 0.22 ng/g and that 2,3,7,8-TCDD represented 5% of the total TCDD content of fly ash. Battelle did not include the recent EPA data, other than to provide some dioxin vapor phase emission data. Battelle noted that the emissions reported for the Dutch incinerators are considerably higher than the other reported emissions (TCDD=54 vs 5.8 ng/g for ESP fly ash and 100 vs. 2 ng/g for stack particulates). Considering the available data, Battelle concluded that the best estimate of TCDD emissions possible is 1×10^{-9} to 500×10^{-9} lb/ton of refuse burned and that total dioxin emissions are possibly a factor of 10 higher. The emission estimated for the very toxic isomer 2,3,7,8-TCDD was 0.5×10^{-9} lb/ton of refuse burned. This was based on a 0.22 ng/g concentration of 2,3,7,8-TCDD in the fly ash relative to a 4.4 ng/g concentration of total TCDD in the fly ash (approximately 5% of 10×10^{-9} lb/ton = 0.5×10^{-9} lb/ton).

- Arthur D. Little Report (Reference "L")

A.D. Little analyzed the European data on TCDD emissions and came to the conclusion that the amount of 2,3,7,8-TCDD emitted per ton of refuse burned was 0.034×10^{-6} lb/ton. The 2,3,7,8-TCDD isomer was estimated to be 10% of the TCDD content.

Reference "L" includes emission data for other species of dioxins as well as for the 2,3,7,8-TCDD and TCDD as follows:

<u>Dioxin Species</u>	<u>Emission</u>
2,3,7,8-TCDD	34 x 10 ⁻⁹ lb/ton
TCDD	340 x 10 ⁻⁹ lb/ton
P5CDD	900 x 10 ⁻⁹ lb/ton
HCDD	1550 x 10 ⁻⁹ lb/ton
H7CDD	1550 x 10 ⁻⁹ lb/ton
OCDD	350 x 10 ⁻⁹ lb/ton

° Overview Report (Reference "O")

This report states a resource recovery plant burning 1500 tons per day of MSW would emit 0.06 oz. of 2,3,7,8-TCDD dioxins per year. (This is equivalent to 6.85 x 10⁻⁹ lb/ton).

Comparative data on 2,3,7,8-TCDD emissions from the references "K", "L", and "O" are then as follows:

<u>Reference</u>	<u>2,3,7,8-TCDD Emission</u>
"K"	0.50 x 10 ⁻⁹ lb/ton
"L"	34.00 x 10 ⁻⁹ lb/ton
"O"	6.85 x 10 ⁻⁹ lb/ton

Reference "O" also states that recent test data has shown that 98% of the generated dioxins that form in the combustion process are sorbed on collected fly ash and bottom ash and that only 2% is emitted to the atmosphere. This would indicate total ash (fly ash and bottom ash) amounts to 49 times the ash emitted to atmosphere. Reference "O" furthermore states that the fly ash and bottom ash can be safely placed in modern landfills since dioxins have a very low solubility in water and will therefore have a minimal leachate problem.

b) Furans

Reference "L" provides emission data for species of chlorinated dibenzofuranes (furans) as follows):

<u>Furan Species</u>	<u>Emission</u>
TCDF	520 x 10 ⁻⁹ lb/ton
P5CDF	1080 x 10 ⁻⁹ lb/ton
HCDF	1810 x 10 ⁻⁹ lb/ton
H7CDF	1280 x 10 ⁻⁹ lb/ton
OCDF	160 x 10 ⁻⁹ lb/ton

13. Pesticides and Herbicides

Concentrations of pesticides and herbicides in North Santa Clara County MSW combustibles, as determined by sampling survey and laboratory measurements are given in Table III-9 of Cal Recovery Systems Report 83-01 (Reference "B").

Summary data is given in Table 83-09-05.2.11.

Atmospheric emissions due to combustion of pesticides and herbicides in the waste are already accounted for in the analyses made for the criteria and non-criteria atmospheric (stack) emissions described to date. The following analyses will account for the pesticides and herbicides that may be incompletely burned in the furnaces and which may report to the bottom ash.

a) MSW Combustion

Based on 87.7% of NSCC MSW being combustible (on a dry basis), and facility throughput of 822 TPD₇ wet MSW @ 25% H₂O (0.75 x 822 = 617 TPD₇ dry), pesticides and herbicides (P₁, P₂ & H) processed along with MSW is the product of P₁, P₂ & H concentrations and the MSW combustibles throughput, as follows:

$$\begin{aligned} &*(837 + 4733 + 496) \times 10^{-9} \times 617 \text{ TPD}_7 \times 0.877 \\ &= 6066 \times 10^{-9} \times 541 \text{ TPD}_7 \end{aligned}$$

$$= 0.00328 \text{ TPD}_7 \text{ P}_1 \text{ P}_2 \text{ \& H, dry basis}$$

The 822 TPD₇ wet MSW @ 25% H₂O is reduced to 180 TPD₇ residue, dry basis (See Table 9**).

The residue is expected to contain:

5% combustible and
0.2% putrescible materials.
(See Outline Specification**, page 2-12).

The putrescible material production rate is computed as follows:

$$0.002 \times 180 \text{ TPD}_7 = 0.3600 \text{ TPD}_7$$

This putrescible material in the residue is calculated as a percentage of the incoming MSW combustibles, dry basis, as follows:

$$\frac{0.3600}{0.75 \times 822 \times 0.877} \times 100 = 0.0666\%$$

* From Table 83-09-05.2.11

** From Hayden-Wegman/Carollo Report No. 82-09-03-3

The total pesticides and herbicides are assumed to be incinerated in the furnace at the same efficiency as the MSW combustibles.

Thus the total pesticides and herbicides input, amounting to 0.00328 TPD₇ P₁ P₂ & H, dry basis, would be reduced to the following:

$$0.00328 \times 0.000666 = 2.18 \times 10^{-6} \text{ TPD}_7 \text{ P}_1 \text{ P}_2 \text{ \& H dry basis}$$

Maximum concentration of total pesticides and herbicides in the residue is then:

$$\frac{2.18 \times 10^{-6} \text{ TPD}_7 \text{ P}_1 \text{ P}_2 \text{ \& H, dry basis}}{180 \text{ TPD}_7 \text{ Residue, dry basis}} \\ = 12.1 \times 10^{-9} = 12.1 \text{ ppb}$$

The 6066 ppb maximum concentration of total pesticides and herbicides in MSW combustibles is then seen to be reduced to 12.1 ppb maximum concentration of pesticides and herbicides in the residue.

The calculation, given above, neglects the reacted lime products (e.g. Ca SO₄) of the flue gas desulfurization system, amounting to 90 TPD₇. (See Table 9, Report 82-09-03-3).

If the 90 TPD₇ is added to the 180 TPD₇ residue, total residue is 270 TPD₇, dry basis, and the resultant maximum concentration of pesticides and herbicides (P₁ P₂ & H) in residue is then computed as follows:

$$\frac{2.18 \times 10^{-6} \text{ TPD}_7 \text{ P}_1 \text{ P}_2 \text{ \& H, dry basis}}{270 \text{ TPD}_7 \text{ Modified Residue, dry basis}} \\ 8.1 \times 10^{-9} = 8.1 \text{ ppb}$$

The 6066 maximum concentration of total pesticides and herbicides, in MSW combustibles is then seen to be reduced to 8.1 ppb maximum concentration of pesticides and herbicides in the modified residue.

b) RDF Combustion

RDF manufactured, corresponding to 822 TPD₇ wet MSW @ 25% H₂O and 83.3% (dry basis) recovery rate, is as follows:

$$= 0.833 \times 0.75 \times 822 \text{ TPD}_7 \\ = 514 \text{ TPD}_7 \text{ RDF, dry basis}$$

Pesticides and Herbicides (P₁ P₂ & H) processed along with the MSW becomes part of the RDF. P₁ P₂ & H in the RDF is the product of P₁ P₂ & H concentrations and the RDF manufactured:

$$*(837 + 4733 + 496) \times 10^{-9} \times 514 \text{ TPD}_7$$

$$= 6066 \times 10^{-9} \times 514 \text{ TPD}_7$$

$$= 0.00312 \text{ TPD}_7 \text{ P}_1 \text{ P}_2 \text{ \& H, dry basis}$$

The 822 TPD₇ wet MSW @ 25% H₂O is initially reduced to 514 TPD₇ RDF, dry basis (643 TPD₇ wet basis @ 20% H₂O), which after combustion, is further reduced to 55 TPD₇ residue dry basis. (See Table 11**)

The residue is expected to contain:

5% combustible and

0.2% putrescible materials

(See Outline Specification**, page 2-56)

The putrescible material is computed as follows:

$$0.002 \times 55 \text{ TPD}_7 = 0.1100 \text{ TPD}_7$$

The putrescible material in the residue is calculated as a percentage of the RDF that is to be burned, dry basis as follows:

$$\frac{0.1100}{514} \times 100 = 0.0214\%$$

The total pesticides and herbicides (P₁ P₂ & H) are assumed to be incinerated in the furnace at the same efficiency as the RDF.

Thus the total pesticides and herbicides input in the RDF, amounting to 0.00312 TPD₇ P & H, dry basis would be reduced to

$$0.00312 \times 0.000214 = 0.67 \times 10^{-6} \text{ TPD}_7 \text{ P}_1 \text{ P}_2 \text{ \& H dry basis}$$

Maximum concentration of total pesticides and herbicides (P₁ P₂ & H) in the modified residue is then:

$$\frac{0.67 \times 10^{-6} \text{ TPD}_7 \text{ P \& H, dry basis}}{55 \text{ TPD}_7 \text{ residue, dry basis}}$$

$$= 12.1 \times 10^{-9} = 12.1 \text{ ppb}$$

The 6066 ppb maximum concentration of total pesticides and herbicides in MSW combustible is then reduced to 12.1 ppb maximum concentration of pesticides and herbicides in the residue.

* From Table 83-09-05.2.11

** From Hayden-Wegman/Carollo Report 82-09-03-3

The calculation, given above, neglects the reacted lime products (e.g. Ca SO_4) of the flue gas desulfurization system, amounting to 24 TPD₇, (See Table 11, Report 82-09-03-3).

If the 24 TPD₇ is added to the 55 TPD₇ residue, total residue is 79 TPD₇ and the resultant maximum concentration of pesticides and herbicides (P_1 , P_2 & H) in modified residue is then computed as follows:

$$\frac{0.67 \times 10^{-6} \text{ TPD}_7 \text{ } P_1 \text{ } P_2 \text{ \& H, dry basis}}{79 \text{ TPD}_7 \text{ modified residue, dry basis}} \\ = 8.5 \times 10^{-9} = 8.5 \text{ ppb}$$

The 6066 ppb maximum concentration of total pesticides and herbicides in MSW combustibles is then seen to be reduced to 8.5 ppb maximum concentration of pesticides and herbicides in the modified residue.

HAYDEN-WEGMAN/CAROLLO

engineers

October 25, 1983

RESOURCE RECOVERY FACILITY DESIGN NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.1
Estimated Average Non-Criteria Pollutant Metal Emissions From MSW Combustion

Group	Element	Symbol	(1) Fly Ash Uncontrolled		(2) Bottom Ash		(3) Total Ash = (1) + (2)		(4) Atmospheric Fly Ash Controlled @ 99.5%	
			*	ppm	*	ppm	*	ppm	*	ppm
I	Arsenic	As	2.11	52	5.37	12	7.48	15	0.01	52
I	Barium	Ba	42.27	1040	117.06	262	159.33	327	0.21	1040
I	Cadmium	Cd	3.58	88	2.11	4.7	5.69	12	0.02	88
I	Chromium	Cr	16.26	400	37.39	83	53.65	110	0.08	400
I	Lead	Pb	299.15	7360	139.82	313	438.97	900	1.50	7360
I	Mercury	Hg	4.71	116	-	-	4.71	9.7	0.02	116
I	Selenium	Se	0.33	8	0.16	0.4	0.49	1	0.002	8
I	Silver	Ag	4.55	112	2.28	5	6.83	14	0.02	112
II	Antimony	Sb	48.8	1200	42.30	95	91.04	187	0.24 ⁻⁵	1200
II	Beryllium	Be	0.01	0.2	0.40	0.9	0.41	0.8	4x10 ⁻⁵	0.2
II	Cobalt	Co	6.50	160	13.01	29	19.51	40	0.03	160
II	Copper	Cu	17.88	440	1217.72	2724	1235.60	2533	0.09	440
II	Manganese	Mn	66.66	1640	396.70	887	463.36	950	0.33	1640
II	Molybdenum	Mo	1.95	48	17.56	39	19.51	40	0.01	48
II	Nickel	Ni	17.88	440	37.39	84	55.28	113	0.09 ⁻⁵	440
II	Thallium	Tl	0.10	2.4	6.40	14	6.50	13	49x10 ⁻⁵	2.4
II	Vanadium	V	2.11	52	2.11	4.7	4.22	8.7	0.01	52
II	Zinc	Zn	352.80	8680	586.91	1313	939.71	1927	1.76	8680

Group I metals are classified Non-Criteria Pollutants by USEPA & CDOHS

Group II metals are classified Non-Criteria Pollutants by CDOHS only

USEPA = United States Environmental Protection Agency

CDOHS = California Department of Health Services

* = lb of metal emitted (dry)

1000 tons MSW @ 25% H₂O

ppm = parts per million, concentration of metal
in ash category (1), (2), (3) or (4),
uncorrected for ash products of acid gas control system

HAYDEN-WEGMAN/CAROLLO

engineers

October 25, 1983

RESOURCE RECOVERY FACILITY DESIGN NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.2
Estimated Average Non-Criteria Pollutant Metal Emissions From RDF Combustion

Group	Element	Symbol	(1) Fly Ash Uncontrolled		(2) Bottom Ash		(3) Total Ash = (1) + (2)		(4) Atmospheric Fly Ash Controlled @ 99.5%	
			*	ppm	*	ppm	*	ppm	*	ppm
I	Arsenic	As	1.95	51	4.88	51	6.83	51	0.01	51
I	Barium	Ba	35.93	944	99.50	1037	135.43	1011	0.18	944
I	Cadmium	Cd	2.60	68	1.46	15	4.06	30	0.013	68
I	Chromium	Cr	8.94	235	20.32	212	29.26	218	0.04	235
I	Lead	Pb	100.31	2637	46.99	490	147.30	1100	0.50	2637
I	Mercury	Hg	3.09	81	-	-	3.09	23	0.016	81
I	Selenium	Se	0.33	9	0.16	2	0.49	4	0.002	9
I	Silver	Ag	2.93	77	1.46	15	4.39	33	0.015	77
II	Antimony	Sb	45.03	1184	38.85	405	83.89	626	0.23	1184
II	Beryllium	Be	0.01	0.2	0.40	4	0.41	3	4×10^{-5}	0.2
II	Cobalt	Co	3.09	81	6.02	63	9.11	68	0.016	81
II	Copper	Cu	9.10	239	621.54	6475	630.64	4708	0.046	239
II	Manganese	Mn	33.49	880	200.14	2085	233.63	1744	0.17	880
II	Molybdenum	Mo	1.79	47	16.26	169	18.05	135	0.01	47
II	Nickel	Ni	8.94	235	18.53	193	27.47	205	0.04	235
II	Thallium	Tl	0.10	3	5.92	62	6.02	45	5×10	3
II	Vanadium	V	1.87	49	1.87	19	3.74	28	0.01	49
II	Zinc	Zn	197.05	5179	327.76	3417	524.81	3917	1.00	5179

Group I metals are classified Non-Criteria Pollutants by USEPA & CDOHS

Group II metals are classified Non-Criteria Pollutants by CDOHS only

USEPA = United States Environmental Protection Agency

CDOHS = California Department of Health Services

* = lb of metal emitted (dry)

1000 tons MSW @ 25% H₂

ppm = parts per million, concentration of metal
in ash category (1), (2), (3) or (4),
uncorrected for ash products of acid gas control system

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RESOURCE RECOVERY FACILITY DESIGN NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.3 (Sheet 1 of 2)
California Waste Extraction Test (WET)
*Proposed Threshold Concentration Limits For
Hazardous Waste Classification of Ash Containing Non-Criteria Metals

Group	Element	Symbol	(1) T T L C Total Threshold Limit Concentration (ppm)	(2) S T L C Soluble Threshold Limit Concentration (ppm)
I	Arsenic	As	500	5
I	Barium	Ba	10,000	100
I	Cadmium	Cd	100	1
I	Chromium	Cr	500	5
I	Lead	Pb	1,000	5
I	Mercury	Hg	20	0.2
I	Selenium	Se	100	1.0
I	Silver	Ag	500	5.0
II	Antimony	Sb	500	100
II	Beryllium	Be	75	7.5
II	Cobalt	Co	8,000	80
II	Copper	Cu	250	2.5
II	Manganese	Mn	No Limit Set	No Limit Set
II	Molybdenum	Mo	3,500	350
II	Nickel	Ni	2,000	20
II	Thallium	Tl	700	7
II	Vanadium	V	2,400	24
II	Zinc	Zn	2,500	25

*Data, subject to revision, provided by Gerry White, Analyst of the Office of Waste-to-Energy California Waste Management Board, Oct. 6, 1983 telephone communication for guidance only.

Group I metals are classified Non-Criteria Pollutants by USEPA & CDOHS
Group II metals are classified Non-Criteria Pollutants by CDOHS only
USEPA = United States Environmental Protection Agency
CDOHS = California Department of Health Services
ppm = parts per million, concentration of metal in ash

Table 82-09-05.2.3 (Sheet 2 of 2)
California Waste Extraction Test (WET)

- (1) TTLC ppm concentration limits are set for the Nitric Acid Digestion Process test. If ash samples pass this test, no need to test for STLC limits.
- (2) STLC testing to be performed only if TTLC ppm concentrations exceed TTLC threshold limits given in Table. STLC testing determines if a 0.2 molar solution of citrate buffer, having a pH of 4.5 will, in a 48-hour test, leach Non-Criteria metals from an ash sample in an amount to exceed STLC threshold limits.
- (3) State Water Resources Control Board will rule if composite ash samples (e.g. combined fly ash and bottom ash) is allowed.

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RESOURCE RECOVERY FACILITY DESIGN
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TABLE 82-09-05.2.4
Comparison of Average Non-Criteria Pollutant Metal Emissions* from MSW Combustion

Group	Element	Symbol	"C" Washington D.C. SWRC #1 Cycl. Col./ESP 0.9 lb/ton			"D" Nicosia Tray Scrub'r		"E" Braintree ESP 2.7 lb/ton		"C" Alexandria Wet Baffle 5.6 lb/ton	
			**Fly Ash	Suspended		8 lb/ton		Inlet	Outlet	**Flyash	Suspended
I	Arsenic	As	59	310 (0.28)		200		120	57 (0.15)	40	210
I	Barium	Ba	3,200	990 (0.89)		220		400	340 (0.92)	2,800	890
I	Cadmium	Cd	185	1,900 (1.71)		1,500		1,100	480 (1.29)	42	1,100
I	Chromium	Cr	780	870 (0.78)		105		270	200 (0.54)	1,330	490
I	Lead	Pb	NR	78,000 (70.20)		69,000		NR	NR	40,000	97,000
I	Mercury	Hg	NR	NR		NR		NR	0.31 (8×10^{-4})	NR	NR
I	Selenium	Se	12	39 (0.03)		49		< 25	38 (1×10^{-4})	3.4	23
I	Silver	Ag	220	1,000 (0.90)		110		165	79 (0.21)	85	390
II	Antimony	Sb	580	2,400 (2.16)		1,600		2,200	1,600 (4.32)	270	2,400
II	Beryllium	Be	NR	NR		NR		< 0.15	< 0.16 (4×10^{-4})		
II	Cobalt	Co	27	5 (0.0045)		2		38	17 (0.05)	12	
II	Copper	Cu	950	1,500 (1.35)		1,700		1,800	1,600 (4.32)	980	2,000
II	Manganese	Mn	2,100	410 (0.37)		270		770	330 (0.89)	4,300	1,500
II	Molybdenum	Mo	NR	NR		NR		43	37 (0.10)	NR	NR
II	Nickel	Ni	NR	170 (0.15)		79		NR	NR	740	200
II	Thallium	Tl	NR	NR		NR		1.8	1.6 (0.004)	NR	NR
II	Vanadium	V	NR	NR		NR		39	24 (0.06)	135	22
II	Zinc	Zn	240,000	140,000 (126)		110,000		> 10,000	> 10,000 (> 27)	10,800	120,000

Group I metals are classified Non-Criteria Pollutants by USEPA & CDOHS

Group II metals are classified Non-Criteria Pollutants by CDOHS only

USEPA = United States Environmental Protection Agency

CDOHS = California Department of Health Services

NR = Not Reported

* Metal emissions are given in ppm concentration of metal in total particulate emissions

ppm = parts per million unless noted

() = lb of metal emitted/1000 ton MSW

** Collected Fly Ash

"C", "D" & "E" denote references to literature. (See page v).

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engineers

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RESOURCE RECOVERY FACILITY DESIGN NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.5
Emission Factors for TSP & HCl Based on Total Feed Material

UNCONTROLLED*					CONTROLLED**			
Category	I	II	III	Coal	I	II	III	Coal
T S P lb/ton	25	20	134	128	0.125	0.100	0.670	0.640
HCl lb/ton	1.4	NA	3.2	0.4	0.140	NA	0.320	0.040

Category Definitions

- I - Mass-fired MSW Combustion w/o Heat Recovery
- II - Mass-fired MSW Combustion with Heat Recovery
- III - RDF Combustion with Heat Recovery

T S P Total Suspended Particulates
HCl Hydrochloric Acid

Emissions given in lb of emission per ton of total feed:
MSW for Categories I & II
RDF for Category III

* Reference: An Evaluation of Emission Factors For
Waste-to-Energy Systems - Executive Summary
by G.M. Rinaldi, T.R. Blackwood,
D.L. Harris & K.M. Tackett
Monsanto Research Corp. Dayton, Ohio
Table 6 for TSP Uncontrolled Emissions)
Table 13 for HCl Uncontrolled Emissions)
29 May 1979
USEPA Contract No. 68-03-2550, Task II

** Assume Controlled Emissions as follows:
99.5% Efficiency for TSP
90.0% " " HCl

NA - No data available

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RESOURCE RECOVERY FACILITY DESIGN NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.6
Concentrations of Trace Elements in Uncontrolled Particulate Emissions

UNCONTROLLED CONCENTRATIONS ppm				
Element	Category I	Category II	Category III	Coal
Antimony	- ^a	260 - 620	0.4 - 10	7 - 20
Arsenic	- ^a	50 - 70	20 - 80	20 - 120
Barium	- ^a	270 - 540	- ^a	- ^a
Bromine	- ^a	420 - 2,400	- ^a	- ^a
Cadmium	- ^a	380 - 820	0.3 - 1.4	0.6 - 1.0
Chlorine	- ^a	>10,000	- ^a	- ^a
Chromium	- ^a	50 - 560	5 - 20	6 - 8
Cobalt	- ^a	10 - 100	0.6 - 2.0	0.4 - 1.5
Copper	- ^a	420 - 590	10 - 50	6 - 7
Iron	- ^a	970 - 1,090	700 - 2,410	2,350 - 2,800
Lead	- ^a	11,600 - 17,500	1,220 - 2,930	340 - 380
Manganese	- ^a	420 - 1,400	10 - 20	20 - 40
Nickel	- ^a	- ^a	3 - 20	6 - 20
Selenium	- ^a	<90	10 - 40	10 - 50
Silver	- ^a	110 - 200	- ^a	- ^a
Tin	- ^a	2,600 - 5,000	50 - 150	20 - 30
Zinc	- ^a	>10,000	860 - 3,770	180 - 560

^a Data Not Available

Reference: An Evaluation of Emission Factors For
Waste-to-Energy Systems - Executive Summary
by G.M. Rinaldi, T.R. Blackwood,
D.L. Harris & K.M. Tackett
Monsanto Research Corp., Dayton, Ohio
(Tables 14, 15, 16 & 17)
29 May 1979
USEPA Contract No. 68-03-2550, Task II

Category Definitions: See Table 82-09-05.2.5

ppm = parts per million

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October 25, 1983

RESOURCE RECOVERY FACILITY DESIGN

NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.7
Concentrations of Trace Elements in Controlled Particulate Emissions

C O N T R O L L E D C O N C E N T R A T I O N S ppm				
Element	Category I	Category II	Category III	Coal
Antimony	610 - 12,600	460 - 1,000	2 - 180	10 - 150
Arsenic	80 - 510	50 - 100	140 - 740	20 - 680
Barium	40 - 1,700	270 - 540	-a	-a
Bromine	320 - 6,700	350 - 1,200	-a	-a
Cadmium	520 - 2,300	670 - 1,150	0.2 - 10	2 - 8
Chlorine	99,000 - 330,000	>10,000	-a	-a
Chromium	70 - 1,800	130 - 260	60 - 100	30 - 40
Cobalt	2 - 30	5 - 50	4 - 40	3 - 30
Copper	970 - 6,800	620 - 800	50 - 280	30 - 40
Iron	1,700 - 18,000	2,000 - 2,130	6,940 - 17,300	13,200 - 18,200
Lead	50,000 - 155,000	18,100 - 34,200	4,470 - 18,400	1,050 - 1,790
Manganese	170 - 5,700	140 - 490	110 - 240	100 - 140
Nickel	40 - 440	-a	20 - 190	30 - 40
Selenium	10 - 120	<30	20 - 430	30 - 40
Silver	40 - 2,000	50 - 110	-a	-a
Tin	8,500 - 15,100	1400 - 5000	260 - 870	30 - 270
Zinc	47,000 - 240,000	>10,000	4,360 - 17,200	910 - 3340

^a Data Not Available

Reference: See Table 82-09-05.2.6

Category Definitions: See Table 82-09-05.2.5

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RESOURCE RECOVERY FACILITY DESIGN

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TABLE 82-09-05.2.8

Controlled Emissions of Trace Elements

C O N T R O L L E D E M I S S I O N S		lb/1000 ton
Element	Category II	Category III
Antimony	0.046-0.10	0.0013-0.121
Arsenic	0.005-0.01	0.094-0.496 _a
Barium	0.027-0.054	- _a
Bromine	0.035-0.120	- _a
Cadmium	0.067-0.115	0.0001-0.0067 _a
Chlorine	>1	- _a
Chromium	0.013-0.026	0.040-0.067 _a
Cobalt	0.0005-0.005	0.0027-0.027
Copper	0.062-0.080	0.034-0.188
Iron	0.200-0.213	4.650-11.591
Lead	1.810-3.420	2.995-12.328
Manganese	0.014-0.049 _a	0.074-0.161
Nickel	- _a	0.013-0.127
Selenium	<0.003	0.013-0.288 _a
Silver	0.005-0.011	- _a
Tin	0.140-0.500	0.174-0.583
Zinc	>1	2.921-11.524

Controlled Emissions in lb/1000 tons is product of data shown in Tables 82-09-05.2.5 and 82-09-05.2.7

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RESOURCE RECOVERY FACILITY DESIGN

NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.9

Metals in MSW Combustibles - NSCC vs Others

(ppm)

Group	Element	Symbol	NSCC	Others
I	Arsenic	As	5.7	ND
I	Barium	Ba	110	170
I	Cadmium	Cd	<3	9
I	Chromium	Cr	19	55
I	Lead	Pb	50	330
I	Mercury	Hg	2.1	1.2
I	Selenium	Se	<0.4	ND
I	Silver	Ag	<2.5	3
II	Antimony	Sb	70	45
II	Beryllium	Be	<0.3	ND
II	Cobalt	Co	<5	3
II	Copper	Cu	423	350
II	Manganese	Mn	138	130
II	Molybdenum	Mo	<12.2	ND
II	Nickel	Ni	<16	22
II	Thallium	Tl	<4	ND
II	Vanadium	V	2.9	ND
II	Zinc	Zn	339	780

ND = No Data

NSCC data based on average ppm concentrations reported in combustible fraction of MSW from Cal Rec'y Syst. Inc. Report No. 83-01 "Laboratory Analysis of the Combustible Fraction of NSCC MSW" dated March, 1983 Table III-6 (weighted averages).

Others data based on average ppm concentrations of combustible fraction of MSW from Washington D.C., Baltimore, Howard and Montgomery Counties, Md., Tampa, FL and Tulsa, OK as measured at the Bureau of Mines Avondale Metallurgy Research Center in Maryland; "Sources of Metals in Municipal Incinerator Emissions" by Stephen L. Law and Glen E. Gordon, Table II, Environmental Science & Technology, April, 1979.

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RESOURCE RECOVERY FACILITY DESIGN NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.10

Polynuclear Aromatic Hydrocarbons (PAH) Emissions

EMISSIONS 1b/1000 Ton		
PAH Species	Category I	Category III
Benzo(a) anthracene/chrysene	6.2	-
Benzo(b) fluoranthene	2.8	-
Benzo (ghi) perylene	3.2	-
BaP/BeP	1.5	1.5
Coronene	1.6	-
Fluoranthene	10.0	2.5
Indino (1,2,3, cd) pyrene	1.5	-
Perylene	1.5	1.5
Pyrene	12.0	0.76
Fluorene	-	0.76
1,2 - Benzofluorene and 2,3 - Benzofluorene	-	1.1

Reference: An Evaluation of Emission Factors for Waste-to-Energy Systems -
Executive Summary by G. M. Rinaldi, T.R. Blackwood, D. L. Harris &
K. M. Tackett, Monsanto Research Corporation, Dayton, Ohio.
(Tables 18 and 19)
29 May, 1979
USEPA Contract No. 68-03-2550. Task II

Category Deninitions: See Table 82-09-05.2.5

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RESOURCE RECOVERY FACILITY DESIGN NORTH SANTA CLARA COUNTY SOLID WASTE MANAGEMENT AUTHORITY

TABLE 82-09-05.2.11

Pesticides and Herbicides Concentrations in NSCC MSW Combustibles

Processable Waste		Maximum Concentration, ppb (dry basis)					
		Pesticides				Herbicides (H)	
		Chlorinated (P ₁)		Phosphate (P ₂)			
Delivered By	% (1)	Lab.(2)	Ext.(3)	Lab.(2)	Ext.(3)	Lab.(2)	Ext.(3)
Rear Loaders	(33.6%)	426	143	5187	1742	545	183
Front Loaders	(44.6%)	1271	567	4963	2213	435	194
Debris Boxes	(21.8%)	583	127	3570	778	545	119
<u>Composite</u>	<u>(100.0%</u>		<u>837</u>		<u>4733</u>		<u>496</u>

Notes:

- (1) % Distribution of Processable Waste amongst Rear Loaders, Front Loaders & Debris Boxes based on Summary of Average Daily Waste Quantities given in Table I of Authority 4/11/83 MEMO.
- (2) Laboratory data on Maximum Concentration of respective pesticides and herbicides in sampled vehicles; Reference "B", Table III-9.
- (3) Extension of Data Inputs (1) and (2) are derived by multiplication of respective % distributions and lab data on Rear Loaders, Front Loaders and Debris Boxes, and summing the respective products to obtain the composite waste characteristics indicated.

Exhibit A
Scope of Work

Leaching Characteristics of Ash in a Landfill Environment

Tasks

1. Pack columns with ash and start flow of municipal waste leachate or distilled water, as prescribed in plan.
2. Collect leachate samples twice weekly from the glass manifolds and from each column.
3. Analyze each leachate sample for the following:

Metals

Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium (total & Cr IV)
Cobalt
Copper
Lead
Mercury
Molybdenum
Nickel
Selenium
Silver
Thallium
Vanadium
Zinc

Minerals

Cations

Ammonia
Sodium
Potassium
Calcium
Magnesium

Anions

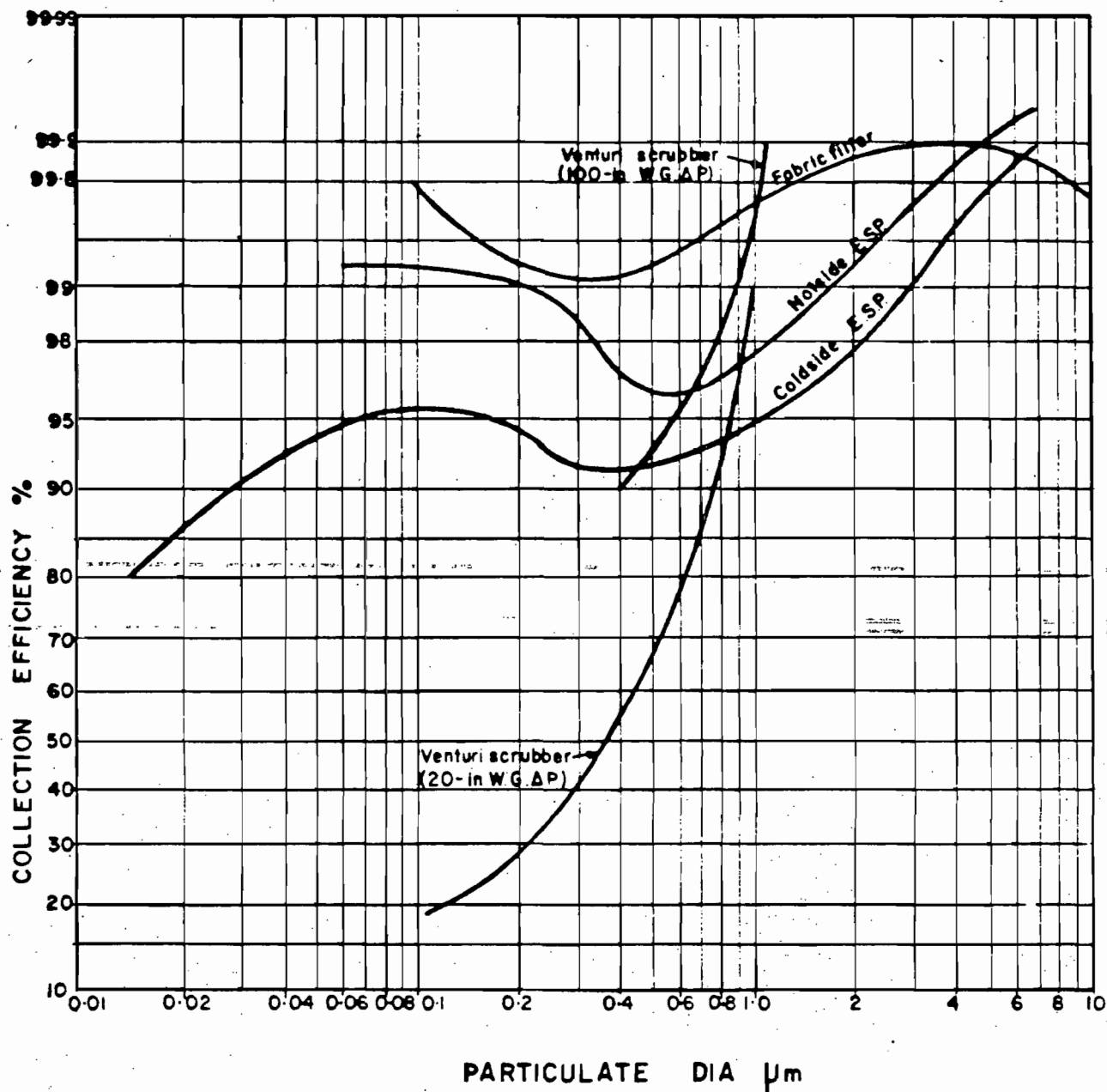
Bicarbonate
Carbonate
Chloride
Sulfate
Nitrate (as N)
Fluoride
Hydroxide

Additional

pH
Alkalinity
Total Hardness
Specific Conductance

- A. Elemental analysis shall be conducted by using; inductive coupled plasma-atomic emissions spectrometry (ICP) twice weekly and once every two weeks by atomic absorption spectroscopy (AA) for metallic elements.
- B. Mineral analysis, pH, alkalinity, total hardness, and specific conductance shall be recorded twice weekly.
4. Monitor pH and Eh continuously at glass manifolds.
5. Record total volume over time of leachate and distilled water.
6. All ICP analyses completed and entered into Data Management System.
7. All AA analyses completed and entered into Data Management System.
8. Submit monthly reports to Project Manager.
9. Draft report to Project Manager.
10. Final report published and submitted to Project Manager.

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**FRACTIONAL EFFICIENCY CURVES FOR CONVENTIONAL
AIR-POLLUTION CONTROL DEVICES**

Received DER

PALM BEACH COUNTY
SOLID WASTE AUTHORITY

AUG 23 1985



P P S

August 16, 1985

Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Attn: Mr. Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

Re: Response to July 17, 1985 Letter
Application for Power Plant Siting Certification
Resource Recovery Facility
Palm Beach County Solid Waste Authority

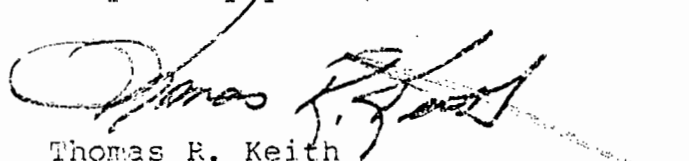
Dear Mr. Oven:

Accompanying this letter are 45 copies of the response to your letter of July 17, 1985 in which a total of 30 questions/comments were raised concerning the application. Individual responses to each of the 30 questions/comments are included in each response book for distribution.

In the response book the questions from the Department of Environmental Regulation's Solid Waste Section and Groundwater Section have been combined and are numbered in consecutive order, 1 through 30. The responses to the Solid Waste Section's questions are numbered 1 through 10. The responses to the Groundwater Section's questions are numbered 11 through 30 as indicated on a copy of your letter which is attached.

Should you have any further questions please contact our office.

Very truly yours,


Thomas R. Keith
Environmental Compliance
Administrator

TRK/pc
enclosures

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 1: In the scenario for total plant shutdown, Class III landfill area would be transferred for use as Class I and constructed in accordance with all applicable requirements (page 2-9). Would this include a double liner? What would be the fate of the interceptor wells (used for cooling water)?

RESPONSE: In this scenario for total plant shutdown it is anticipated that all Class I material will be disposed of in the Class I sanitary landfill. In the unlikely event that a total plant shutdown occurs for an extended period of time and the Class I landfill capacity is reached, it would be possible to expand the Class I landfill into the proposed Class III area in accordance with all applicable regulatory requirements. More specifically, this would require modification of the design to include a double liner with a double leachate collection system similar in design to the proposed Class I landfill of this application.

The pumping rates and locations of the interceptor wells were established to contain ground water beneath the landfills and to prevent its off-site migration. Monitor wells were planned to allow on-going assessment of ground water quality and ground water levels and to measure the effectiveness of the interceptor wells. In the event of total plant shutdown, the interceptor wells will continue to provide irrigation water for the capped

Letter Dated July 17, 1985

portions of the proposed landfills and the existing Dyer Boulevard Landfill. The annual total water volume pumped from the interceptor wells will be equivalent to 0.5 mgd (million gallons per day). Irrigation pumping will take place predominantly during the dry season.

If the plant is shut down and pumping from interceptor wells is reduced, the interceptor wells will be used as monitor wells; water pumped from these wells for irrigation will be analyzed for indicators of leachate. If indicators of leachate appear in any of the monitor wells, the interceptor wells will be activated as appropriate to contain the leachate. Water pumped in this case will be diverted to the injection well for disposal.

The previously described plume of mineralized ground water beneath the Dyer Boulevard Landfill will be entirely contained if the interceptor wells are pumped at design rates. Numerous monitor wells exist in the vicinity of the Dyer Boulevard Landfill; these wells will be used for their intended purpose whether or not the interceptor wells are pumped at design capacity. Should leachate be detected in monitor wells, the interceptor wells will be activated for containment of the leachate, and water will be pumped to the injection well for disposal.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 2: Recommend stormwater discharge culvert from "conservation" area to EPB-10 (see Sheet 20 of 25, Appendix 10.4) not go under landfill.

RESPONSE: According to the proposed plan, the stormwater discharge culvert will be developed beneath the landfill and will ultimately discharge into the EPB-10 canal. The DER's recommendation to reroute this culvert has been considered and is taken into advisement. However, the cost effectiveness of routing the EPB-10 canal and the extension to that discharge culvert is considerably more expensive in cost as well as valuable landfill capacity. We believe that neither the environment nor safety has been compromised in the proposed design. The proposed culverts, as depicted in our detail sheet 24 of 25, are proposed as two reinforced concrete 76 in. by 48 in., culverts extending approximately 400 ft. across the landfill with extensions of 200 ft. (minimum) on either side of the landfill. The anticipated height at that crossing is not to extend above the culvert more than 40 ft. This is equivalent to a loading of approximately 15 lbs./in.². To avoid unnecessary loading during installation, the culvert will be built around and covered last in that area. Reinforced concrete pipes with sealed joints which are large enough to allow periodic inspection will be used. Furthermore, the culverts have been designed to carry twice the capacity expected in that channel during a 25-year 72-hour storm. The additional weight imposed by the placement of garbage should not jeopardize the integrity of the culvert.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 3: Concept of double liner good, but will need actual specifications (type, thickness, joining procedure, etc.) on liner and quality assurance procedure for sealing area around leachate collection pipe where it intersects the liner.

RESPONSE: The actual specifications on the liner and quality assurance procedures for sealing the area around leachate collection pipes and other penetrations are detailed in Sheet 23 of 25. It is anticipated and specified that the primary liner will be high density polyethylene (HDPE). The secondary liner will be polyolefin or the equivalent. Both liners are anticipated to be 40 mils in thickness. To supplement the details on Sheet 23 of 25 in the submitted plans, the following specifications will be incorporated into the construction documents:

High Density Polyethylene Field Joints

Joints between the lining sheets shall be field welded using the manufacturer's extrusion joining equipment and techniques. The joining procedure shall consist of softening the liner material by heated air ranging in temperature from 420°F to 680°F. The exact temperature used shall be determined by the installation supervisor. Directly following the application of heat, a 1 in. minimum-width strip made of the same high density polyethylene resin as the sheet shall be extruded between the overlapped sheets. The temperature of the resin as it emerges from the extrusion die shall range from 428°F to 526°F. The overlapped sheets will then be pressed together to form the extrusion joint.

Penetrations of Liner Material

Penetrations through the liner for pipe flashings, patches, etc. shall be field welded using an extrusion hand-welder. The joining procedure shall consist of softening the liner material by heated air as described above. Directly following the application of heat, a hot strip of the same material from which the

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

sheet is made will be extruded over the joint to produce the extruded joint.

Any required repair of small holes in the liner surface shall be made with the extrusion hand welder. Liner material shall be cleaned of all dirt, dust, and other foreign material; all smooth HDPE surfaces roughened; the air heated to the prescribed temperature, and the strip of HDPE resin extruded over the hole to produce an extruded welded repair.

Seals Around Penetrations. All pipe penetrations shall be sleeved with HDPE pipe sealed to the liquid-carrying pipe to prevent leakage. The basin liner shall be anchored to a concrete collar surrounding the penetration. An HDPE apron shall be extrusion welded to the pipe sleeve and to the base sheet outside of the area where the base sheet is anchored to the concrete collar.

Polyolefin Field Joints

Individual panels of liner material shall be laid out and overlapped by a minimum of 2 inches prior to welding. Extreme care shall be taken by the installer in the preparation of the areas to be welded. The area to be welded shall be carefully cleaned and prepared according to the procedures laid down by the material manufacturer. All sheeting shall be welded together by means of the homogeneous overlap-extrusion fusion process which provides continuous dynamic integration of the extrudate bead with the lining material. The composition of the extrudate shall be identical to the lining material.

Penetrations of Liner Material

Same as the HDPE installation instructions.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 4: Monitoring well no. 10 (shallow) appears to be located between the landfill access road and the liner near proposed Phase IV of the Class I area. As its location seems prone to much activity, what measure will be taken to protect this well?

RESPONSE: Monitoring well no. 10 is approximately 10 ft. west of contour elevation 30 as depicted on the submitted plans Sheet 15 of 25. Monitoring well no. 10 is a shallow monitoring well and may be utilized during the operation of the landfill. It is anticipated that the well will be extended to a top casing at elevation 17 so that a seasonal high water table will not effect the well. During construction of the landfill and in the vicinity of well no. 10, a corrugated metal pipe will be placed vertically around the well casing at a reasonable distance above ground. This procedure will insure that construction equipment, vehicles, and activities do not jeopardize the integrity of the well. Once construction is finished in the vicinity of well no. 10, a field crew will inspect the well to insure proper operation.

Monitor wells 1 through 14, as shown on Sheets 14, 15, 16, 18, 19, and 20 of Appendix 10.4, are existing monitor wells and should have been so designated. These wells will be used only to the extent that their locations do not interfere with other

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

planned structures; otherwise, they will be properly abandoned. The proposed monitor wells will be constructed at locations shown on Figure 4.2-1 (Figure 13-1, Response to July 2, 1985 Letter). The ground water monitoring program, including a discussion of the proposed monitor wells, is described in Chapter 4, Section 4.2.2.1.

The "Typical Monitor Well" diagram shown on Sheet 21 of Appendix 10.4 pertains to the proposed monitor wells. Proposed monitor wells will be constructed in pairs -- a shallow well and a deep well -- at each proposed monitor well site. The well screen intervals will be from 5- to 50-ft. deep and 50- to 125-ft. deep, respectively.

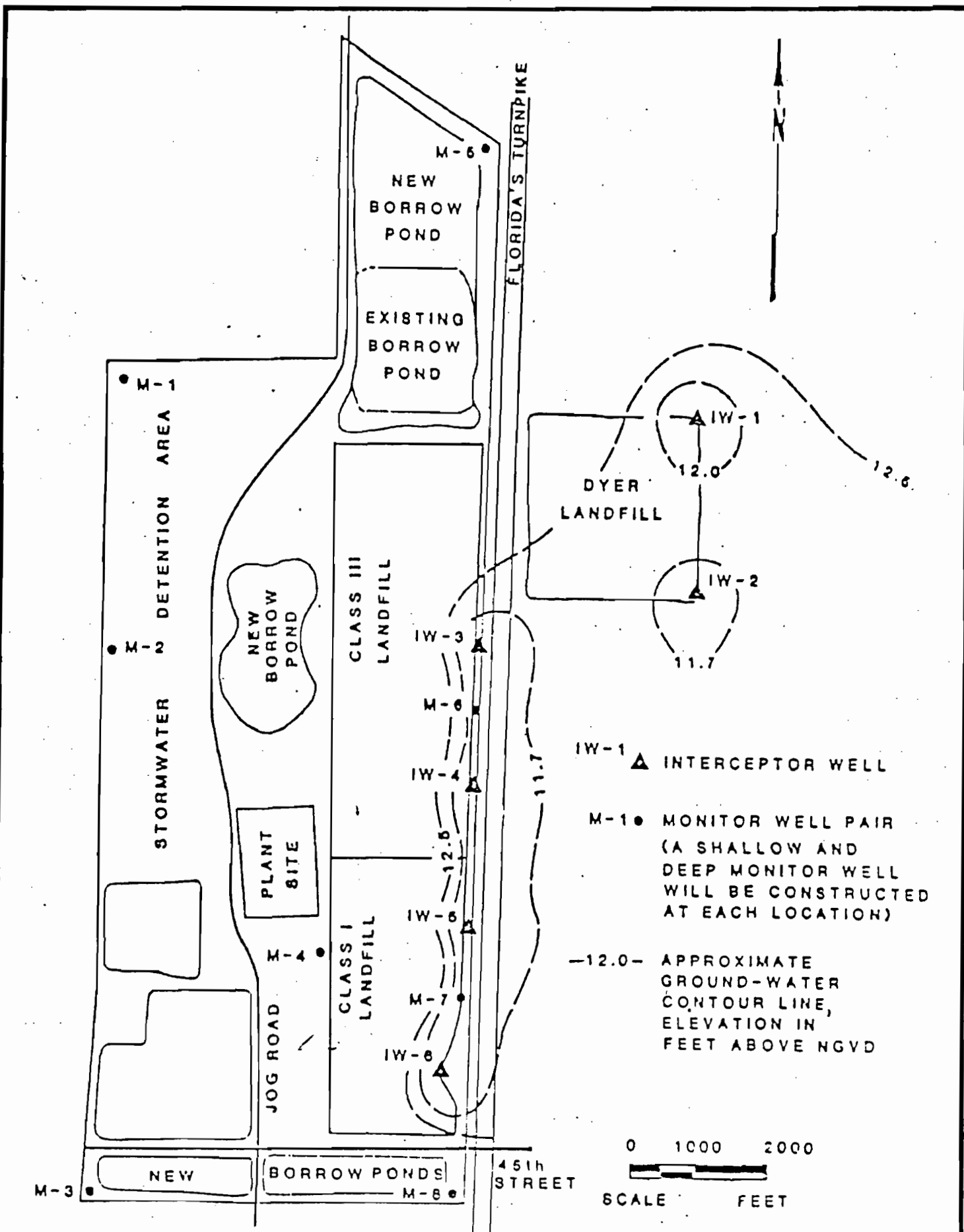


FIGURE 13-1



RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 5: To insure cover is applied at the end of each working day, will personnel remain on site to complete this work after gates are locked (6 p.m.) to incoming waste?

RESPONSE: In accordance with the operating plan of this land-fill, cover will be applied at the end of each working day until all waste is covered. Sufficient equipment and manpower will be available after 6 p.m. to insure that complete daily cover is obtained.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 6: Tires will not be used in RDF, but will be disposed of in Class I area. What measures (splitting, shredding, etc.), if any, will be taken to insure they stay covered?

RESPONSE: The Solid Waste Authority at its meeting on June 19, 1985 approved the purchase of a mobile tire shredder to shred passenger and truck tires prior to landfilling in the Class I landfill. The tire shredder will be moved to the resource recovery plant once the plant is in operation to shred incoming tires. The shredded tires will then be mixed with the RDF and used for combustion. Tires will represent approximately 1.5% (by weight) of the fuel for the boilers and supply approximately 2% of the heat value of the fuel.

Since the Solid Waste Authority recently approved the purchase of a tire shredder, the statement made in Chapter 3, page 3-3, second paragraph should reflect the use of shredded tires as a processible material and will not be removed for disposal in the landfill. The incoming tires will be separated on the storage room floor and removed for shredding. However, in the event of a malfunction in the operation of the shredder, whole tires may be landfilled.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 7: Tipping area capacity is 3,000 tons which is sufficient overcapacity for initial operation of 2,000 T/D, but will additional capacity be provided when facility operates at 3,000 T/D?

RESPONSE: Standard design for storage of refuse in the tipping area is generally one (1) day's receipt, or 2,000 tons for the Authority's initial operations. Three thousand ton capacity is specified, since the ultimate operation is planned for 3,000 TPD. The 3,000 TPD operation may not require the addition of another RDF processing line, but, if adding another processing line is felt to be prudent and another line is added, the storage capacity would then increase to 4,000 tons.

This decision will not need to be made for several years, and by then the expected availability of the fuel preparation system will be well established.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 8: What provisions will be made in the event of a RDF manufacturing plant shut down for either removal of the stored waste in the tipping area within 48 hours or for vector (flies, rodents, odor) control?

RESPONSE: The refuse storage (charging) area is elevated about 16 ft. above grade and has provisions at one end of the building to remove material through floor openings into top loading trailers (typical transfer station design). These two (2) openings are normally used to remove non-processible materials.

The two dump positions can handle 100 tons per hour minimum. It would require a maximum of 30 hours to remove 3,000 tons of refuse from storage.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 9: If composting of sludge is proposed (page 8-4) on this site, adequate information (location, method, etc.) must be submitted.

RESPONSE: As discussed in Section 8.2.8.2, Composting of dewatered sludge (12% solids minimum) which is currently being mixed with cover material to enhance top soil may also be mixed with vegetative wastes to produce humas that could be utilized by the Solid Waste Authority or the community, or put up for sale. The composting of dewatered sludge and vegetative wastes is an alternative which was reviewed for this project; however, at this time the composting alternative will not be implemented. Should the Solid Waste Authority in the future reconsider the composting alternative, plans as to the location, method, use and other items will be submitted to the Department of Environmental Regulation for approval prior to starting a composting project.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 10: Where will the conduits for transporting the water from the interceptor wells to the resource recovery facility be located?

RESPONSE: The proposed route of the process water main to connect the two (2) interceptor wells, IW1 and IW2, (to be located at the Dyer Boulevard Landfill) with the four (4) interceptor wells, IW3 through IW6, (to be located adjacent to the Class I and Class III Landfills and which will supply the process water to the resource recovery plant) is described in the following paragraphs. The locations of the interceptor wells have been described in Appendix 10.14.7

The process water main for the two interceptor wells IW1 and IW2 located at the Dyer Boulevard Landfill will be constructed parallel to the extension of Dyer Boulevard west to the Florida Turnpike east right-of-way. The process water main will then turn south, adjacent to the east right-of-way of the Turnpike, within an easement granted to the Solid Waste Authority. Located approximately 4,600 ft. north of 45th Street, the process water main will cross under the Turnpike through an existing box culvert and connect to the process water main that will serve interceptor wells IW3 through IW6.

Interceptor wells IW3 through IW6 will be connected to a process water main which will run in a north to south direction adjacent to the landfill perimeter access road. At the southern end of the Class I landfill, the process water main will turn west and run to a point approximately 2,000 ft. west of the Florida Turnpike. The process water main will then turn north and run approximately 3,000 ft. to the resource recovery plant.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985.

ITEM 1: Joint Venture's surge protection features along with the supporting calculations must be provided before an injection well construction permit is considered complete. (Rule 17-28.22(1)(f))

SWA RESPONSE NO. 11: The surge protection features of the deep well injection system will consist of an in-line hydropneumatic tank, pump controlled valves, and air release valves properly placed so as to provide adequate protection to the system. The actual calculations of the surge protection features will be submitted to the Department of Environmental Regulation for approval prior to construction of the deep well injection system.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 2: Please provide a more detailed map showing ground water flow in the Floridan aquifer. The regional potentiometric surface map presented (Appendix 10.8, Figure 4) is not adequate for this purpose.

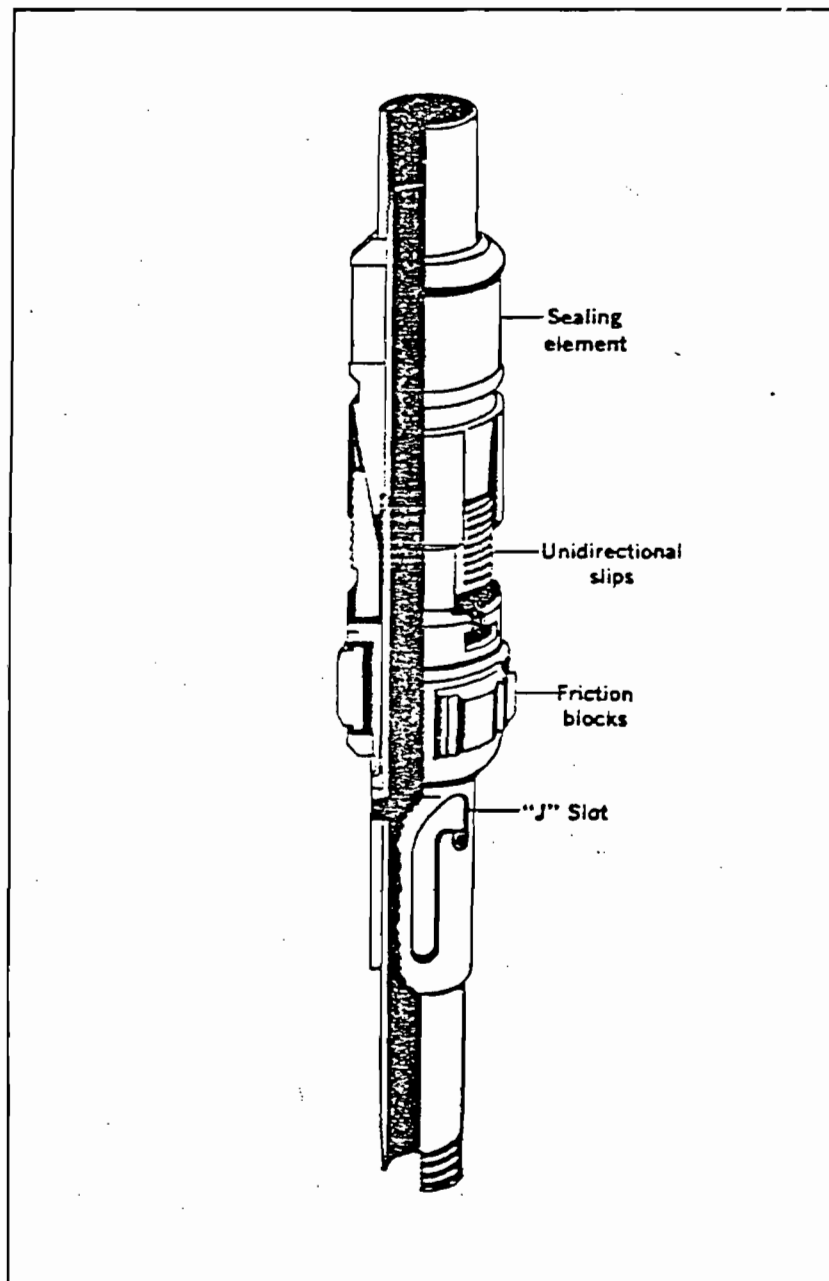
SWA RESPONSE NO. 12: As shown on Figure 1, Appendix A, and Page 2 of the Injection Well Construction and Testing Program (Appendix 10.8), none of the wells in the area of review penetrate the Floridan aquifer. Therefore, based on existing information, a site specific map depicting the direction of ground water flow in the Floridan aquifer can not be prepared. The regional map of the potentiometric surface included in the report (Figure 4) was taken from a publication prepared by the USGS for FDER specifically for use in the UIC program. The map depicts the general direction of ground water flow in the Floridan aquifer at the site and satisfies the requirements in Section 17-28.33(2)(c) and (e).

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 3: Details of the packer assembly should be provided (preferably a drawing).

SWA RESPONSE NO. 13: A schematic drawing of a typical packer assembly has been included as Figure 13-1.



RESPONSE: JULY 17, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



TYPICAL
WEIGHT-SET PACKER

FIGURE 13-1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 4.: Specify the type of corrosion inhibitors which will be used in the annulus between the eight inch injection tubing and the 12 inch final casing.

SWA RESPONSE NO. 14: At this time corrosion inhibitors will not be used in the fresh water in the annulus because commercially available corrosion inhibitors contain priority pollutants.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 5: Specify whether the intermediate casing (22 inch) will extend below all ground water containing less than 10,000 mg/l total dissolved solids (TDS).

SWA RESPONSE NO. 15: The 27 in. casing will be set below waters containing less than 10,000 mg/l TDS.

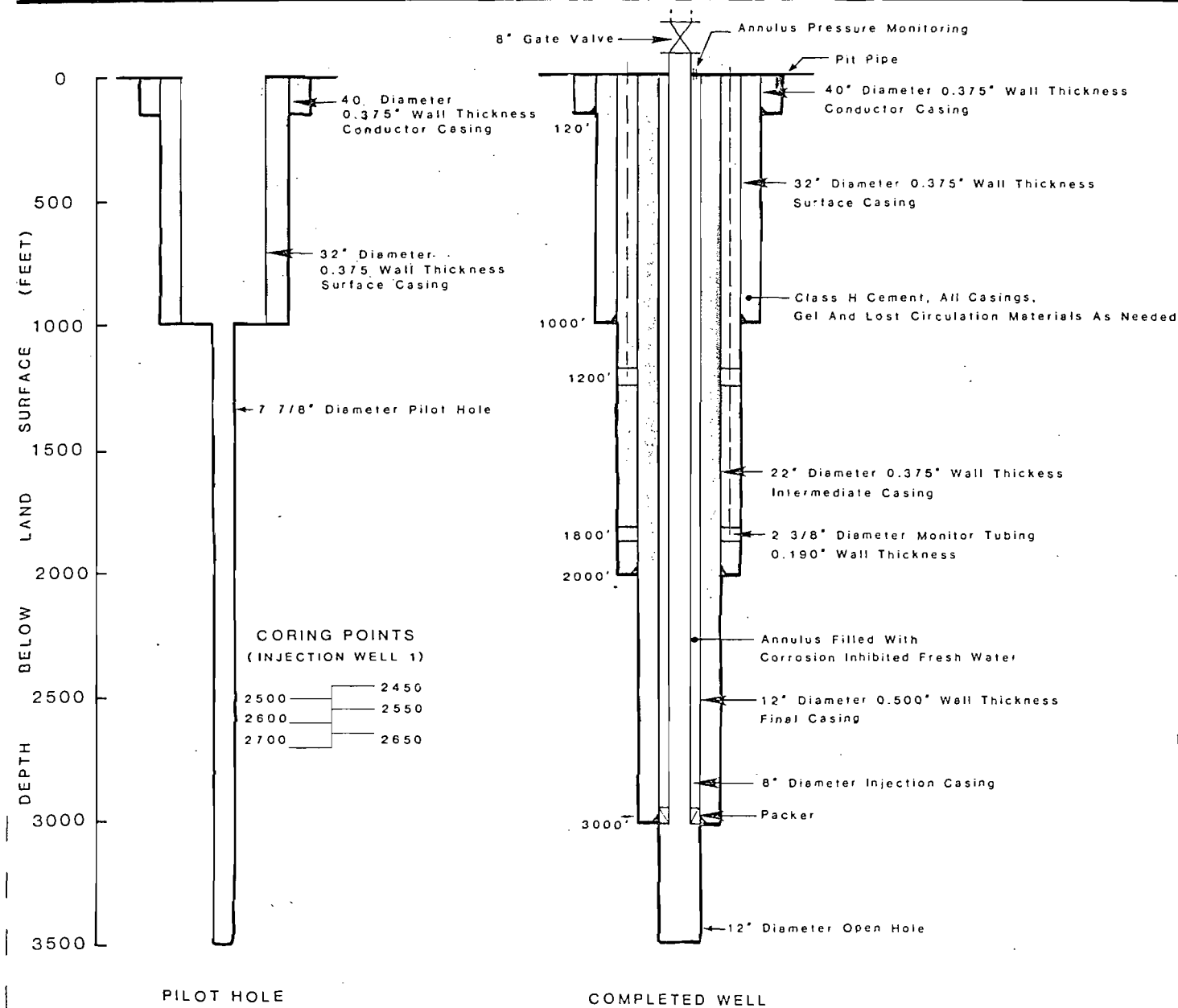
RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 6: Specify whether the proposed monitor well will monitor waters containing greater or less than 10,000 mg/l TDS. Why is no monitoring of the upper Floridan aquifer proposed? This is a deviation from the current practice in the area.

SWA RESPONSE NO. 16: The upper monitor tube, included in the Specifications, will be set at approximately 1,200 ft. and used to monitor the upper Floridan aquifer. The upper monitor tube is shown on the accompanying Figure 16-1. The lower monitor tube will be set below waters containing less than 10,000 mg/l TDS.

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CASING SCHEDULE

Conductor: 40-Inch Diameter,
Casing: 0.375 Inch Wall Pipe
May Be Spiral Wound,
ERW, Or DSAW Pipe,
Welded Joints

Surface: 32-Inch Diameter,
Casing: 0.375 Inch Wall Pipe
May Be Spiral Wound,
ERW, Or DSAW Pipe,
Welded Joints

Intermediate: 22-Inch Diameter,
Casing: 0.375 Inch Wall Pipe
May Be Spiral Wound,
ERW, Or DSAW
Pipe, Welded Joints

Final: 12-Inch Diameter,
Casing: 0.500 Inch Wall,
Seamless, Welded Joints

Injection: 8-Inch Diameter,
Casing: 0.352 Inch Wall,
Threaded And Coupled

RESPONSE, JULY 17, 1985

INJECTION WELL DESIGN
AND DETAILS OF THE CORING
AND TESTING PROGRAM



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY

FIGURE 16-1

P746WE1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 7: The 40 inch casing should extend below all producing zones used for drinking water (private or public) supplies in the area.

SWA RESPONSE NO. 17: The suggested requirement that the 40 in. casing extend below all producing zones, to the best of our knowledge, does not appear in current regulations. Further, review of recently issued deep-well injection system construction permits do not evidence the imposition of this particular requirement. Construction permits reviewed by this office include:

Coral Springs Improvement District

Acme Improvement District

Palm Beach County System 3

Loxahatchee River Environmental Control District

City of West Palm Beach

City of Plantation

Pratt & Whitney

The technical basis for this requirement is not clear. The well will be drilled to the top of the Floridan aquifer using the mud rotary method. Surface casing designed to protect the surficial aquifer from the more saline waters in the lower formations will be cemented in place to this depth. We, therefore, respectfully seek clarification regarding the Department's intent and basis for the referenced requirement.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 8: Rule 17-28.22(1)(c)1., FAC, requires corrosion protection for a minimum of 30 feet above and below any uncemented portions of casing. This is not discussed in the injection well specifications.

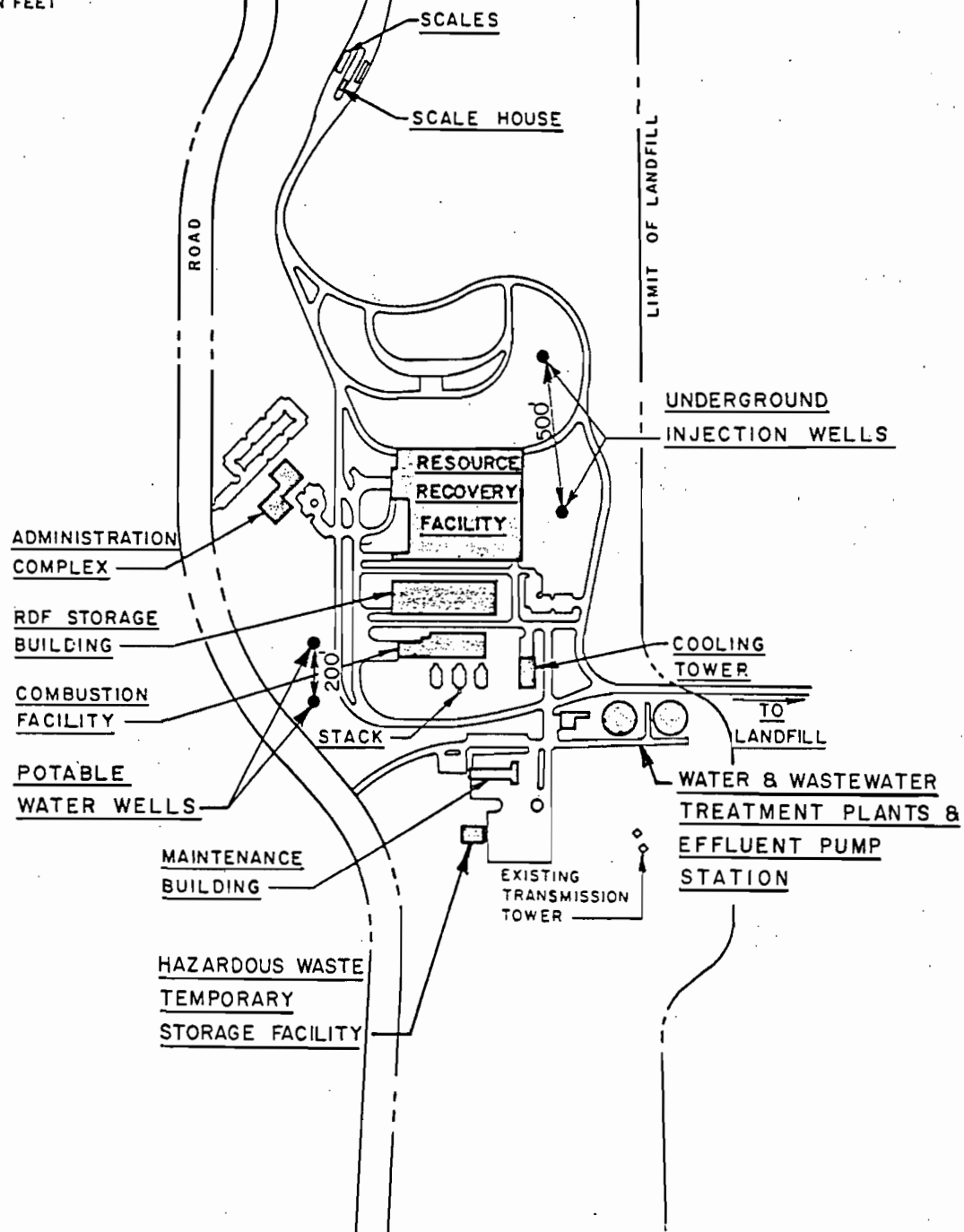
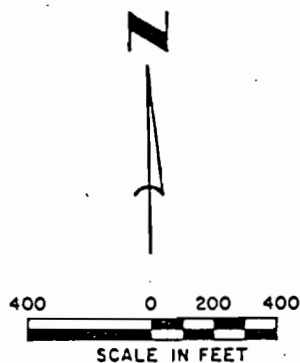
SWA RESPONSE NO. 18: Specifications for this well were prepared prior to the May 8, 1985 rule amendment. Subsequent to that amendment, corrosion protection to meet or exceed the requirement of FAC rule 17-28.22(1)(c)1 will be provided.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 9: A site drawing showing the proposed location of the injection wells is required. At a minimum, this drawing should indicate the distance between the wells.

SWA RESPONSE NO. 19: The location of the deep wells are shown on the accompanying Figure 19-1, Response to July 2, 1985 Letter. The separation distance between wells will be approximately 500 ft.



RESPONSE: JULY 17, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



RESOURCE RECOVERY PLANT
SITE PLAN

FIG. 19-1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 10: A drawing showing drilling pad dimensions and features (slopes, concrete thickness, curb height, etc.) is necessary either as a part of the permit application or completed as per a specific condition of the construction permit before drilling can commence.

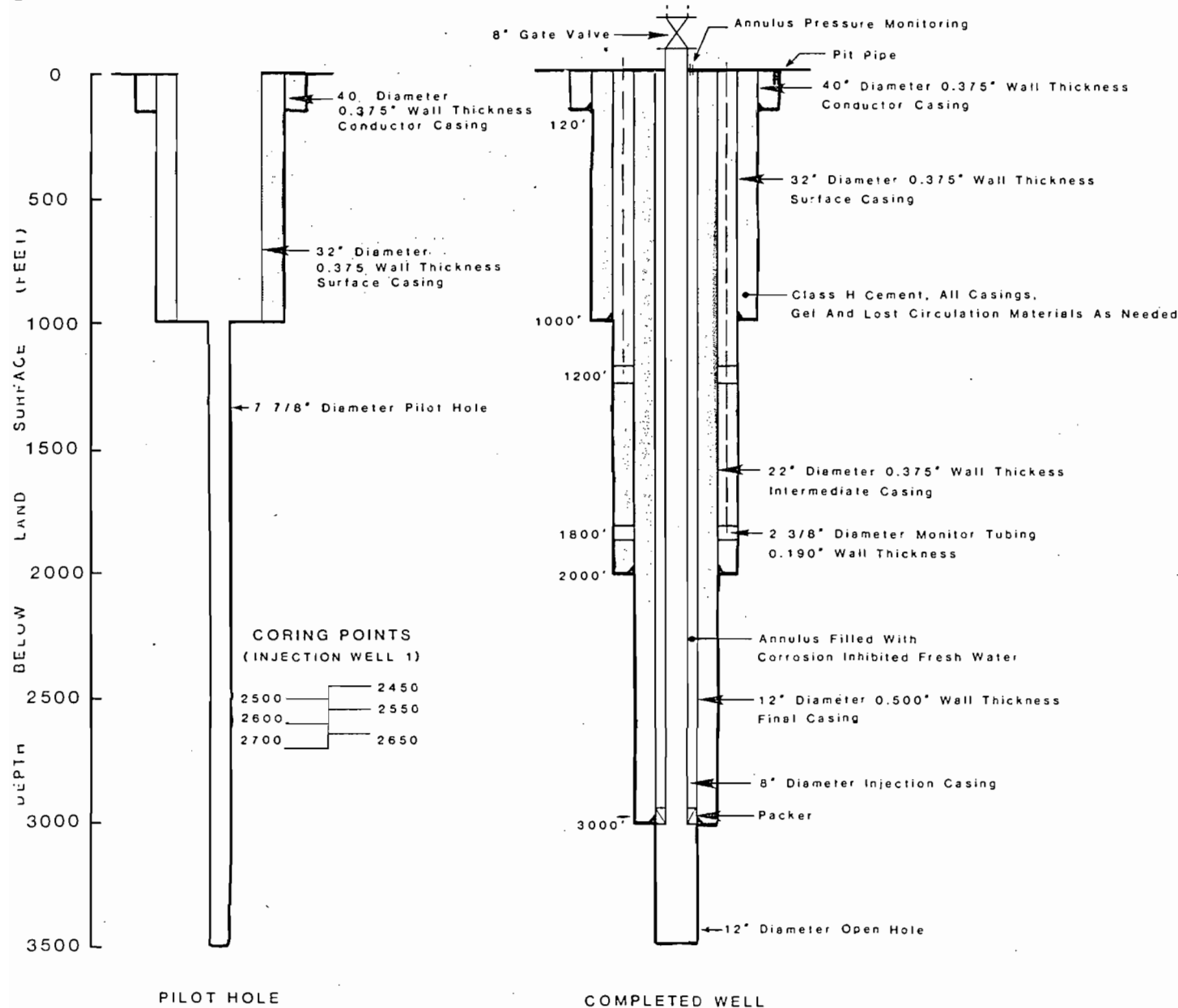
SWA RESPONSE NO. 20: Design of the pad will be based on the Contractor's drilling equipment. Because the Contractor will not be selected until a permit to construct the well is issued, we therefore, suggest that this requirement be included as a specific condition of the construction permit.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 11: Figure 5 (Appendix 10.8) shows the final casing string (12 inch) as being ERW pipe with a wall thickness of 0.500 inch. The Construction and Testing Program and Technical Specifications texts indicate this casing string will be seamless pipe with a 0.500 inch wall thickness. Which is it? Any deviation from seamless pipe with a 0.500 inch wall thickness must be justified in writing (Rule 17-28.(4)(b), FAC).

SWA RESPONSE NO. 21: Figure 21-1 has been corrected and included to show that the injection casing will be 0.500 in. (wall thickness) seamless casing as specified in the Program and Specifications.



CASING SCHEDULE

Conductor	40-Inch Diameter,
Casing:	0.375 Inch Wall Pipe May Be Spiral Wound, ERW, Or DSAW Pipe, Welded Joints
Surface	32-Inch Diameter,
Casing:	0.375 Inch Wall Pipe May Be Spiral Wound, ERW, Or DSAW Pipe, Welded Joints
Intermediate	22-Inch Diameter,
Casing:	0.375 Inch Wall Pipe May Be Spiral Wound, ERW, Or DSAW Pipe, Welded Joints
Final	12-Inch Diameter,
Casing:	0.500 Inch Wall, Seamless, Welded Joints
Injection	8-Inch Diameter,
Casing:	0.352 inch Wall, Threaded And Coupled

RESPONSE, JULY 17, 1985

INJECTION WELL DESIGN
AND DETAILS OF THE CORING
AND TESTING PROGRAM



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY

FIGURE 21-1

P745W1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 12: The applicant must specify the disposal location for excess mud, drill cuttings, drilling fluids, etc., before drilling can begin. This location must be acceptable to all parties involved before drilling can begin.

SWA RESPONSE NO. 22: This requirement should be included as a specific condition of the construction permit. Once a Contractor is selected, this information will be furnished to the Technical Advisory Committee (TAC).

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 13: Cuttings (formation samples) must be collected from land surface to total well depth not just below 1,000 feet depth as proposed in item #5(a) of the drilling plan.

SWA RESPONSE NO. 23: As stated on Page 9 of the Drilling and Testing Program, samples will be collected at 10 ft. intervals during all drilling.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 14: The pressure test of the final casing string must be at least 1.5 times the expected injection pressure.

SWA RESPONSE NO. 24: The expected well-head pressure at the design flow rate (1 mgd) is approximately 57 psi. The pressure test will be conducted at 1.5 times this pressure, or approximately 85 psi.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 15: No indication of the distance between the two injection wells is given in the specifications.

SWA RESPONSE NO. 25: Please refer back to SWA Response No. 19.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 16: Rule 17-28.13(6), FAC, requires that a temperature or noise log be run on the completed injection well for mechanical integrity testing purposes. A temperature log run in the pilot hole is not sufficient to fulfill this requirement.

SWA RESPONSE NO. 26: We believe that the temperature log specified in the Program and Specifications satisfies the requirements in Chapter 17-28 FAC and will provide useful information when compared with temperature logs run in the future in order to evaluate mechanical integrity.

In order to use temperature logs to evaluate mechanical integrity (absence of fluid movement along the outside of the injection casing), the background temperature of the fluid in the formations penetrated by the well must be established. In order for the temperature log to be representative of background conditions, it should be run prior to operation of the well and during a period when the temperature of the fluid in the well is not influenced by the heat given off from curing cement. The best time to obtain a background temperature log is during the geophysical logging of the pilot hole.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 17: The daily drilling log must also include the type and volume (amount) of weighting materials (such as salt) used to control artesian flow.

SWA RESPONSE NO. 27: Records of the type and volume of weight materials will be kept and supplied to the Technical Advisory Committee (TAC) along with the daily reports.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 18: Background water quality must be established for the following parameters pursuant to Rule 17-28.25(1)(e), FAC.

- A. Monitor zones containing less than 10,00 mg/l TDS:
 - 1. Primary drinking water parameters
 - 2. Secondary drinking water parameters
 - 3. Minimum Criteria (free forms)
- B. Monitor zones containing greater than 10,000 mg/l TDS:
 - 1. Parameters left up to the Department

SWA RESPONSE NO. 28: The monitor zones will be sampled and tested for primary and secondary drinking water standards and EPA Test Method 608, 624, and 625 constituents.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 19: An analysis of the compatability of the five waste streams which are to be injected must be made. This study should include analyes of the compatability of the waste streams with each other as well as with the formation materials, formation fluids and well construction materials.

SWA RESPONSE NO. 29: The waste streams which will be combined for injection into the "Boulder Zone" are: 1) Resource Recovery Plant Blowdown from boilers, cooling towers and demineralizers; 2) Domestic wastewater treatment plant effluent and; 3) Leach-ate. The characteristics of the Resource Recovery Plant effluent has been described in Chapter 3 of the Application and Table 3.5-2, Characteristics of Blowdown Mixture, has been included in this response. The characteristics of the effluent from the domestic wastewater treatment plant are representative of values found in effluents in South Florida. The characteristics of the leachate were discussed in Chapter 3 and Appendix 10.7.

An analysis of the combined waste streams is shown on the accompanying table, and as discussed above, representative values have been used. As discussed in the Application, once the monitoring programs are started, actual data on the waste streams can be utilized to conduct a more conclusive analysis. A flow diagram of the waste streams which will be combined is also included in this response.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

Based on the representative values available, combining the waste streams will not have an adverse impact on the formation materials, the fluid in the Boulder Zone, or the well construction materials of the Class I industrial deep-well injection system as outlined in Appendix 10.8.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

PROJECTED AVERAGE FLOW

Plant Blowdown 371 gallons/minute
 Sanitary 14 gallons/minute
 Leachate 7 gallons/minute

Parameter	PLANT BLOWDOWN		SANITARY		LEACHATE		COMBINED EFFLUENT	
	Mg/l	lb/day	Mg/l	lb/day	Mg/l	lb/day	Mg/l	lb/day
Ca as CaCO ₃	361	1612	129	22	400	34	354	1668
Mg as CaCO ₃	21	96	2.9	.5	20	2	21	98.5
Na as CaCO ₃	246	1,097	50	8	200	17	238	1,122
HCO ₃ as CaCO ₃	1,000	4,459	369	62	500	42	969	4,563
CO ₃ as CaCO ₃	149	666	0	0	150	13	144	679
SO ₄ as CaCO ₃	92	413	1.3	.2	57	5	89	418.2
Cl as CaCO ₃	236	1,053	30.5	5	900	76	241	1,134
PO ₄ as CaCO ₃	9	40	10	2	150	13	12	55
TDS	1,773	7,983	370	62	6,120	514	1,818	8,559
TSS	22	96	8	1	0	0	20	98
BOD	0	0	8	1	1,000	84	18	87
² Arsenic	-	-	-	-	20 ¹	1.7x10 ⁻⁶	.4 ¹	1.7x10 ⁻⁶
² Barium	-	-	-	-	<100 ¹	<8.4x10 ⁻⁶	<1.8 ¹	<8.4x10 ⁻⁶
² Cadmium	-	-	-	-	< 5 ¹	<4.2x10 ⁻⁷	<.09 ¹	<4.2x10 ⁻⁷
² Chromium	-	-	-	-	< 10 ¹	<8.4x10 ⁻⁷	< .2 ¹	<8.4x10 ⁻⁷
² Lead	-	-	-	-	< 10 ¹	<8.4x10 ⁻⁷	< .2 ¹	<8.4x10 ⁻⁷
² Mercury	-	-	-	-	< .5 ¹	<4.2x10 ⁻⁸	<.009 ¹	<4.2x10 ⁻⁸
² Selenium	-	-	-	-	< 5 ¹	<4.2x10 ⁻⁷	<.09 ¹	<4.2x10 ⁻⁷
² Silver	-	-	-	-	< 10 ¹	<8.4x10 ⁻⁷	<.18 ¹	<8.4x10 ⁻⁷

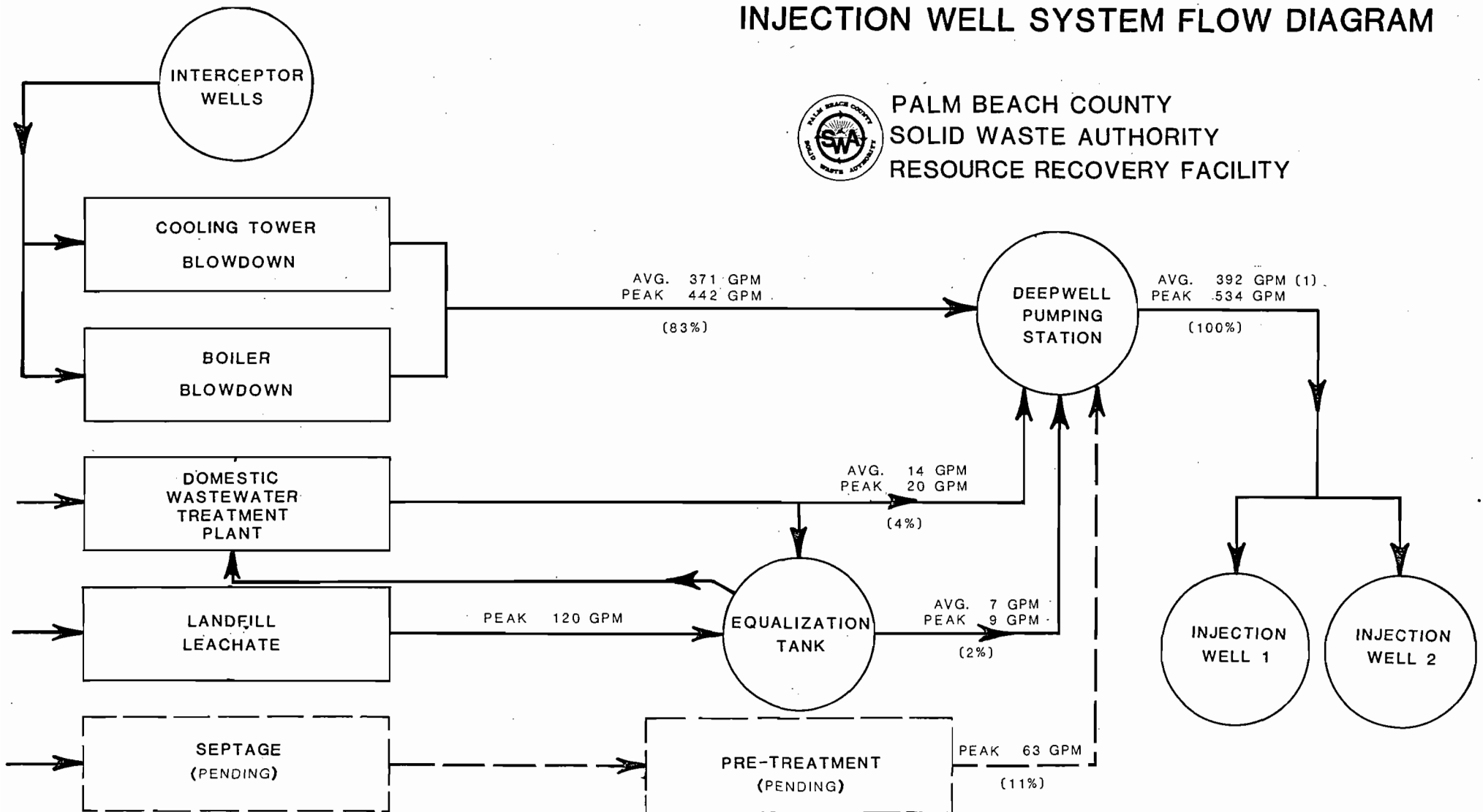
1. Expressed in terms of ug/l.

2. Data taken from samples at the Dyer Boulevard Landfill
 See Appendix 10.7

INJECTION WELL SYSTEM FLOW DIAGRAM



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



(1) EXCLUDES SEPTAGE FLOW

RESPONSE: JULY 17, 1985

FIGURE 29-1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 17, 1985

ITEM 20: In the future it would be preferable if the information were presented in the format of form 17-1.209(9). Items such as the injection waste stream analysis should be presented in Appendix 10.8 which discusses the injection program not somewhere else in the document.

SWA RESPONSE NO. 30: In the future, information concerning the deep-well injection system will be presented in the format as outlined in form 17-1.209(9).

file copy

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY

July 2, 1985

Mr. James T. Wilburn, Chief
Air Management Branch
Air & Waste Management Division
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Wilburn:

RE: Palm Beach County Solid Waste Resource Recovery Facility
Application for Power Plant Site Certification, PSD-FL-108

The Bureau of Air Quality Management is reviewing Palm Beach County's Solid Waste Resource Recovery Facility Application for Power Plant Site Certification. We are sending you a copy of the complete application under separate cover. Please review the application and submit any comments or questions to Tom Rogers or Ed Svec at the above address or at (904)488-1344.

Sincerely,

Patty Adams

Patty Adams
Bureau of Air Quality
Management

/pa

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

July 2, 1985

Chief, Permit Review and Technical
Support Branch
National Park Service - AIR
Post Office Box 25287
Denver, Colorado 80225

Dear Sir:

RE: Palm Beach County Solid Waste Resource Recovery Facility
Application for Power Plant Site Certification, PSD-FL-108

The Bureau of Air Quality Management is reviewing Palm Beach County's Solid Waste Resource Recovery Facility Application for Power Plant Site Certification. We are sending you a copy of the complete application under separate cover. Please review the application and submit any comments or questions to Tom Rogers at the above address or at (904)488-1344.

Sincerely,

Patty Adams
Bureau of Air Quality
Management

/pa

Hayden | Wegman

Barker, Osha & Anderson

A Joint Venture
860 U. S. Highway One
North Palm Beach, Florida 33408
305/626-4653

Received DER

JUN 26 1985

June 24, 1985

PPS

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

DER

JUN 28 1985

RAQM

Attn: Mr. Hamilton Owen, P.E.
Power Plant Siting Section

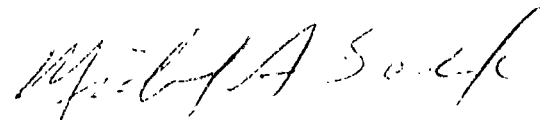
Re: Application for Power Plant Site Certification
Palm Beach County Solid Waste Authority
Resource Recovery Facility

Gentlemen:

Accompanying this letter are 45 copies of the revision to Appendix 10.6, Existing State Permits. Please remove the information as submitted in its entirety and replace it with this revised Appendix 10.6.

Very truly yours,

BARKER, OSHA & ANDERSON, INC.
HAYDEN/WEGMAN, INC.

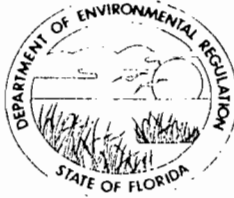


Michael A. Schenk, P.E.
For the Joint Venture

MAS/pc
enclosures
cc: Mr. Tim Hunt

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

DER

JUN 28 1985

June 27, 1985
BAQM

Mr. William J. Kendrick
Division of Administrative Hearings
The Oakland Building
2009 Apalachee Parkway
Tallahassee, FL 32301

RE: Palm Beach County Resource Recovery Facility
PA 84-20

Dear Mr. Kendrick:

Enclosed please find an amendment to the Palm Beach County Resource Recovery Facility power plant siting application.

Sincerely,

Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

HSOjr/sb

cc: All Parties
PPSRC

DER
JUN 28 1985
BAQM

APPENDIX 10.6

EXISTING STATE PERMITS

There have been no state permits issued to date for the Resource Recovery Facility. Application for all applicable state permits for the Resource Recovery Facility have been included in this application for Power Plant Site Certification.

RECEIVED
JUL 22 1985

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

July 17, 1985

Mr. Timothy Hunt, Jr.
Palm Beach County Solid Waste Authority
5114 Okeechobee Boulevard
Suite 2C
West Palm Beach, FL 33409

Dear Mr. Hunt:

The Department of Environmental Regulation's Solid Waste Section raised the following questions or comments about the sufficiency of your power plant siting application:

1. In the scenario for total plant shutdown, Class III landfill area would be transferred for use as Class I and constructed in accordance with all applicable requirements (page 2-9). Would this include a double liner? What would be the fate of the interceptor wells (used for cooling water)?
2. Recommend stormwater discharge culvert from "conservation" area to EPB-10 (see Sheet 20 of 25, Appendix 10.4) not go under landfill.
3. Concept of double liner good, but will need actual specifications (type, thickness, joining procedure, etc.) on liner and quality assurance procedure for sealing area around leachate collection pipe where it intersects the liner.
4. Monitoring well No. 10 (shallow) appears to be located between the landfill access road and the liner near proposed Phase IV of the Class I area. As its location seems prone to much activity, what measure will be taken to protect this well?
5. To insure cover is applied at the end of each working day, will personnel remain on site to complete this work after gates are locked (6 p.m.) to incoming waste?
6. Tires will not be used in RDF, but will be disposed of in Class I area. What measures (splitting, shredding, etc.), if any, will be taken to insure they stay covered?

7. Tipping area capacity is 3,000 tons which is sufficient over-capacity for initial operation of 2,000 T/D, but will additional capacity be provided when facility operates at 3,000 T/D?

8. What provisions will be made in the event of a RDF manufacturing plant shut down for either removal of the stored waste in the tipping area within 48 hours or for vector (flies, rodents, odor) control?

9. If composting of sludge is proposed (page 8-4) on this site, adequate information (location, method, etc.) must be submitted.

10. Where will the conduits for transporting the water from the interceptor wells to the resource recovery facility be located?

SWA
RESPONSE The department's Groundwater Section raised the following concerns about the proposed injection well:

- 11 1. Joint Venture's surge protection features along with the supporting calculations must be provided before an injection well construction permit is considered complete. (Rule 17-28.22(1)(f))
- 12 2. Please provide a more detailed map showing ground water flow in the Floridan aquifer. The regional potentiometric surface map presented (Appendix 10.8, Figure 4) is not adequate for this purpose.
- 13 3. Details of the packer assembly should be provided (preferably a drawing).
- 14 4. Specify the type of corrosion inhibitors which will be used in the annulus between the eight inch injection tubing and the 12 inch final casing.
- 15 5. Specify whether the intermediate casing (22 inch) will extend below all ground water containing less than 10,000 mg/l total dissolved solids (TDS).
- 16 6. Specify whether the proposed monitor well will monitor waters containing greater or less than 10,000 mg/l TDS. Why is no monitoring of the upper Floridan aquifer proposed? This is a deviation from the current practice in the area.
- 17 7. The 40 inch casing should extend below all producing zones used for drinking water (private or public) supplies in the area.

SWA
RESPONSE

- 18 8. Rule 17-28.22(1)(c)1., FAC, requires corrosion protection for a minimum of 30 feet above and below any uncemented portions of casing. This is not discussed in the injection well specifications.
- 19 9. A site drawing showing the proposed location of the injection wells is required. At a minimum, this drawing should indicate the distance between the wells.
- 20 10. A drawing showing drilling pad dimensions and features (slopes, concrete thickness, curb height, etc.) is necessary either as a part of the permit application or completed as per a specific condition of the construction permit before drilling can commence.
- 21 11. Figure 5 (Appendix 10.8) shows the final casing string (12 inch) as being ERW pipe with a wall thickness of 0.500 inch. The Construction and Testing Program and Technical Specifications texts indicate this casing string will be seamless pipe with a 0.500 inch wall thickness. Which is it? Any deviation from seamless pipe with a 0.500 inch wall thickness must be justified in writing (Rule 17-28.(4)(b), FAC).
- 22 12. The applicant must specify the disposal location for excess mud, drill cuttings, drilling fluids, etc., before drilling can begin. This location must be acceptable to all parties involved before drilling can begin.
- 23 13. Cuttings (formation samples) must be collected from land surface to total well depth not just below 1,000 feet depth as proposed in item #5(a) of the drilling plan.
- 24 14. The pressure test of the final casing string must be at least 1.5 times the expected injection pressure.
- 25 15. No indication of the distance between the two injection wells is given in the specifications. Will these wells be far enough apart so that the pumping well does not interfere with the injecting well during these tests?
- 26 16. Rule 17-28.13(6), FAC, requires that a temperature or noise log be run on the completed injection well for mechanical integrity testing purposes. A temperature log run in the pilot hole is not sufficient to fulfill this requirement.
- 27 17. The daily drilling log must also include the type and volume (amount) of weighting materials (such as salt) used to control artesian flow.

Page Four
Mr. Hunt
July 17, 1985

SWA
RESPONSE

- 28 18. Background water quality must be established for the following parameters pursuant to Rule 17-28.25(1)(e), FAC.
- A. Monitor zones containing less than 10,000 mg/l TDS:
 - i Primary drinking water parameters
 - ii Secondary drinking water parameters
 - iii Minimum Criteria (free froms)
 - B. Monitor zones containing greater than 10,000 mg/l TDS:
 - i Parameters left up to the Department
- 29 19. An analysis of the compatability of the five waste streams which are to be injected must be made. This study should include analyses of the compatability of the waste streams with each other as well as with the formation materials, formation fluids and well construction materials.
- 30 20. In the future it would be preferable if the information were presented in the format of form 17-1.209(9). Items such as the injection waste stream analysis should be presented in Appendix 10.8 which discusses the injection program not somewhere else in the document.

Sincerely,

Hamilton S. Owen, Jr.
Hamilton S. Owen, Jr., P.E.
Administrator
Siting Coordination Section

HSOjr/sb

cc: William J. Kendrick
Don White
All Parties



STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301 8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

July 2, 1985

Mr. William J. Kendrick
Division of Administrative Hearings
The Oakland Building
2009 Apalachee Parkway
Tallahassee, FL 32301

RE: Palm Beach County Resource Recovery Facility
PA 84-20, DOAH Case No. 85-2032

Dear Mr. Kendrick:

The Department of Environmental Regulation has reviewed the Palm Beach County Resource Recovery Facility power plant site certification application for completeness pursuant to subsection 403.506(2), Florida Statutes. The department finds the application to be complete. During the review, however, the department noted that the application was insufficient in addressing the following areas in DER Form 17-1.211(1):

1. Section 2.2.4 fails to discuss how drainage structures may affect the works of the water management agencies in the area.
2. Section 2.3.4.2, Measurement Programs, should describe the background physical and chemical parameters of surface waters with respect to spatial and temporal changes. The data submitted does not include a station location map indicating where the samples were taken nor are the dates of sampling indicated.
3. A dredge and fill jurisdictional of the project site was conducted prior to the passage of the Henderson Wetland Protection Act. This jurisdictional was not grandfathered pursuant to Chapter 17.4.022, F.A.C., and therefore is not a valid dredge and fill jurisdictional under the current rules. The acreage of jurisdictional wetland impacted given in Appendix 10.1 may therefore not be correct.
4. No dredge and fill jurisdictional has been conducted for the transmission line corridor. The transmission line corridor is not included in the dredge and fill application in Appendix 10.1. No acreage of jurisdictional wetlands impacted by the transmission line is given.

Page Two
July 2, 1985
Mr. Kendrick

5. A plan view drawing showing the location and indicating the acreage of created wetlands should be submitted.
6. Table 2.3-13, Table 3.3-1, and Table 3.4-1 do not agree with respect to sulfur content. Please explain.
6. Table 2.3-13, Table 3.3-1 and Table 3.4-1 do not agree with respect to sulfur content. Please explain.
7. Design criteria on page 3-11(3.4.1.4.1.2) mentions that the furnaces will have assistance from gas fed auxillary burners to aid in the combustion process yet on page 3-7(section 3.3) it states that no provision is made for auxillary fuels except for natural gas which is to be used as a start-up fuel. Page 3-18 mentions natural gas and oil firing. Please clarify.
8. Please show on the appropriate Figure or map the location of well DW 10A and its proximity to the proposed landfill.
9. No flow diagrams are provided as asked for in 3.6 of the application format guide for the chemical waste system.
10. Does Palm Beach County have any plans to possibly use the ash in road construction, fill or other purposes?
11. Could more specific information be provided on how Palm Beach County plans to keep stormwater run-off and leachate separated while the landfill is active?
12. If ash may be used as a daily cover for the class III landfill (page 3.43), why will only a single liner leachate collection system be utilized?
13. Figure 4.2-1 is referenced to (page 5-9) but is not present in the application. Drawdown contours (plotted) are not present for the area within 5 miles of the plant's water supply wells.
14. In section 4.5.2.2 please clarify what chemicals are potentially to be used for dust control.
15. Location of the hazardous waste storage facility is not shown on any of the provided maps although it is mentioned that it will be located next to the maintenance building.
16. What are the units for Table 5.3.1?
17. When will Palm Beach County know if they will need a Special Exception to the RS zoning for a switching station?

Page Three
July 2, 1985
Mr. Kendrick

18. For section 6.1.9.1, list any herbicides proposed for use and provide aquatic organism toxicity data. Also discuss application techniques and impacts on off-property vegetation.

19. How many flail mills will there be?

20. Please fill out DER Form 17-1.209(9) for Construction and Operation of an Underground Injection Well. The information contained in the application insufficiently addresses the injection well.

21. Are the air pollution impact modelling computer runs previously furnished to the department current?

Sincerely,

Hamilton S. Oven, Jr.

Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

HSOjr/sb

cc: Don White
Julie Cobb
Larry Keeseey
Thomas Schwartz
Steve Tribble
Tim Hunt

RECEIVED
JUL - 8 1985



DEPARTMENT OF

Health & Rehabilitative Services

District Nine
P. O. Box 29

Bob Graham, Governor

Palm Beach County Health Dept.
West Palm Beach, Florida 33402

Please Address

Reply to: ESE-WPB

Received DER

August 15, 1985

AUG 22 1985

BRS

Mr. Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Dear Mr. Oven:

Below please find our very preliminary comments pursuant to your letter dated June 19, 1985 regarding the Palm Beach County Resource Recovery Plant (PA 84-20).

Our staff will continue to review subject application and submit comments at appropriate times.

1. Vol IV - Air Quality, page 2, paragraph 1.4 states that "Palm Beach County is in attainment with all NAAQB". It should be noted that Palm Beach County has been officially designated non-attainment for the pollutant ozone and that the plans to construct subject facility should be prepared accordingly.
2. Vol IV - Air Quality, page 16. Where will the CO monitor be located?
3. Volume IV, page 18 states that the SO₂ emission factor, used in calculating the facilities emissions, is based only on the sulfur content of RDF.

Volume IV, page 23 states that auxiliary fuel is used during start-up and shut-down and will constitute 1.25% of the heat input to each furnace and either No. 2 oil or natural gas will be used as the auxiliary fuel.

Volume I, Section 3-11 indicates that auxiliary burners will be used to assist the combustion process when refuse is wet or otherwise difficult to burn.

Volume 1, Section 3-8 suggests that landfill gas may be used as a source of auxiliary fuel.

DER

AUG 23 1985

BAQM

Mr. Hamilton S. Oven, Jr., P.E.

Page 2

August 15, 1985

It should be determined what the auxiliary fuel will be, what the amount consumed will be, and what the actual sulfur content of this fuel will be.

Auxiliary fuel usage may prove to be a significant source of SO₂ and should be examined more closely.

4. Volume I, Section 2-10 states that should a total combustion shutdown occur, the RDF processing line would continue to operate until the RDF stockpile exceeded storage capacity (2 to 3 days).

If a total combustion shutdown occurred, the negative air system utilized in the storage area would not be able to vent the odors to the furnace for incineration as originally intended.

Is an alternative method of odor abatement to be employed during total combustion shutdown?

5. The dust control system used on the RDF processing line is currently designed to vent exhaust air directly to the outside environment.

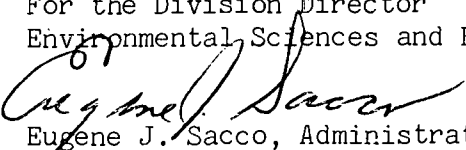
The negative air system servicing the RDF processing building vents air to the furnace so that odors will be incinerated.

The dust control system should also vent the exhaust air into the furnace or it will defeat the purpose of the negative air system.

5. Dewatered ash from the furnaces will be carried by a conveyor system and discharged into open top ash trucks. Adequate precautions should be taken to prevent emissions of this material to the ambient air (material should be kept moist or covered).
7. Access roads should be paved to reduce dust emissions.
8. Land clearing material generated during site preparation should be land-filled and not burned.
9. Unconfined emissions of particulate matter as described in Chapter 17-2. 610(3), FAC shall be adequately controlled during site preparation and plant construction.

Sincerely,

For the Division Director
Environmental Sciences and Engineering


Eugene J. Sacco, Administrator
Air Pollution, Solid and
Hazardous Waste Control

FJG/EJS/sc



United States Department of the Interior

NATIONAL PARK SERVICE SOUTHEAST REGIONAL OFFICE

75 Spring Street, S.W.
Atlanta, Georgia 30303

IN REPLY REFER TO:

N3615(SER-OPS)

AUG 16 1985

Mr. Tom Rogers
Bureau of Air Quality Management
State of Florida
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Rogers:

Thank you for sending us a copy of the Palm Beach County Resource Recovery power plant site certification application for a proposed resource recovery facility in Palm Beach County, Florida, approximately 120 km northeast of Everglades National Park. Your early notification of this project is appreciated.

We have reviewed the information you sent to us and, based on that information, we would not expect emissions from the proposed facility to adversely impact the air quality or air quality values of Everglades National Park.

However, we have several comments regarding the air quality and control technology analyses contained in the application. These comments are discussed in the enclosed technical review document. We ask that you consider these comments while performing your review of the application. We also ask that you forward us a copy of your preliminary determination document once your technical review of the project is completed. We will review your preliminary determination and submit any additional comments regarding the project during the 30-day public comment period.

If you have any questions regarding the enclosed comments, please contact Mark Scruggs of our Air Quality Division in Denver at (303) 236-8765.

Sincerely,

Regional Director
Southeast Region

Enclosure

DER

AUG 22 1985

BAQM

DEPARTMENT OF ENVIRONMENTAL REGULATION

**ROUTING AND
TRANSMITTAL SLIP**

ACTION NO

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION)

Ed Suec

Initial

Date

2.

Initial

Date

3.

Initial

Date

4.

Initial

Date

REMARKS:

*National Park Service
Comments on the Palom
Beach County RRF*

INFORMATION

Review & Return

Review & File

Initial & Forward

DISPOSITION

Review & Respond

Prepare Response

For My Signature

For Your Signature

Let's Discuss

Set Up Meeting

Investigate & Report

Initial & Forward

Distribute

Concurrence

For Processing

Initial & Return

FROM:

Vom

DATE
8/23

PHONE

Technical Review of Power Plant Site Certification Application
for Palm Beach County Solid Waste Authority

By

Permit Review and Technical Support Branch
Air Quality Division - Denver

Palm Beach County Solid Waste Authority (Palm Beach County) is proposing to construct a resource recovery facility in an unincorporated section of Palm Beach County. The location is approximately 120 km northeast of Everglades National Park, a PSD class I area administered by the National Park Service. The purpose of the facility is to dispose of solid waste generated in Palm Beach County. The project will be a mass-burn facility with a maximum continuous design rated capacity of 3,000 tons per day of solid waste and a maximum electrical generating capacity of approximately 75 megawatts. The initial design is for 2,000 tons per day capacity and 50 megawatt generating capacity. The emissions from the proposed facility are estimated as follows based on 1,800 tons per day (annual average) of refuse burned: 3,942 tons per year (TPY) of carbon monoxide, 1,314 TPY of nitrogen oxides, 2,957 TPY of sulfur dioxide, 1,150 TPY of chlorides, 65.6 TPY of volatile organic compounds, 214 TPY of particulate matter, 0.131 TPY of sulfuric acid mist, 13.2 TPY of fluorides, 0.46 TPY of lead, 0.98 TPY of mercury, and 0.003 TPY of beryllium.

Under the PSD regulations, these emission rates are considered significant for carbon monoxide, nitrogen oxides, sulfur dioxide, volatile organic compounds, fluorides, mercury, beryllium, and particulate matter. Therefore, new source review is required for the aforementioned pollutants. Following are our comments on the best available control technology, air quality, and air quality related values analyses with respect to the project's expected impacts.

BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

The major sources of emissions at the proposed facility are the three associated boilers. Therefore, our review will focus on emission controls on these units. Also, there is a relatively recent publication entitled, "Air Pollution Control at Resource Recovery Facilities" that discusses resource recovery facilities in detail. This document was published in May 1984 by the California Air Resources Board, and was summarized in a technical paper presented at the 77th annual meeting of the Air Pollution Control Association held in June 1984. As of 1984, all refuse-burning facilities with applications pending in California are proposing control technologies that are consistent with, or more stringent than, the guideline emission limits discussed in this report. We refer to this publication throughout our comments on the proposed air pollution control technology analysis.

Particulate Matter (PM)

Palm Beach County proposes to use electrostatic precipitators (ESPs) to minimize PM emissions generated by combustion of the solid waste in the boilers. Each ESP will be capable of reducing the exhaust gas PM concentration to 0.03 grains per dry standard cubic foot (gr/dscf). Palm Beach County states that an ESP with an outlet grain loading of 0.03 gr/dscf is best available control technology (BACT) for the proposed facility.

We agree that high efficiency control devices such as ESPs or baghouses represent BACT for PM emissions from the proposed facility. However, based on information provided in the California Air Resources Board (CARB) document referenced above, an emission limit of 0.01 gr/dscf can be achieved with these devices. This is the guideline emission limit proposed by the CARB for new refuse recovery facilities in California and should be considered as the BACT emission limit.

Palm Beach County indicates on page 8, Volume IV, of their certification application that they could obtain a guaranteed PM emission rate of less than 0.01 gr/dscf from a baghouse. However, they determined a baghouse was not appropriate due to filter media blinding and due to the incidence of fires caused by sparks.

Baghouses have been installed at several refuse burning facilities. Blinding problems were encountered at the East Bridgewater, Massachusetts, installation, but the unit was rebuilt to maintain flue gas temperature at 500°F through the baghouse. The modification apparently solved the major blinding problems. If baghouses are installed, and if the proposed flue gas temperature is increased from 450°F to 500°F, blinding should not be a major problem. The spark carry over and danger of fire in the bags could be minimized by installing a primary collector such as a multitube cyclone ahead of the baghouse. Regardless of whether baghouses or ESPs are installed we feel an emission limit of 0.01 gr/dscf represents BACT.

Sulfur Dioxide (SO₂)

Palm Beach County is proposing no control devices for limiting SO₂ emissions; rather, they are proposing the firing of low sulfur refuse as BACT for the proposed facility. The resulting BACT limit proposed is 0.7 pounds per million Btu heat input (lb/10⁶ Btu).

The emission guideline recommended in the CARB document is 30 ppm, which corresponds to an SO₂ emission rate of approximately 0.08 lb/10⁶ Btu. To achieve this emission level, flue gas controls such as wet or dry scrubbing are required. Dry scrubbing processes have been effectively employed at pilot and full-scale refuse burning facilities in Europe, Japan, and the United States. Wet scrubbers have also been employed at full-scale refuse burning facilities. In light of this information, we recommend that Palm Beach County re-evaluate flue gas scrubbing as BACT for SO₂ emissions from the proposed facility.

Nitrogen Oxide (NO_x) and Carbon Monoxide (CO)

The proposed BACT for NO_x and CO emissions is boiler design and good combustion practices. The resulting NO_x and CO emissions limits proposed are 0.3 and 1.0 lb/10⁶ Btu, respectively. Based on information presented in the CARB report, combustion modifications such as staged combustion, low excess air, and flue gas recirculation can reduce NO_x emissions to between 140 to 200 ppm or 0.28 to 0.4 lb/10⁶ Btu. Since the proposed NO_x limit falls in this range, we agree that the proposed combustion controls and corresponding emission limit represent NO_x BACT. Regarding CO emissions, proper application of the above combustion modification techniques will also minimize CO emissions.

Other Pollutants

Other pollutants emitted from the proposed resource recovery facility requiring BACT review include fluoride, beryllium, and mercury. The proposed BACT for beryllium is the ESPs for the control of particulate matter emissions. Beryllium is emitted in the solid phase, therefore control of PM emissions will also control beryllium emissions. We agree that the proposed ESPs represent BACT for beryllium.

Fluorides and mercury are emitted in small quantities primarily in the gaseous phase. No additional controls are proposed for these pollutants. However, if the wet or dry scrubbers recommended for SO₂ control were installed, the fluoride emissions could be reduced by over 90 percent.

Our last comment in this section pertains to the large discrepancies in some of Palm Beach County's emission estimates compared to those made for the Broward County refuse recovery facility in their March 1985 site certification application. Since the Palm Beach County facility is rated (annual average) at 1,800 tons per day (initial stage) and the Broward County facility is rated at 3,300 tons per day, we would expect the ratio of the Palm Beach County to Broward County emissions to be 1800/3300 or 0.55.

The following table illustrates that, for several pollutants, this is not the case:

<u>Pollutant</u>	Emission		Palm Beach Co. Broward Co. <u>Ratio</u>
	<u>Rate for Palm Beach County</u> (Tons Per Year)	<u>Rate for Broward County</u> (Tons Per Year)	
SO ₂	2957	3428	0.86
NO _x	1314	3491	0.38
CO ₂	3942	555	7.10
PM ₁₀	214	461	0.46
Lead	0.46	187	0.002
Fluorides	13.2	156	0.085
Sulfuric Acid Mist	0.131	17.3	0.008

The above inconsistencies in emission estimates should be resolved before granting power plant site certifications for the proposed facilities.

AIR QUALITY ANALYSIS

The air quality modeling analysis appears to be adequate for the study area that was analyzed. However, there is no indication of estimates of concentration values in Everglades National Park, a class I area. A screening level air quality modeling analysis should have been performed. Also, at a minimum, a Level I visibility analysis should be done and the results given. (Note: Due to the lack of such a technical analysis, we performed a Level I

visibility analysis. Based on the expected emissions and the distance to the park, the analysis confirms that the project should not significantly impact the visibility at Everglades National Park).

AIR QUALITY RELATED VALUES ANALYSIS

Presently, low SO₂ concentrations have been monitored in Everglades National Park, and the proposed project would probably contribute little to the concentrations. Therefore, we do not anticipate any adverse impacts on air quality related values (AQRVs) in the park from SO₂. However, because this appears to be a high-growth area, and because bioassays of lichens and epiphytes in the park are showing elevated levels of sulfur, we would like to see a cumulative modeling analysis showing the pollutant concentrations expected at Everglades National Park from the proposed source, background, and all other proposed sources.

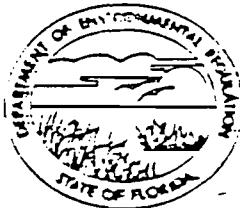
In addition, high ozone levels have been monitored in Everglades National Park, and we have commenced studies to determine if there are any adverse impacts on vegetation. However, we do not expect the proposed source to significantly contribute to ozone levels in the park. However, it is known that for some species small amounts of SO₂ can act synergistically with the ozone to cause more foliar injury than would be expected with the SO₂ or ozone alone. We are awaiting results of fumigation studies being conducted for us by EPA on slash pine using O₃ and SO₂ which will give us information on how much SO₂ can be added to high O₃ areas before impacts on slash pine will occur.

CONCLUSION

Based on the information provided, we would not expect emissions from the proposed facility to adversely impact the air quality or air quality related values of Everglades National Park. However, we have made several comments regarding the proposed control technology and air quality analyses that should be addressed before the power plant site certification is granted for the proposed project. Results from current studies may lead to the National Park Service reaching different conclusions about the effects of similar sources on AQRVs in the future.

7/30/85

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

APPLICATION TO CONSTRUCT/OPERATE/ABANDON
CLASS I, III, OR V INJECTION WELL SYSTEMS

PART I. Directions.

- A. All applicable items must be completed in full in order to avoid delay in processing this application. Where attached sheets or other technical documentation are utilized in lieu of the blank space provided, indicate appropriate cross-reference in the space and provide copies to the department in accordance with (C) below. Where certain items do not appear applicable to the project, indicate N/A in the appropriate spaces. When this form is used in conjunction with DER Form 17-1.205(1), duplicative information requests need to be completed only once.
- B. All information is to be typed or printed in ink.
- C. Four (4) copies of this application and four (4) copies of supporting information such as plans, reports, drawings and other documents shall be submitted to the appropriate District/Subdistrict office. An engineering report is also required to be submitted to support this application pursuant to the applicable sections of Florida Administrative Code Rule 17-29. The attached lists* shall be used to determine completeness of supporting data submitted or previously received. A check for the application fee in accordance with Florida Administrative Code Rule 17-4.05 made payable to the Department shall accompany the application.
- D. For projects involving construction, this application is to be accompanied by four (4) sets of engineering drawings, specifications and design data as prepared by a Professional Engineer registered in Florida, where required by Chapter 471, Florida Statutes.
- E. Attach 8 1/2" x 11" USGS site location map indicating township, range and section and latitude/longitude for the project.

PART II. General Information

Mr. Timothy Hunt, Palm Beach

A. Applicant: Name County Solid Waste Authority Title Executive Director

Address 5114 Okeechobee Boulevard

City West Palm Beach, Florida Zip 33409

Telephone Number (305) 471-5770

B. Project Status: ☒ New ☐ Existing

☐ Modification (specify) _____

*"Engineering and Hydrogeologic Data Required for Support of Application to Construct, Operate and Abandon Class I, III, or V Injection Wells"

C. Well Type:

() Exploratory Well (X) Test/Injection Well

D. Type of Permit Application:

- () Class I Exploratory Well Construction and Testing Permit
(X) Class I Test/Injection Well Construction and Testing Permit
() Class I Well Operating Permit
() Class I Well Plugging and Abandonment Permit
() Class III Well Construction/Operation/Plugging and Abandonment Permit
() Class V well Construction Permit
() Class V Well Operating Permit
() Class V Well Plugging and Abandonment Permit

E. Facility Identification:

Name: Resource Recovery Facility

Facility Location: Street: North of 45th St., West of Florida's Turnpike

City: West Palm Beach County: Palm Beach

SIC Code: _____

F. Proposed facility located on Indian Lands: Yes _____ No X

G. Well Identification:

Well No. 1&2 of 2 Wells
(total #)

Purpose (Proposed Use): Disposal of blowdown water

Well Location: Latitude: 26° 46' 45" Longitude 80° 8' 22"

(attach separate sheet, if necessary, for multiple wells.)

Subpart B. General Project Description:

- (1) Describe the nature, extent and schedule of the injection well project. Refer to existing and/or future pollution control facilities, expected improvement in performance of the facilities and state whether the project will result in full compliance with the requirements of Chapter 403, Florida Statutes, and all rules and regulations of the Department. Attach additional sheet(s) if necessary or cross-reference the engineering report.

See injection well construction and testing program, March 1985,
by Geraghty & Miller, Inc.

PART III Statement by Applicant and Engineer

A. Applicant

the Palm Beach County

I, the owner/authorized representative* of Solid Waste Authority, certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. I understand that this certification also applies to all subsequent reports submitted pursuant to this permit. Where construction is involved, I agree to retain the design engineer, or other professional engineer registered in Florida, to provide inspection of construction in accordance with Florida Administrative Code Rule 17-28.34(1)(c).

Signed

Date

Timothy L. Hunt Jr
Timothy Hunt, Executive Director, PBCSWA

7/30/85
(305) 471-5770

Name and Title (Please Type)

Telephone Number

*Attach a Letter of Authorization.

B. Professional Engineer Registered in Florida

This is to certify that the engineering features of this injection well have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgement, that the well, when properly maintained and operated, will discharge the effluent in compliance with all applicable statutes of the State of Florida and the rules and regulations of the Department. It is also agreed that the undersigned will furnish the applicant a set of instructions for proper maintenance and operation of the well.

Signed:

Peter Louis Palmer
Peter Louis Palmer

Name (Please Type)

GERAGHTY & MILLER GROUND WATER
ENGINEERS, INC.

Company Name (Please Type)

(Please Affix Seal)

P.O. Box 271173, Tampa FL 33688

Mailing Address (Please Type)

FLORIDA REGISTRATION NUMBER 18324

Date: 7/14/85

Phone No. 813-961-1921

PALM BEACH COUNTY

SOLID WASTE AUTHORITY



July 30, 1985

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

Attn: Mr. Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

Re: Response to July 2, 1985 Letter
Application for Power Plant Siting Certification
Resource Recovery Facility
Palm Beach County
Solid Waste Authority

Dear Mr. Oven:

Accompanying this letter are 45 copies of the response to your letter of July 2, 1985 to Mr. William J. Kendrick in which 21 questions/comments were raised concerning the application. Individual responses to each of the 21 items are included in each response book for distribution. Should you have any further questions please contact our office.

Very truly yours,

Thomas R. Keith
Environmental Compliance
Administrator

TRK/pc
enclosures

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 1: Section 2.2.4 fails to discuss how drainage structures may affect the works of the water management agencies in the area.

RESPONSE: In accordance with the South Florida Water Management District, the proposed drainage system will not discharge more than the maximum allowable 129 CFS during a 25 year 72 hour storm. This discharge will not affect the EPB-10 canal or the surrounding area in the immediate site vicinity. However, according to the Northern Palm Beach County Water Control District a downstream culvert may require some modification. No other adverse affects to the water control district works are anticipated.

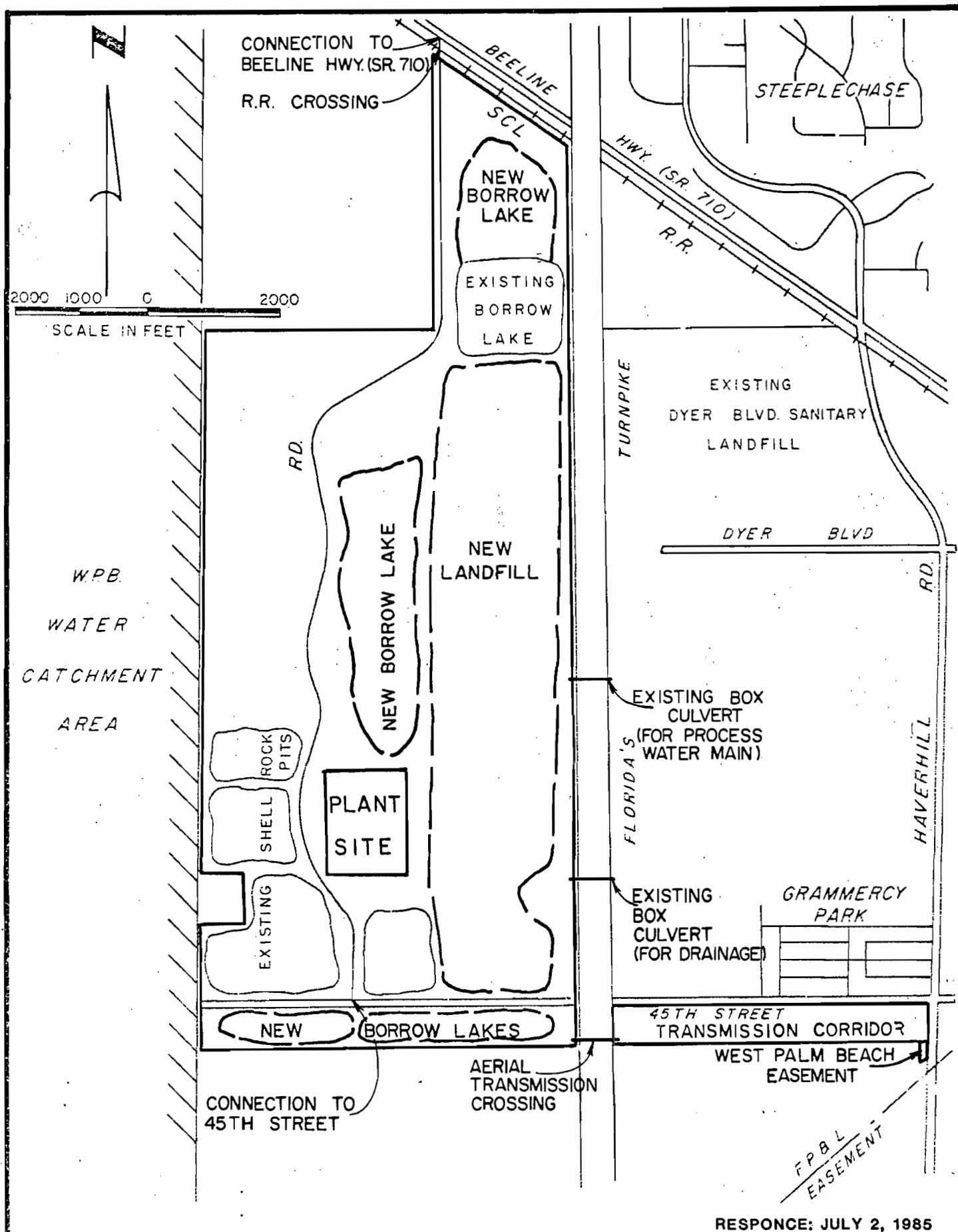
As described in Section 2.2.4, Easements, Title, Agency Works, the Solid Waste Authority has agreed to grant right-of-way and fund construction of a roadway through the project site from 45th Street to the Beeline Highway (S.R. 710). The construction of this roadway will require approval from Palm Beach County for the intersection with 45th Street. It will also require the approval of the Seaboard Coastline Railroad to traverse the railroad right-of-way. Florida Department of Transportation approval will be required for the intersection with the Beeline Highway (S.R. 710).

The Department of Transportation will also have to grant approval of several crossings of Florida's Turnpike. The first approval would be for the use of an existing box culvert for the discharge of stormwater runoff from the project site to the Northern Palm Beach County Water Control District EPB-10 canal. The second approval would be for the use of an existing box culvert north of

the drainage box culvert on Florida's Turnpike for the construction of the process water main from Dyer Boulevard Landfill's interceptor wells no. 1 and 2 to the project site. The process water main would run through the box culvert secured to the ceiling and wall. This box culvert would also provide a means of travel from the closed Dyer Boulevard Landfill to the project site by the Solid Waste Authority personnel. The third approval will be for the aerial crossing of Florida's Turnpike with the electrical transmission lines discussed in Chapter 6. The fourth approval will be for an underground crossing of Florida's Turnpike at 45th Street for a natural gas main using the bore and jack method.

The City of West Palm Beach will also have to grant an easement for the construction of the electrical transmission lines from the transmission corridor to the Florida Power & Light transmission corridor in the vicinity of 45th Street and Haverhill Road. The width of the easement required will be 50 feet.

The accompanying Figure 1-1 shows the locations of the Turnpike crossing and the easement from the City of West Palm Beach as discussed above.



PALM BEACH COUNTY
 SOLID WASTE AUTHORITY
 RESOURCE RECOVERY FACILITY



AGENCY WORKS AND EASEMENTS

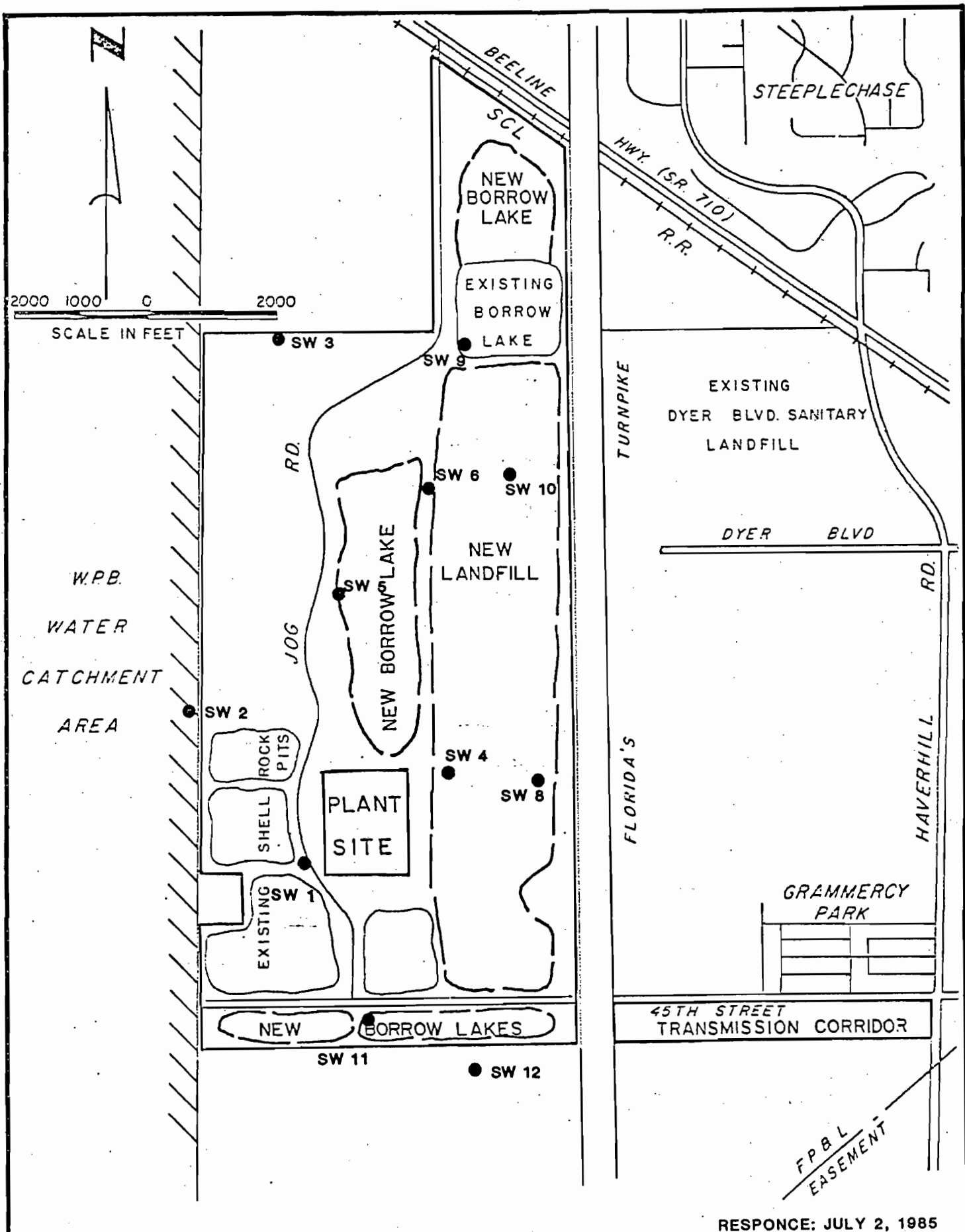
FIG. 1-1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 2: Section 2.3.4.2, Measurement Programs, should describe the background physical and chemical parameters of surface waters with respect to spatial and temporal changes. The data submitted does not include a station location map indicating where the samples were taken nor are the dates of sampling indicated.

RESPONSE: The accompanying Figure 2-1 delineates the sample locations. Table 1 cross references the surface water sample locations and respective dates of sampling. Also, included in this response is the report of analysis of the surface water sampling program.



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



SURFACE WATER SAMPLING POINTS

FIGURE 2-1

TABLE 1

SURFACE WATER QUALITY

<u>Sample No.</u>	<u>Date Sampled</u>
SW-1	5-11-84
SW-2	5-11-84
SW-3	8-3-84
SW-4	7-27-84
SW-5	7-27-84
SW-6	7-27-84
SW-8	5-11-84
SW-9	5-11-84
SW-10	7-27-84
SW-11	5-11-84
SW-12	5-11-84

Date Sampled taken from Orlando Laboratories, Inc. Reports of Analysis.

There is not a Sample No. SW-7.



Orlando Laboratories, Inc.

P. O. Box 19127

Orlando, Florida 32814

305/896-8645

REPORT OF ANALYSIS

Post Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 42333 (4946)
Sampled by: OLI-M. Smar/D. Bungo
Date sampled: 07-27-84
Date received: 07-30-84
Date reported: 09-18-84

Page 1 of 9

SITE SEVEN SAMPLES FIELD INFORMATION

Sample #1: SW-4 @ 1120 hrs, Water Depth: 0.05 ft, Temperature: 27.0°C, Water Condition: Turbid.

Sample #2: SW-5 @ 1310 hrs, Water Depth: 0.05 ft, Temperature: 31.0°C, Water Condition: Clear.

Sample #3: SW-6 @ 1510 hrs, Water Depth: 0.79 ft, Temperature: 27.5°C, Water Condition: Clear.

Sample #4: SW-10 @ 1230 hrs, Water Depth: 0.25 ft, Temperature: 29.0°C, Water Condition: Clear.

Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 42333 (4946)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 07-27-84
Date Received: 07-30-84
Date Reported: 09-18-84
Page 2 of 9

IDENTIFICATION: SW-4, Water Condition: Yellowish/Clear.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

2.1.a

RESULTS

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
Total Dissolved Solids, TDS (500)		58	Hydrogen Sulfide, H ₂ S [F-F]		0.03
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		91
Total Alkalinity, CaCO ₃		59.8	Foaming Agents (MBAS) (0.5)		<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na (160)		3.25
Bicarbonate Alkalinity, CaCO ₃		59.8	Nitrate Nitrogen, N (10)		<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		33.9
Bicarbonates, HCO ₃		72.9	Calcium Hardness, CaCO ₃		29.8
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		4.15
Carbon Dioxide, CO ₂		12.2	Calcium, Ca		11.9
Chloride, Cl (250)		4.7	Magnesium, Mg		1.01
Sulfate, SO ₄ (250)		<1.0	Iron, Fe (0.3)		0.17
Fluoride, F (1.4-2.4)		0.043	Manganese, Mn (0.05)		<0.05
pH (Laboratory) (6.5-8.5)		7.0	Copper, Cu (1.0)		<0.01
pHs		8.47	Zinc, Zn (5)		<0.05
Stability Index		9.94			
Saturation Index, corrosivity (+0.2)		-1.47			
Color, PCU (15)		>100			
Odor Threshold (3)		1			
Turbidity, NTU (5)		1.1			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS

Post Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 42333 (4946)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 07-27-84
Date Received: 07-30-84
Date Reported: 09-18-84
Page 3 of 9

IDENTIFICATION: SW-5, Water Condition: Yellow.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

RESULTS

2.1.a

DETERMINATION	(MCL)	mg/l	DETERMINATION	(MCL)	mg/l
Total Dissolved Solids, TDS (500)		84	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		140
Total Alkalinity, CaCO ₃		49.7	Foaming Agents (MBAS) (0.5)		<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na (160)		7.20
Bicarbonate Alkalinity, CaCO ₃		49.7	Nitrate Nitrogen, N (10)		<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		<61.21
Bicarbonates, HCO ₃		60.6	Calcium Hardness, CaCO ₃		57.1
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		<4.12
Carbon Dioxide, CO ₂		2.03	Calcium, Ca		22.84
Chloride, Cl (250)		3.7	Magnesium, Mg		<1.00
Sulfate, SO ₄ (250)		<1.0	Iron, Fe (0.3)		<0.10
Fluoride, F (1.4-2.4)		0.023	Manganese, Mn (0.05)		<0.05
pH (Laboratory) (6.5-8.5)		7.7	Copper, Cu (1.0)		<0.01
pHs		8.27	Zinc, Zn (5)		<0.05
Stability Index		8.85			
Saturation Index, corrosivity (+0.2)		-0.57			
Color, PCU (15)		80			
Odor Threshold (3)		1			
Turbidity, NTU (5)		0.9			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 42333 (4946)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 07-27-84
Date Received: 07-30-84
Date Reported: 09-18-84
Page 4 of 9

IDENTIFICATION: SW-6, Water Condition: Yellow.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

RESULTS

2.1.a

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
Total Dissolved Solids, TDS (500)		158	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		225
Total Alkalinity, CaCO ₃		110	Foaming Agents (MBAS) (0.5)		<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na (160)		12.6
Bicarbonate Alkalinity, CaCO ₃		110	Nitrate Nitrogen, N (10)		<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		105
Bicarbonates, HCO ₃		134	Calcium Hardness, CaCO ₃		96.4
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		8.47
Carbon Dioxide, CO ₂		7.11	Calcium, Ca		38.6
Chloride, Cl (250)		21.0	Magnesium, Mg		2.06
Sulfate, SO ₄ (250)		<1.0	Iron, Fe (0.3)		<0.10
Fluoride, F (1.4-2.4)		0.075	Manganese, Mn (0.05)		<0.05
pH (Laboratory) (6.5-8.5)		7.5	Copper, Cu (1.0)		<0.01
pHs		7.75	Zinc, Zn (5)		<0.05
Stability Index		8.00			
Saturation Index, corrosivity (+0.2)		-0.25			
Color, PCU (15)		50			
Odor Threshold (3)		1			
Turbidity, NTU (5)		0.2			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 42333 (4946)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 07-27-84
Date Received: 07-30-84
Date Reported: 09-18-84
Page 5 of 9

IDENTIFICATION: SW-10, Water Condition: Yellow.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

2.1-a

RESULTS

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
Total Dissolved Solids, TDS (500)		166	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		248
Total Alkalinity, CaCO ₃		106	Foaming Agents (MBAS) (0.5)		<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na (160)		12.8
Bicarbonate Alkalinity, CaCO ₃		106	Nitrate Nitrogen, N (10)		<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		105
Bicarbonates, HCO ₃		129	Calcium Hardness, CaCO ₃		96.9
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		8.49
Carbon Dioxide, CO ₂		1.72	Calcium, Ca		38.8
Chloride, Cl (250)		20.1	Magnesium, Mg		2.06
Sulfate, SO ₄ (250)		<1.0	Iron, Fe (0.3)		<0.10
Fluoride, F (1.4-2.4)		0.087	Manganese, Mn (0.05)		<0.05
pH (Laboratory) (6.5-8.5)		8.1	Copper, Cu (1.0)		<0.01
pHs		7.77	Zinc, Zn (5)		<0.05
Stability Index		7.43			
Saturation Index, corrosivity (+0.2)		0.33			
Color, PCU (15)		50			
Odor Threshold (3)		1			
Turbidity, NTU (5)		0.4			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

PRIMARY DRINKING WATER REGULATIONS ANALYSIS (ORG. & INORG.)

Post Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 42333 (4946)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 07-27-84
Date Received: 07-30-84
Date Reported: 09-18-84
6 of 9

Identification: #1. SW-4 #2. SW-5 #3. SW-6 #4. SW-10

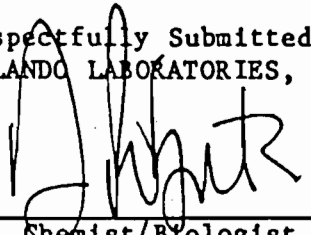
METHODS & LIMITS: In accordance with Federal Register-Vol. 40, No. 248, Part IV-
Wednesday, December 24, 1975. U.S. Environmental Protection
Agency, National Interim Primary Drinking Water Regulations.

2.1.b

<u>CONTAMINANT</u>	<u>*MCL</u>	<u>#1</u>	<u>#2</u>	<u>#3</u>	<u>#4</u>
<u>INORGANIC:</u>					
Arsenic, As	0.05	<0.01	<0.01	<0.01	<0.01
Barium, Ba	1.0	<0.10	<0.10	<0.10	<0.10
Cadmium, Cd	0.010	<0.005	<0.005	<0.005	<0.005
Chromium, Cr	0.05	<0.01	<0.01	<0.01	<0.01
Lead, Pb	0.05	<0.01	<0.01	<0.01	<0.01
Mercury, Hg	0.002	<0.0005	<0.0005	<0.0005	<0.0005
Selenium, Se	0.01	<0.005	<0.005	<0.005	<0.005
Silver, Ag	0.05	<0.01	<0.01	<0.01	<0.01
Fluoride, F	1.4 - 2.4	0.043	0.023	0.075	0.087
Turbidity, NTU	5	1.1	0.9	0.2	0.4
Nitrate Nitrogen, NO ₃ -N	10	<0.02	<0.02	<0.02	<0.02
<u>ORGANIC:</u>					
Endrin	0.0002	<0.0001	<0.0001	<0.0001	<0.0001
Lindane	0.004	<0.001	<0.001	<0.001	<0.001
Methoxychlor	0.1	<0.01	<0.01	<0.01	<0.01
Toxaphene	0.005	<0.001	<0.001	<0.001	<0.001
2,4-D	0.1	<0.01	<0.01	<0.01	<0.01
2,4,5-TP (Silvex)	0.01	<0.001	<0.001	<0.001	<0.001

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

Post Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.

Report #: 42333 (4946)
09-18-84 8 of 9

Identification: #1. SW-4 #2. SW-5 #3. SW-6 #4. SW-10

2.1.c

BASE NEUTRALS

	#1	#2	#3	#4
bis(2-Ethylhexyl)phthalate	<0.01	<0.01	<0.01	<0.01
Di-n-octyl phthalate	<0.01	<0.01	<0.01	<0.01
Dimethyl phthalate	<0.01	<0.01	<0.01	<0.01
Diethyl phthalate	<0.01	<0.01	<0.01	<0.01
Di-n-butyl phthalate	<0.01	<0.01	<0.01	<0.01
Butyl benzyl phthalate	<0.01	<0.01	<0.01	<0.01

ACID EXTRACTABLE ORGANICS

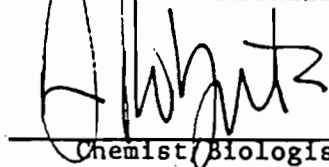
Phenol	<0.01	<0.01	<0.01	<0.01
2-Nitrophenol	<0.01	<0.01	<0.01	<0.01
4-Nitrophenol	<0.01	<0.01	<0.01	<0.01
2,4-Dinitrophenol	<0.01	<0.01	<0.01	<0.01
Pentachlorophenol	<0.01	<0.01	<0.01	<0.01
2-Chlorophenol	<0.01	<0.01	<0.01	<0.01
2,4-Dichlorophenol	<0.01	<0.01	<0.01	<0.01
2,4,6-Trichlorophenol	<0.01	<0.01	<0.01	<0.01
2,4-Dimethylphenol	<0.01	<0.01	<0.01	<0.01
2-Methyl-4,6-Dinitrophenol	<0.01	<0.01	<0.01	<0.01
4-Chloro-3-Methyl Phenol	<0.01	<0.01	<0.01	<0.01

PESTICIDES/PCB's

Aroclor 1016	<0.001	<0.001	<0.001	<0.001
Aroclor 1221	<0.001	<0.001	<0.001	<0.001
Aroclor 1232	<0.001	<0.001	<0.001	<0.001
Aroclor 1242	<0.001	<0.001	<0.001	<0.001
Aroclor 1248	<0.001	<0.001	<0.001	<0.001
Aroclor 1254	<0.001	<0.001	<0.001	<0.001
Aroclor 1260	<0.001	<0.001	<0.001	<0.001
Parathion	<0.001	<0.001	<0.001	<0.001
Mirex	<0.001	<0.001	<0.001	<0.001
Aldrin	<0.001	<0.001	<0.001	<0.001
Dieldrin	<0.001	<0.001	<0.001	<0.001

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.



Chemist/Biologist

Chemist/Biologist

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Post Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.

Report #: 42333 (4946)
09-18-84 9 of 9

Identification: #1. SW-4 #2. SW-5 #3. SW-6 #4. SW-10

2.1.C

PESTICIDES/PCB's - cont.

	#1	#2	#3	#4
Chlorodane	<0.001	<0.001	<0.001	<0.001
DDT	<0.001	<0.001	<0.001	<0.001
Demeton	<0.001	<0.001	<0.001	<0.001
Endosulfan	<0.001	<0.001	<0.001	<0.001
Guthion	<0.001	<0.001	<0.001	<0.001

NO Table

RADIOCHEMISTRY

GROSS ALPHA, pCi/l
Storet # 01501

Counting error, pCi/l
Storet # 01502

#1	0.4	± 0.5
#2	0.2	± 0.5
#3	0.2	± 0.7
#4	0.6	± 1.0

RADIUM 226, pCi/l
Storet # 09501

Counting error, pCi/l
Storet # 09502

#1	<0.2	± 0.2
#2	<0.2	± 0.2
#3	<0.2	± 0.2
#4	<0.2	± 0.2

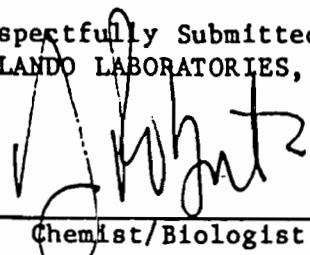
RADIUM 228, pCi/l
Storet # 11501

Counting error, pCi/l
Storet # 11502

#1	0.7	± 0.2
#2	<0.2	± 0.2
#3	0.7	± 0.2
#4	<0.2	± 0.2

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist

Chemist/Biologist

Chemist/Biologist



Orlando Laboratories, Inc.

P. O. Box 19127 • Orlando, Florida 32814 • 305/896-6645

REPORT OF ANALYSIS

Post Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date sampled: 05-11-84
Date received: 05-11-84
Date reported: 07-17-84
Page 1 of 19

PALM BEACH COUNTY, SITE 7 SAMPLING SURFACE WATER SAMPLES

- Sample #1: SW-1 @ 1505 hrs, Water Depth: 2.08 ft, pH: 8.6, Water Temperature: 28.°C, Specific Conductance: 451 umhos, Water Condition: Clear, Chlorine Residual: <0.1 mg/l, Dissolved Oxygen: 7.9 mg/l, Light chop, wind 10-15 MPH out of east, sunny.
- Sample #2: SW-2 @ 1600 hrs, Water Depth: 0.5 ft, pH: 7.1, Water Temperature: 28.1°C, Specific Conductance: 104 umhos, Water Condition: Clear, Chlorine Residual: <0.1 mg/l, Dissolved Oxygen: 5.81 mg/l, Calm, sunny.
- Sample #3: SW-8 @ 1700 hrs, Water Depth: 1.0 ft, pH: 7.2, Water Temperature: 28.0°C, Specific Conductance: 211 umhos, Water Condition: Clear, Chlorine Residual: <0.1 mg/l, Dissolved Oxygen: 9.8 mg/l, Light chop, wind 5-10 MPH out of north, sunny.
- Sample #4: SW-9 @ 1745 hrs, Water Depth: 16.58 ft, pH: 8.9, Water Temperature: 27.5°C, Specific Conductance: 450 umhos, Water Condition: Turbid, Chlorine Residual: <0.1 mg/l, Dissolved Oxygen: not field-fixed, no value, Heavy chop, wind 20 MPH out of north.
- Sample #5: SW-11 @ 1320 hrs, Water Depth: 3.92 ft, pH: 7.1, Water Temperature: 29.8°C, Specific Conductance: 432 umhos, Water Condition: Clear, Chlorine Residual: <0.1 mg/l, Dissolved Oxygen: 9.5 mg/l, Light chop, wind 10-15 MPH out or east, sunny.
- Sample #6: SW-12 @ 1215 hrs, Water Depth: 2.83 ft, pH: 7.0°C, Water Temperature: 27.°C, Specific Conductance: 390 umhos, Water Condition: Turbid, Chlorine Residual: <0.1 mg/l, Dissolved Oxygen: 0.5 mg/l, Calm, wind <5 MPH, sunny.

Our Florida Department of Health & Rehabilitative Service Identification Number is 83141

Respectfully submitted,
ORLANDO LABORATORIES, INC.

Chemist/Biologist

PRIMARY DRINKING WATER REGULATIONS ANALYSIS (ORG. & INORG.)

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 2 of 19

Identification: SW-1

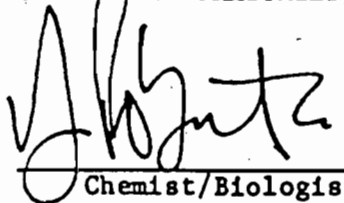
METHODS & LIMITS: In accordance with Federal Register-Vol. 40, No. 248, Part IV-Wednesday, December 24, 1975. U.S. Environmental Protection Agency, National Interim Primary Drinking Water Regulations.

2.1.6

<u>CONTAMINANT</u>	<u>*MCL</u>	<u>SAMPLE</u>
<u>INORGANIC:</u>		
Arsenic, As	0.05	<0.01
Barium, Ba	1.0	<0.10
Cadmium, Cd	0.010	<0.005
Chromium, Cr	0.05	<0.01
Lead, Pb	0.05	<0.01
Mercury, Hg	0.002	<0.0005
Selenium, Se	0.01	<0.005
Silver, Ag	0.05	<0.01
Fluoride, F	1.4 - 2.4	0.164
Turbidity, NTU	5	0.7
Nitrate Nitrogen, NO ₃ -N	10	<0.02
<u>ORGANIC:</u>		
Endrin	0.0002	<0.0001
Lindane	0.004	<0.001
Methoxychlor	0.1	<0.01
Toxaphene	0.005	<0.001
2,4-D	0.1	<0.01
2,4,5-TP (Silvex)	0.01	<0.001

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.



Chemist/Biologist

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Chemist/Biologist

PRIMARY DRINKING WATER REGULATIONS ANALYSIS (ORG. & INORG.)

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 3 of 19

Identification: SW-2

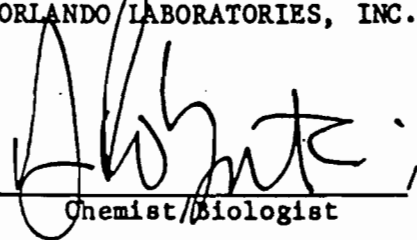
METHODS & LIMITS: In accordance with Federal Register-Vol. 40, No. 248, Part IV-Wednesday, December 24, 1975. U.S. Environmental Protection Agency, National Interim Primary Drinking Water Regulations.

2.1.b

<u>CONTAMINANT</u>	<u>*MCL</u>	<u>SAMPLE</u>
<u>INORGANIC:</u>		
Arsenic, As	0.05	<0.01
Barium, Ba	1.0	<0.10
Cadmium, Cd	0.010	<0.005
Chromium, Cr	0.05	<0.01
Lead, Pb	0.05	<0.01
Mercury, Hg	0.002	<0.0005
Selenium, Se	0.01	<0.005
Silver, Ag	0.05	<0.01
Fluoride, F	1.4 - 2.4	0.054
Turbidity, NTU	5	1.9
Nitrate Nitrogen, NO ₃ -N	10	<0.02
<u>ORGANIC:</u>		
Endrin	0.0002	<0.0001
Lindane	0.004	<0.001
Methoxychlor	0.1	<0.01
Toxaphene	0.005	<0.001
2,4-D	0.1	<0.01
2,4,5-TP (Silvex)	0.01	<0.001

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
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PRIMARY DRINKING WATER REGULATIONS ANALYSIS (ORG. & INORG.)

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Report #: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 4 of 19

Identification: SW-8

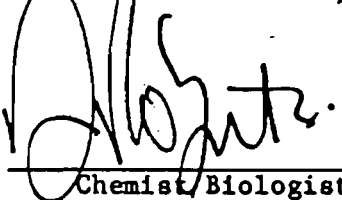
METHODS & LIMITS: In accordance with Federal Register-Vol. 40, No. 248, Part IV-
Wednesday, December 24, 1975. U.S. Environmental Protection
Agency, National Interim Primary Drinking Water Regulations.

2.1.b

<u>CONTAMINANT</u>	<u>*MCL</u>	<u>SAMPLE</u>
<u>INORGANIC:</u>		
Arsenic, As	0.05	<0.01
Barium, Ba	1.0	<0.10
Cadmium, Cd	0.010	<0.005
Chromium, Cr	0.05	<0.01
Lead, Pb	0.05	<0.01
Mercury, Hg	0.002	<0.0005
Selenium, Se	0.01	<0.005
Silver, Ag	0.05	<0.01
Fluoride, F	1.4 - 2.4	0.055
Turbidity, NTU	5	1.3
Nitrate Nitrogen, NO ₃ -N	10	<0.02
<u>ORGANIC:</u>		
Endrin	0.0002	<0.0001
Lindane	0.004	<0.001
Methoxychlor	0.1	<0.01
Toxaphene	0.005	<0.001
2,4-D	0.1	<0.01
2,4,5-TP (Silvex)	0.01	<0.001

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.



Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

PRIMARY DRINKING WATER REGULATIONS ANALYSIS (ORG. & INORG.)

Post, Buckley, Schuh & Jernigan, Inc.
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889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84

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Identification: SW-9

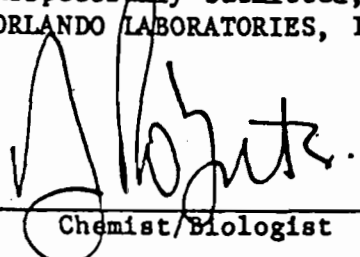
METHODS & LIMITS: In accordance with Federal Register-Vol. 40, No. 248, Part IV-
Wednesday, December 24, 1975. U.S. Environmental Protection
Agency, National Interim Primary Drinking Water Regulations.

2.1.b

<u>CONTAMINANT</u>	<u>*MCL</u>	<u>SAMPLE</u>
<u>INORGANIC:</u>		
Arsenic, As	0.05	<0.01
Barium, Ba	1.0	<0.10
Cadmium, Cd	0.010	<0.005
Chromium, Cr	0.05	<0.01
Lead, Pb	0.05	<0.01
Mercury, Hg	0.002	<0.0005
Selenium, Se	0.01	<0.005
Silver, Ag	0.05	<0.01
Fluoride, F	1.4 - 2.4	0.373
Turbidity, NTU	5	89
Nitrate Nitrogen, NO ₃ -N	10	0.39
<u>ORGANIC:</u>		
Endrin	0.0002	<0.0001
Lindane	0.004	<0.001
Methoxychlor	0.1	<0.01
Toxaphene	0.005	<0.001
2,4-D	0.1	<0.01
2,4,5-TP (Silvex)	0.01	<0.001

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

PRIMARY DRINKING WATER REGULATIONS ANALYSIS (ORG. & INORG.)

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Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 6 of 19

Identification: SW-11

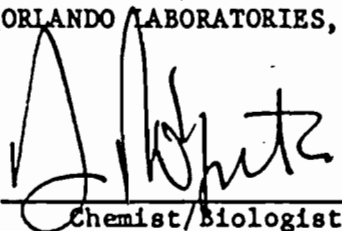
METHODS & LIMITS: In accordance with Federal Register-Vol. 40, No. 248, Part IV-
Wednesday, December 24, 1975. U.S. Environmental Protection
Agency, National Interim Primary Drinking Water Regulations.

2.1.b

<u>CONTAMINANT</u>	<u>*MCL</u>	<u>SAMPLE</u>
<u>INORGANIC:</u>		
Arsenic, As	0.05	<0.01
Barium, Ba	1.0	<0.10
Cadmium, Cd	0.010	<0.005
Chromium, Cr	0.05	<0.01
Lead, Pb	0.05	<0.01
Mercury, Hg	0.002	<0.0005
Selenium, Se	0.01	<0.005
Silver, Ag	0.05	<0.01
Fluoride, F	1.4 - 2.4	0.162
Turbidity, NTU	5	1.1
Nitrate Nitrogen, NO ₃ -N	10	<0.02
<u>ORGANIC:</u>		
Endrin	0.0002	<0.0001
Lindane	0.004	<0.001
Methoxychlor	0.1	<0.01
Toxaphene	0.005	<0.001
2,4-D	0.1	<0.01
2,4,5-TP (Silvex)	0.01	<0.001

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.



Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

PRIMARY DRINKING WATER REGULATIONS ANALYSIS (ORG. & INORG.)

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889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 7 of 19

Identification: SW-12

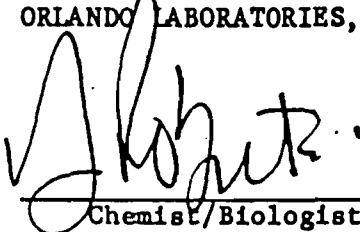
METHODS & LIMITS: In accordance with Federal Register-Vol. 40, No. 248, Part IV-
Wednesday, December 24, 1975. U.S. Environmental Protection
Agency, National Interim Primary Drinking Water Regulations.

2.1.b

<u>CONTAMINANT</u>	<u>*MCL</u>	<u>SAMPLE</u>
<u>INORGANIC:</u>		
Arsenic, As	0.05	<0.01
Barium, Ba	1.0	<0.10
Cadmium, Cd	0.010	<0.005
Chromium, Cr	0.05	<0.01
Lead, Pb	0.05	<0.01
Mercury, Hg	0.002	<0.0005
Selenium, Se	0.01	<0.005
Silver, Ag	0.05	<0.01
Fluoride, F	1.4 - 2.4	0.135
Turbidity, NTU	5	2.4
Nitrate Nitrogen, NO ₃ -N	10	<0.02
<u>ORGANIC:</u>		
Endrin	0.0002	<0.0001
Lindane	0.004	<0.001
Methoxychlor	0.1	<0.01
Toxaphene	0.005	<0.001
2,4-D	0.1	<0.01
2,4,5-TP (Silvex)	0.01	<0.001

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.



Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 8 of 19

IDENTIFICATION: SW-1, Water Appearance: Slightly yellow.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

2.1.9

RESULTS

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
Total Dissolved Solids, TDS (500)		224	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		320
Total Alkalinity, CaCO ₃		151	Foaming Agents (MBAS) (0.5)		<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na (160)		19.6
Bicarbonate Alkalinity, CaCO ₃		151	Nitrate Nitrogen, N (10)		<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		153
Bicarbonates, HCO ₃		184	Calcium Hardness, CaCO ₃		139
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		13.7
Carbon Dioxide, CO ₂		6.16	Calcium, Ca		55.6
Chloride, Cl (250)		26.2	Magnesium, Mg		3.32
Sulfate, SO ₄ (250)		2.7	Iron, Fe (0.3)		0.20
Fluoride, F (1.4-2.4)		0.164	Manganese, Mn (0.05)		<0.05
pH (Laboratory) (6.5-8.5)		7.7	Copper, Cu (1.0)		<0.01
pHs		7.49	Zinc, Zn (5)		<0.01
Stability Index		7.28			
Saturation Index, corrosivity (+0.2)		0.21			
Color, PCU (15)		10			
Odor Threshold (3)		1			
Turbidity, NTU (5)		0.7			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 9 of 19

IDENTIFICATION: SW-2, Water Appearance: Yellow.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

RESULTS

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
21.a Total Dissolved Solids, TDS (500)		90	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		63
Total Alkalinity, CaCO ₃		20.0	Foaming Agents (MBAS) (0.5)		<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na (160)		6.49
Bicarbonate Alkalinity, CaCO ₃		20.0	Nitrate Nitrogen, N (10)		<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		23.1
Bicarbonates, HCO ₃		24.8	Calcium Hardness, CaCO ₃		16.6
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		6.54
Carbon Dioxide, CO ₂		4.19	Calcium, Ca		6.64
Chloride, Cl (250)		11.1	Magnesium, Mg		1.59
Sulfate, SO ₄ (250)		<1.0	Iron, Fe (0.3)		<0.10
Fluoride, F (1.4-2.4)		0.054	Manganese, Mn (0.05)		<0.05
pH (Laboratory) (6.5-8.5)		7.0	Copper, Cu (1.0)		<0.01
pHs		9.21	Zinc, Zn (5)		<0.01
Stability Index		11.4			
Saturation Index, corrosivity (+0.2)		-2.21			
Color, PCU (15)		40			
Odor Threshold (3)		1			
Turbidity, NTU (5)		1.9			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 10 of 19

IDENTIFICATION: SW-8, Water Appearance: Yellow.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

2.1.a

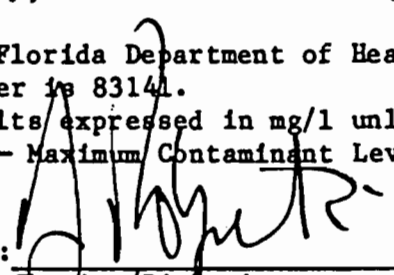
RESULTS

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
Total Dissolved Solids, TDS (500)		124	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		150
Total Alkalinity, CaCO ₃		70.0	Foaming Agents (MBAS) (0.5)		<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na (160)		4.25
Bicarbonate Alkalinity, CaCO ₃		70.0	Nitrate Nitrogen, N (10)		<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		<78.9
Bicarbonates, HCO ₃		85.4	Calcium Hardness, CaCO ₃		74.8
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		<4.12
Carbon Dioxide, CO ₂		2.26	Calcium, Ca		29.9
Chloride, Cl (250)		5.8	Magnesium, Mg		<1.00
Sulfate, SO ₄ (250)		5.0	Iron, Fe (0.3)		<0.10
Fluoride, F (1.4-2.4)		0.055	Manganese, Mn (0.05)		<0.05
pH (Laboratory) (6.5-8.5)		7.8	Copper, Cu (1.0)		<0.01
pHs		8.04	Zinc, Zn (5)		<0.01
Stability Index		8.27			
Saturation Index, corrosivity (+0.2)		-0.24			
Color, PCU (15)		40			
Odor Threshold (3)		1			
Turbidity, NTU (5)		1.3			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: 

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 11 of 19

IDENTIFICATION: SW-9, Water Appearance: Very Turbid.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

2.1.a

RESULTS

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
Total Dissolved Solids, TDS (500)		262	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		310
Total Alkalinity, CaCO ₃		151	Foaming Agents (MBAS) (0.5)		<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na (160)		13.0
Bicarbonate Alkalinity, CaCO ₃		151	Nitrate Nitrogen, N (10)		0.39
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		191
Bicarbonates, HCO ₃		184	Calcium Hardness, CaCO ₃		181
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		10.6
Carbon Dioxide, CO ₂		3.09	Calcium, Ca		72.2
Chloride, Cl (250)		15.5	Magnesium, Mg		2.58
Sulfate, SO ₄ (250)		3.0	Iron, Fe (0.3)		1.44
Fluoride, F (1.4-2.4)		0.373	Manganese, Mn (0.05)		<0.05
pH (Laboratory) (6.5-8.5)		8.0	Copper, Cu (1.0)		<0.01
pHs		7.38	Zinc, Zn (5)		<0.01
Stability Index		6.77			
Saturation Index, corrosivity (+0.2)		0.62			
Color, PCU (15)		>100			
Odor Threshold (3)		1			
Turbidity, NTU (5)		89			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 12 of 19

IDENTIFICATION: SW-11, Water Appearance: Slight Color.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

2.1.a

RESULTS

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
Total Dissolved Solids, TDS	(500)	162	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		230
Total Alkalinity, CaCO ₃		90.5	Foaming Agents (MBAS)	(0.5)	<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na	(160)	18.1
Bicarbonate Alkalinity, CaCO ₃		90.5	Nitrate Nitrogen, N	(10)	<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		103
Bicarbonates, HCO ₃		110	Calcium Hardness, CaCO ₃		91.2
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		11.9
Carbon Dioxide, CO ₂		2.32	Calcium, Ca		36.5
Chloride, Cl	(250)	23.7	Magnesium, Mg		2.90
Sulfate, SO ₄	(250)	4.6	Iron, Fe	(0.3)	0.13
Fluoride, F	(1.4-2.4)	0.162	Manganese, Mn	(0.05)	<0.05
pH (Laboratory)	(6.5-8.5)	7.9	Copper, Cu	(1.0)	<0.01
pHs		7.87	Zinc, Zn	(5)	<0.01
Stability Index		7.83			
Saturation Index, corrosivity (+0.2)		0.03			
Color, PCU	(15)	10			
Odor Threshold	(3)	1			
Turbidity, NTU	(5)	1.1			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date Sampled: 05-11-84
Date Received: 05-11-84
Date Reported: 07-17-84
Page 13 of 19

IDENTIFICATION: SW-12, Water Appearance: Yellow.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

2.1.a

RESULTS

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
Total Dissolved Solids, TDS	(500)	220	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		290
Total Alkalinity, CaCO ₃		80.0	Foaming Agents (MBAS)	(0.5)	<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na	(160)	32.95
Bicarbonate Alkalinity, CaCO ₃		80.0	Nitrate Nitrogen, N	(10)	<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		105
Bicarbonates, HCO ₃		98	Calcium Hardness, CaCO ₃		80.3
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		24.9
Carbon Dioxide, CO ₂		3.28	Calcium, Ca		32.1
Chloride, Cl	(250)	42.6	Magnesium, Mg		6.04
Sulfate, SO ₄	(250)	7.5	Iron, Fe	(0.3)	0.11
Fluoride, F	(1.4-2.4)	0.135	Manganese, Mn	(0.05)	<0.05
pH (Laboratory)	(6.5-8.5)	7.7	Copper, Cu	(1.0)	<0.01
pHs		7.95	Zinc, Zn	(5)	<0.01
Stability Index		8.2			
Saturation Index, corrosivity (+0.2)		-0.25			
Color, PCU	(15)	60			
Odor Threshold	(3)	1			
Turbidity, NTU	(5)	2.4			

Our Florida Department of Health & Rehabilitative Services Identification

Number is 83741

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist



Orlando Laboratories, Inc.

P. O. Box 19127

Orlando, Florida 32814

305/896-6645

REPORT OF ANALYSIS

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date sampled: 05-11-84
Date received: 05-11-84
Date reported: 07-17-84
Page 14 of 19

IDENTIFICATION: #1. SW-1 #2. SW-2 #3. SW-3

2.1.d

RESULTS OF ANALYSIS

MISCELLANEOUS

	#1	#2	#3
Ammonia, ionized	0.04	0.07	0.04
Ammonia, unionized	0.014	0.0007	0.0005
Total Kjeldahl Nitrogen, TKN	0.86	2.07	0.81
Total Nitrogen, TN	0.86	2.07	0.81
Nitrite Nitrogen, N (NO ₂ -N)	<0.01	<0.01	<0.01
Nitrate Nitrogen, N (NO ₃ -N)	<0.02	<0.02	<0.02
Organic Nitrogen, ON	0.82	2.0	0.77
Fecal Coliform/100 ml (MFT)	<1	<1	<1
Total Coliform/100 ml (MFT)	5	2	<1
Oil & Grease, infrared	<0.1	<0.1	<0.1
BOD ₅ -day	7.9	5.4	4.2
Cyanide, CN	<0.005	<0.005	<0.005
Chemical Oxygen Demand, COD	26.0	61.0	27.0
Dissolved Oxygen, DO (Field-Fixed)	7.9	5.8	9.8
Total Phosphate, P (T-PO ₄ -P)	0.32	0.32	0.16

BOD started 5/14/84 @ 1400 hrs, finished 5/19/84 @ 1400 hrs.

MISCELLANEOUS - METALS

Beryllium, Be	<0.01	<0.01	<0.01
Chromium Trivalent, Cr ⁺³	<0.01	<0.01	<0.01
Chromium Hexavalent, Cr ⁺⁶	<0.01	<0.01	<0.01
Nickel, Ni	<0.01	<0.01	<0.01

Results expressed in mg/l unless otherwise designated. < = Less Than.
Our Florida Department of Health & Rehabilitative Service Identification Number is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

REPORT OF ANALYSIS

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 41917 (4379)
Sampled by: OLI-M. Smar/D. Bungo
Date sampled: 05-11-84
Date received: 05-11-84
Date reported: 07-17-84
Page 15 of 19

IDENTIFICATION: #4. SW-9 #5. SW-11 #6. SW-12

2.1.d

RESULTS OF ANALYSIS

MISCELLANEOUS

	#4	#5	#6
Ammonia, ionized	0.07	0.04	0.16
Ammonia, unionized	0.03	0.0005	0.0013
Total Kjeldahl Nitrogen, TKN	0.98	0.98	1.30
Total Nitrogen, TN	0.98	0.98	1.30
Nitrite Nitrogen, N (NO ₂ -N)	<0.01	<0.01	<0.01
Nitrate Nitrogen, N (NO ₃ -N)	0.39	<0.02	<0.02
Organic Nitrogen, ON	0.91	0.94	1.14
Fecal Coliform/100 ml (MFT)	<1	6	<1
Total Coliform/100 ml (MFT)	3	7	2
Oil & Grease, infrared	<0.1	<0.1	<0.1
BOD ₅ -day	2.9	5.0	12.0
Cyanide, CN	<0.005	<0.005	<0.005
Chemical Oxygen Demand, COD	48.0	38.0	65.0
Dissolved Oxygen, DO (Field-Fixed)	*	9.55	0.5
Total Phosphate, P (T-PO ₄ -P)	0.22	0.16	<0.03

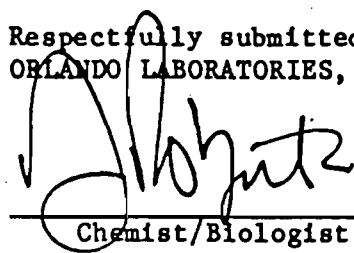
MISCELLANEOUS - METALS

Beryllium, Be	<0.01	<0.01	<0.01
Chromium Trivalent, Cr ⁺³	<0.01	<0.01	<0.01
Chromium Hexavalent, Cr ⁺⁶	<0.01	<0.01	<0.01
Nickel, Ni	<0.01	<0.01	<0.01

*Sample not field-fixed, no value.

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.



Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

REPORT OF ANALYSIS

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.

Report #: 41917 (4379)
Page 16 of 19

IDENTIFICATION: #1. SW-1 #2. SW-2 #3. SW-8 #4. SW-9

2.1.c

ACID EXTRACTABLE ORGANICS

	#1	#2	#3	#4
Phenol	<0.01	<0.01	<0.01	<0.01
2-Nitrophenol	<0.01	<0.01	<0.01	<0.01
4-Nitrophenol	<0.01	<0.01	<0.01	<0.01
2, 4-Dinitrophenol	<0.01	<0.01	<0.01	<0.01
2-Chlorophenol	<0.01	<0.01	<0.01	<0.01
2,4-Dichlorophenol	<0.01	<0.01	<0.01	<0.01
2,4,6-Trichlorophenol	<0.01	<0.01	<0.01	<0.01
2,4-Dimethylphenol	<0.01	<0.01	<0.01	<0.01
2-Methyl-4,6-Dinitrophenol	<0.01	<0.01	<0.01	<0.01
4-Chloro-3-Methyl Phenol	<0.01	<0.01	<0.01	<0.01

BASE NEUTRALS

bis(2-Ethylhexyl)phthalate	<0.01	<0.01	<0.01	<0.01
Di-n-octyl phthalate	<0.01	<0.01	<0.01	<0.01
Dimethyl phthalate	<0.01	<0.01	<0.01	<0.01
Diethyl phthalate	<0.01	<0.01	<0.01	<0.01
Diethyl phthalate	<0.01	<0.01	<0.01	<0.01
Di-n-butyl phthalate	<0.01	<0.01	<0.01	<0.01
Butyl benzyl phthalate	<0.01	<0.01	<0.01	<0.01

PCB'S

Aroclor 1016	<0.001	<0.001	<0.001	<0.001
Aroclor 1221	<0.001	<0.001	<0.001	<0.001
Aroclor 1232	<0.001	<0.001	<0.001	<0.001
Aroclor 1242	<0.001	<0.001	<0.001	<0.001
Aroclor 1248	<0.001	<0.001	<0.001	<0.001
Aroclor 1254	<0.001	<0.001	<0.001	<0.001
Aroclor 1260	<0.001	<0.001	<0.001	<0.001

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

[Signature]

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

REPORT OF ANALYSIS

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.

Report #: 41917 (4379)
Page 17 of 19

IDENTIFICATION: #5. SW-11 #6. SW-12.

2.1.c

ACID EXTRACTABLE ORGANICS

	#5	#6
Phenol	<0.01	<0.01
2-Nitrophenol	<0.01	<0.01
4-Nitrophenol	<0.01	<0.01
2, 4-Dinitrophenol	<0.01	<0.01
2-Chlorophenol	<0.01	<0.01
2,4-Dichlorophenol	<0.01	<0.01
2,4,6-Trichlorophenol	<0.01	<0.01
2,4-Dimethylphenol	<0.01	<0.01
2-Methyl-4,6-Dinitrophenol	<0.01	<0.01
4-Chloro-3-Methyl Phenol	<0.01	<0.01

BASE NEUTRALS

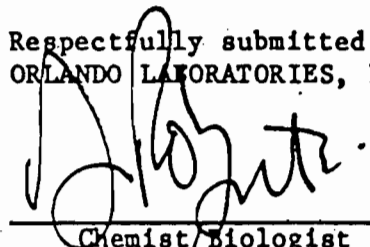
bis(2-Ethylhexyl)phthalate	<0.01	<0.01
Di-n-octyl phthalate	<0.01	<0.01
Dimethyl phthalate	<0.01	<0.01
Diethyl phthalate	<0.01	<0.01
Diethyl phthalate	<0.01	<0.01
Di-n-butyl phthalate	<0.01	<0.01
Butyl benzyl phthalate	<0.01	<0.01

PCB'S

Aroclor 1016	<0.001	<0.001
Aroclor 1221	<0.001	<0.001
Aroclor 1232	<0.001	<0.001
Aroclor 1242	<0.001	<0.001
Aroclor 1248	<0.001	<0.001
Aroclor 1254	<0.001	<0.001
Aroclor 1260	<0.001	<0.001

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.



Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

REPORT OF ANALYSIS

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.

Report #: 41917 (4379)
Page 18 of 19

IDENTIFICATION: #1. SW-1 #2. SW-2 #3. SW-8 #4. SW-9 #5. SW-11 #6. SW-12

2.1.c

PESTICIDES Acid Extractable Organics

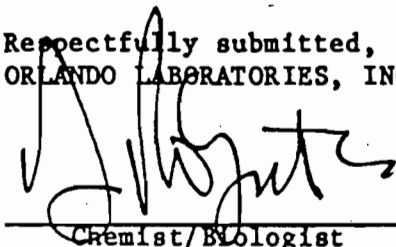
	#1	#2	#3	#4
Phenol	<0.001	<0.001	<0.001	<0.001
2-Nitrophenol	<0.001	<0.001	<0.001	<0.001
4-Nitrophenol	<0.001	<0.001	<0.001	<0.001
2, 4-Dinitrophenol	<0.001	<0.001	<0.001	<0.001
2-Chlorophenol	<0.001	<0.001	<0.001	<0.001
2,4-Dichlorophenol	<0.001	<0.001	<0.001	<0.001
2,4,6-Trichlorophenol	<0.001	<0.001	<0.001	<0.001
2,4-Dimethylphenol	<0.001	<0.001	<0.001	<0.001
2-Methyl-4,6-Dinitrophenol	<0.001	<0.001	<0.001	<0.001
4-Chloro-3-Methyl Phenol	<0.001	<0.001	<0.001	<0.001

BASE NEUTRALS

	#5	#6
bis(2-Ethylhexyl)phthalate	<0.001	<0.001
Di-n-octyl phthalate	<0.001	<0.001
Dimethyl phthalate	<0.001	<0.001
Diethyl phthalate	<0.001	<0.001
Diethyl phthalate	<0.001	<0.001
Di-n-butyl phthalate	<0.001	<0.001
Butyl benzyl phthalate	<0.001	<0.001

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

REPORT OF ANALYSIS

Post, Buckley, Schuh & Jernigan, Inc.
Attn: Mr. David E. Deans, P.E.

Report #: 41917 (4379)
Page 19 of 19

IDENTIFICATION: #1. SW-1 #2. SW-2 #3. SW-8 #4. SW-9 #5. SW-11 #6. SW-12

Not on Tables

RADIOCHEMISTRY

SAMPLES

	GROSS ALPHA, pCi/l Storet # 01501	Counting error, pCi/l Storet # 01502
#1	2.3	± 2.2
#2	0.3	± 0.4
#3	0.5	± 0.8
#4	35.4	± 8.7
#5	1.0	± 1.4
#6	0.3	± 0.8

	RADIUM 226, pCi/l Storet # 09501	Counting error, pCi/l Storet # 09502
#1	<0.2	± 0.2
#2	<0.2	± 0.2
#3	<0.2	± 0.2
#4	1.0	± 0.2
#5	<0.2	± 0.2
#6	0.3	± 0.2

	RADIUM 228, pCi/l Storet # 11501	Counting error, pCi/l Storet # 11502
#1	<2.0	± 0.3
#2	<2.0	± 0.3
#3	<2.0	± 0.3
#4	<2.0	± 0.3
#5	<2.0	± 0.3
#6	<2.0	± 0.3

Results expressed in mg/l unless otherwise designated. < = Less Than
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.

[Signature]
Chemist/Biologist

Chemist/Biologist

Chemist/Biologist



Orlando Laboratories, Inc.

P. O. Box 19127

Orlando, Florida 32814

305/896-6645

PRIMARY DRINKING WATER REGULATIONS ANALYSIS (ORG. & INORG.)

Post, Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report #: 42379 (4992)
Sampled by: OLI-D. Bungo/C. Baker
Date Sampled: 08-03-84 1200-1500 hrs
Date Received: 08-06-84
Date Reported: 09-24-84

Page 1 of 5

Identification: Site 7, Surface #3, Temperature: 34°C, Depth: 0.5 ft,
Specific Conductance: 230 umhos.

METHODS & LIMITS: In accordance with Federal Register-Vol. 40, No. 248, Part IV-
Wednesday, December 24, 1975. U.S. Environmental Protection
Agency, National Interim Primary Drinking Water Regulations.

2.1.b

<u>CONTAMINANT</u>	<u>*MCL</u>	<u>SAMPLE</u>
<u>INORGANIC:</u>		
Arsenic, As	0.05	<0.01
Barium, Ba	1.0	<0.10
Cadmium, Cd	0.010	<0.005
Chromium, Cr	0.05	<0.01
Lead, Pb	0.05	<0.01
Mercury, Hg	0.002	<0.0005
Selenium, Se	0.01	<0.005
Silver, Ag	0.05	<0.01
Fluoride, F	1.4 - 2.4	0.076
Turbidity, NTU	5	1.6
Nitrate Nitrogen, NO ₃ -N	10	<0.02
<u>ORGANIC:</u>		
Endrin	0.0002	<0.0001
Lindane	0.004	<0.001
Methoxychlor	0.1	<0.01
Toxaphene	0.005	<0.001
2,4-D	0.1	<0.01
2,4,5-TP (Silvex)	0.01	<0.001

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

**GENERAL WATER ANALYSIS FOR
SECONDARY DRINKING WATER REGULATIONS**

Post, Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.
889 North Orange Avenue
Orlando, Florida 32801-1088

Report: 42379 (4992)
Sampled by: OLI-D. Bungo/C. Baker
Date Sampled: 08-03-84 1200-1500 hrs
Date Received: 08-06-84
Date Reported: 09-24-84
Page 2 of 5

IDENTIFICATION: Site 7, Surface Water #3, Water appearance: Yellow.

METHODS

This water was analyzed according to "Standard Methods for the Examination of Water and Wastewater," Latest Edition, APHA, AWWA and WPCF.

2.1.a

RESULTS

<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>	<u>DETERMINATION</u>	<u>(MCL)</u>	<u>mg/l</u>
Total Dissolved Solids, TDS (500)		94	Hydrogen Sulfide, H ₂ S [F-F]		<0.01
Phenolphthalein Alkalinity, CaCO ₃		0	Specific Conductance, umhos		155
Total Alkalinity, CaCO ₃		47.6	Foaming Agents (MBAS) (0.5)		<0.01
Carbonate Alkalinity, CaCO ₃		0	Sodium, Na (160)		7.17
Bicarbonate Alkalinity, CaCO ₃		47.6	Nitrate Nitrogen, N (10)		<0.02
Carbonates, CaCO ₃		0	Total Hardness, CaCO ₃		<59.8
Bicarbonates, HCO ₃		58.1	Calcium Hardness, CaCO ₃		55.7
Hydroxides, as OH		0	Magnesium Hardness, CaCO ₃		<4.12
Carbon Dioxide, CO ₂		1.94	Calcium, Ca		22.3
Chloride, Cl (250)		18.9	Magnesium, Mg		<1.00
Sulfate, SO ₄ (250)		<1	Iron, Fe (0.3)		0.21
Fluoride, F (1.4-2.4)		0.076	Manganese, Mn (0.05)		<0.05
pH (Laboratory) (6.5-8.5)		7.7	Copper, Cu (1.0)		0.01
pHs		8.31	Zinc, Zn (5)		<0.05
Stability Index		8.92			
Saturation Index, corrosivity (+0.2)		-0.61			
Color, PCU (15)		60			
Odor Threshold (3)		1			
Turbidity, NTU (5)		1.6			

Our Florida Department of Health & Rehabilitative Services Identification Number is 83141.

Results expressed in mg/l unless otherwise designated. < = Less Than.

MCL - Maximum Contaminant Levels.

Signed: _____

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

Post, Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.

Report: 42379 (4992)
Page 3 of 5

IDENTIFICATION: Site 7, Surface Water #3.

2.1.d

MISCELLANEOUS METALS

SAMPLE

Beryllium, Be	<0.01
Chromium, trivalent, Cr ⁺³	<0.01
Chromium, hexavalent, Cr ⁺⁶	<0.01
Nickel, Ni	<0.02

MISCELLANEOUS

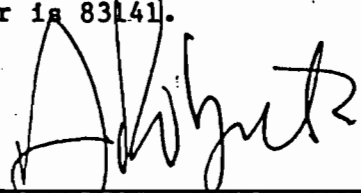
Ammonia Nitrogen, N (ionized)	0.12
Ammonia Nitrogen, N (unionized)	<0.03
Total Kjeldahl Nitrogen, TKN	2.13
Total Nitrogen, TN	2.13
Nitrate Nitrogen, N (NO ₃ -N)	<0.02
Nitrite Nitrogen, N (NO ₂ -N)	<0.01
Organic Nitrogen, ON	2.01
Fecal Coliform/100 ml (MFT)	<1
Total Coliform/100 ml (MFT)	360
Fecal Streptococci/100 ml (MFT)	19,700
Oil & Grease, infrared	<0.1
BOD ₅ -day	5.0
Cyanide, CN	<0.005
Chemical Oxygen Demand, COD	67
Dissolved Oxygen, DO (Field-Fixed)	11.3
Total Phosphate, P (T-PO ₄ -P)	0.05

BOD₅-day Analysis set up 08-04-84 @ 1600 hrs, analyzed 08-09-84 @ 1600 hrs.

Fecal Streptococci set up 08-04-84 @ 1500 hrs, read 08-06-84 @ 1500 hrs.

Coliform set up 08-04-84 @ 1500 hrs, read 08-05-84 @ 1220 hrs.

Results expressed in mg/l unless otherwise designated. < = Less Than.
Our Florida Department of Health & Rehabilitative Services Identification
Number is 83141.

Signed: 

Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

2.1.c

Post, Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.

Report: 42379 (4992)
Page 4 of 5

IDENTIFICATION: Site 7, Surface Water #3.

ACID EXTRACTABLE ORGANICS

Phenol	<0.01
2-Nitrophenol	<0.01
4-Nitrophenol	<0.01
2,4-Dinitrophenol	<0.01
Pentachlorophenol	<0.01
2-Chlorophenol	<0.01
2,4-Dichlorophenol	<0.01
2,4,6-Trichlorophenol	<0.01
2,4-Dimethylphenol	<0.01
2-Methyl-4,6-Dinitrophenol	<0.01
4-Chloro-3-Methyl Phenol	<0.01
Chlorinated Creasols	<0.01

BASE NEUTRALS

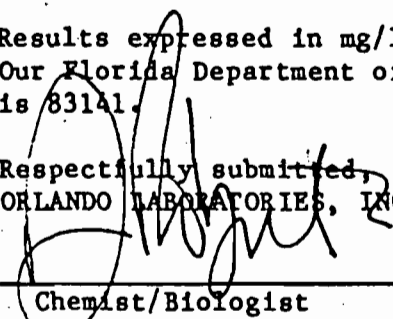
bis(2-Ethylhexyl)phthalate	<0.01
Di-n-octyl phthalate	<0.01
Dimethyl phthalate	<0.01
Diethyl phthalate	<0.01
Di-n-butyl phthalate	<0.01
Butyl benzyl phthalate	<0.01

PESTICIDES/PCB's

Mirex	<0.001
Parathion	<0.001
Aldrin	<0.001
Dieldrin	<0.001
Chlordane	<0.001
DDT	<0.001
Demeton	<0.001
Endosulfan	<0.001
Guthion	<0.001
Aroclor 1016	<0.001
Aroclor 1221	<0.001
Aroclor 1232	<0.001
Aroclor 1242	<0.001
Aroclor 1248	<0.001
Aroclor 1254	<0.001
Aroclor 1260	<0.001

Results expressed in mg/l unless otherwise designated. < = Less Than.
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.



Chemist/Biologist

Post, Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.

Report: 42379 (4992)
Page 5 of 5

IDENTIFICATION: Site 7, Surface Water #3.

Not on Table

RADIOCHEMISTRY

SAMPLE

Results expressed in pCi/l.

Gross Alpha, Storet #01501
Counting error, Storet #01502

0.4
± 0.8

Radium 226, Storet #09501
Counting error, Storet #09502

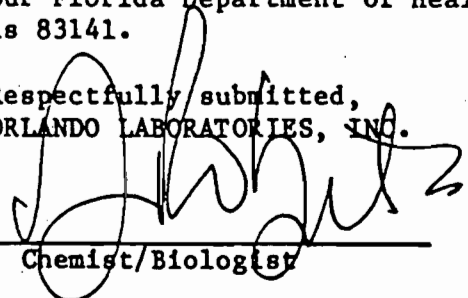
<0.2
± 0.2

Radium 228, Storet #11501
Counting error, Storet #11502

<0.2
± 0.2

Results expressed in mg/l unless otherwise designated. < = Less Than.
Our Florida Department of Health & Rehabilitative Service Identification Number
is 83141.

Respectfully submitted,
ORLANDO LABORATORIES, INC.



Chemist/Biologist

Post Buckley, Schuh & Jernigan, Inc.
Attention: Mr. David E. Deans, P.E.

Report #: 42333 (4946)
09-18-84 7 of 9

Identification: #1. SW-4 #2. SW-5 #3. SW-6 #4. SW-10

2.1.d

MISCELLANEOUS METALS

	#1	#2	#3	#4
Beryllium, Be	<0.01	<0.01	<0.01	<0.01
Chromium, Hexavalent Cr ⁺⁶	<0.01	<0.01	<0.01	<0.01
Chromium, Trivalent Cr ⁺³	<0.01	<0.01	<0.01	<0.01
Nickel, Ni	<0.02	<0.02	<0.02	<0.02

MISCELLANEOUS

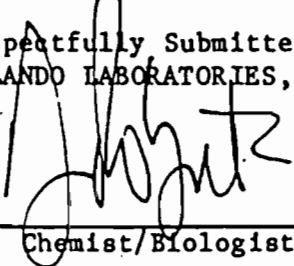
Ammonia Nitrogen, N (ionized)	0.50	1.47	0.07	0.30
Ammonia Nitrogen, N (unionized)	<0.03	0.07	<0.03	0.03
Total Kjeldahl Nitrogen, TKN	4.37	4.16	1.0	1.08
Nitrate Nitrogen, N (NO ₃ -N)	<0.02	<0.02	<0.02	<0.02
Nitrite Nitrogen, N (NO ₂ -N)	<0.01	<0.01	<0.01	<0.01
Organic Nitrogen, ON	3.87	2.62	0.93	0.75
Total Nitrogen, TN	4.37	4.16	1.0	1.08
Oil & Grease, infrared	<0.1	<0.1	<0.1	<0.1
BOD ₅ -day	6.2	1.8	0.7	0.9
Cyanide, CN	<0.005	<0.005	<0.005	<0.005
Chemical Oxygen Demand, COD	95	72	55	51
Dissolved Oxygen, DO (Field-Fixed)	5.6	11.7	4.4	9.4
Fecal Coliform/100 ml (MFT)	6	11	53	300
Total Coliform/100 ml (MFT)	3,700	80	500	600
Total Phosphate, P (T-PO ₄ -P)	<0.03	<0.03	<0.03	<0.03
pH, units	7.0	7.7	7.5	8.1

BOD set up 07-30-84 @ 1600 hrs, analyzed 08-04-84 @ 1600 hrs.

Coliform set up 07-30-84 @ 1700 hrs, read 08-01-84 @ 1700 hrs.

Results are expressed in mg/l (ppm). *MCL - Maximum Contaminant Levels.
Our Florida Department of Health & Rehabilitative Services Laboratory
Identification Number is 83141.

Respectfully Submitted,
ORLANDO LABORATORIES, INC.


Chemist/Biologist

Chemist/Biologist

Chemist/Biologist

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 3: A dredge and fill jurisdictional of the project site was conducted prior to the passage of the Henderson Wetland Protection Act. This jurisdictional was not grandfathered pursuant to Chapter 17.4.022, FAC, and therefore is not a valid dredge and fill jurisdictional under the current rules. The acreage of jurisdictional wetland impacted given in Appendix 10.1 may therefore not be correct.

RESPONSE: The dredge and fill jurisdictional of the project site in regards to the recently passed Henderson Wetland Protection Act is currently being discussed with the Department of Environmental Regulation, southeast Florida district office. The acreage of jurisdictional wetland impacted by this project will be forwarded under a separate cover as soon as it is determined by the Department of Environmental Regulation, southeast Florida district office.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 4: No dredge and fill jurisdictional has been conducted for the transmission line corridor. The transmission line corridor is not included in the dredge and fill application in Appendix 10.1. No acreage of jurisdictional wetlands impacted by the transmission line is given.

RESPONSE: The dredge and fill jurisdictional of the project site in regards to the recently passed Henderson Wetland Protection Act is currently being discussed with the Department of Environmental Regulation, southeast Florida district office. The acreage of jurisdictional wetland impacted by this project will be forwarded under a separate cover as soon as it is determined by the Department of Environmental Regulation, southeast Florida district office.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 5: A plan view drawing showing the location and indicating the acreage of created wetlands should be submitted.

RESPONSE: In order to show the locations of the wetlands which will be mitigated, two Figures have been developed. The accompanying Figure 5-1 shows the existing conditions of the Resource Recovery Facility site indicating the location of the proposed borrow lakes, Class I and III Landfills, resource recovery plant and the north-south roadway. Also, shown in table form are the dredge and fill acreages. The DER acreages are not shown. See Item Numbers 3 and 4 of this response concerning DER jurisdictional acreage.

The accompanying Figure 5-2 is the Master Site Plan showing the proposed areas of mitigated wetlands. The mitigated wetland areas are the existing shell pits and the littoral zones of the proposed borrow lakes. The mitigated wetland details are shown on Figure 3D, Wetland Establishment, Appendix 10.1.4.

LEGEND

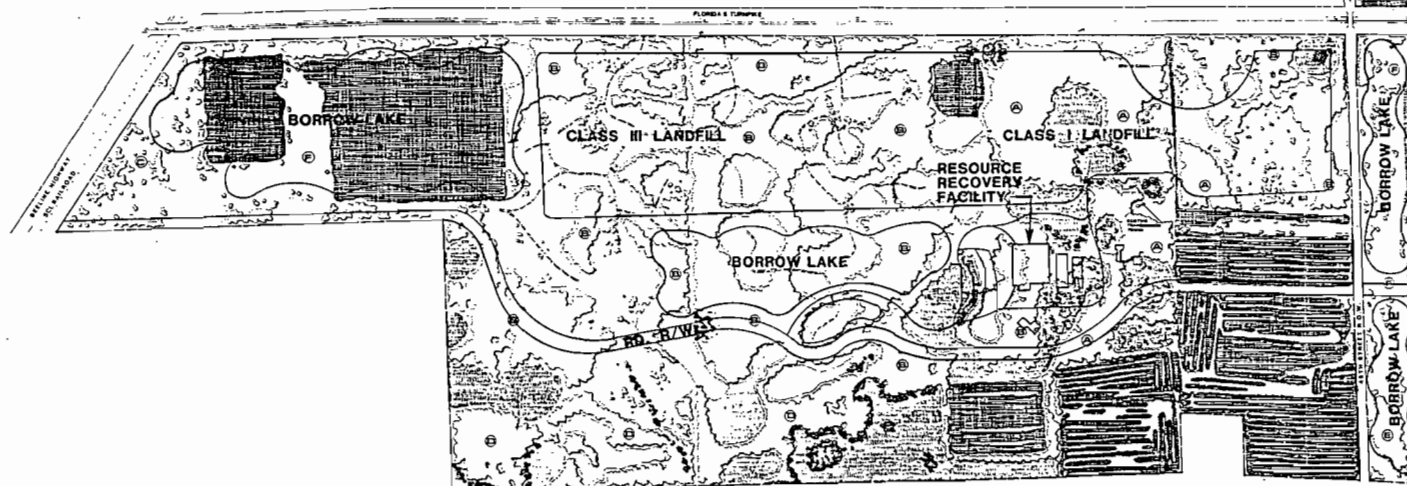
-  BORROW LAKE DREDGED FOR FILL & COVER MATERIAL, PRESENTLY OPEN WATER.
-  ABANDONED SHELL PITS USED FOR SHELLROCK & GRAVEL MATERIAL.
-  FRESH WATER MARSH DOMINATED BY SPHAGNUM, SAURURUS AND PICKERSWEED, WITH ABSENCE OF TREES & WOODY VEGETATION.
-  FRESH WATER SWAMP DOMINATED BY MAPLE & WILLOW WITH PICKERSWEED, ARROWWEED AND SAURURUS IN WETTER AREAS.
-  FRESH WATER SLOUGH DOMINATED BY OAK, MYRTLE, WILLOW, SAURURUS & OTHER WETLAND VEGETATION.
-  WET PRAIRIE DOMINATED BY GRASSES & FORBS WITH SCATTERED WETLAND SHRUBLAND SPECIES.
-  CYPRESS FOREST FOUND IN DEPRESSIONS, WETLANDS, WETLAND SHRUBLAND, WETLANDS, WETLAND GRASSES & MAPLES PRESENT.
-  DRAINAGE CANALS

- A** MIXED FOREST LIVE OAK, LAUREL OAK, RED MAPLE & SLASH PINE COMMUNITY.
- B** PINE FLATWOODS DOMINATED BY SLASH PINE WITH UNDERSTORY OF SAW PALMETTO, MYRTLE, ASH & MYRTLE IN WETTER AREAS.
- C** PALMETTO PRAIRIES DOMINATED BY SAW PALMETTO WITH SCATTERED PINE & UNDERSTORY GRASSES.
- D** PALM HAMMOCK RAHAL PALM HAMMOCK WITH SPERMATOPHYTES, GRASSES & VINES, PINE ARE DOMINANT GROUNDCOVER.
- E** EXOTIC VEGETATION AREAS TAKEN OVER BY MELALEUCA, EUCALYPTUS, OR AUSTRALIAN PINE.
- F** DISTURBED GROUND SCRAPED AREAS WITH REESTABLISHED HERB & GRASSES.

BRIDGE AND FILL AREAS

A. ACRESAGE DEDUCTED		
LOCATION	Onland	Wetland
Antietam Lake Expansion	37.0	8.0
Lake West of Landfill	43.3	24.7
Lake South of 45th Street	42.0	—
TOTAL ACRESAGE	122.3	32.7
B. ACRESAGE FILLED		
Site	Onland	Wetland
Landfill	325.9	121.1
Resource Recovery Plant	35.0	14.8
North-South Roadway *	38.4	13.2
TOTAL ACRESAGE	417.3	157.9

* Acres of wetlands disturbed by construction of the north-south roadway are approximate depending upon final alignment.



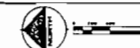
RESPONSE: JULY 2, 1985

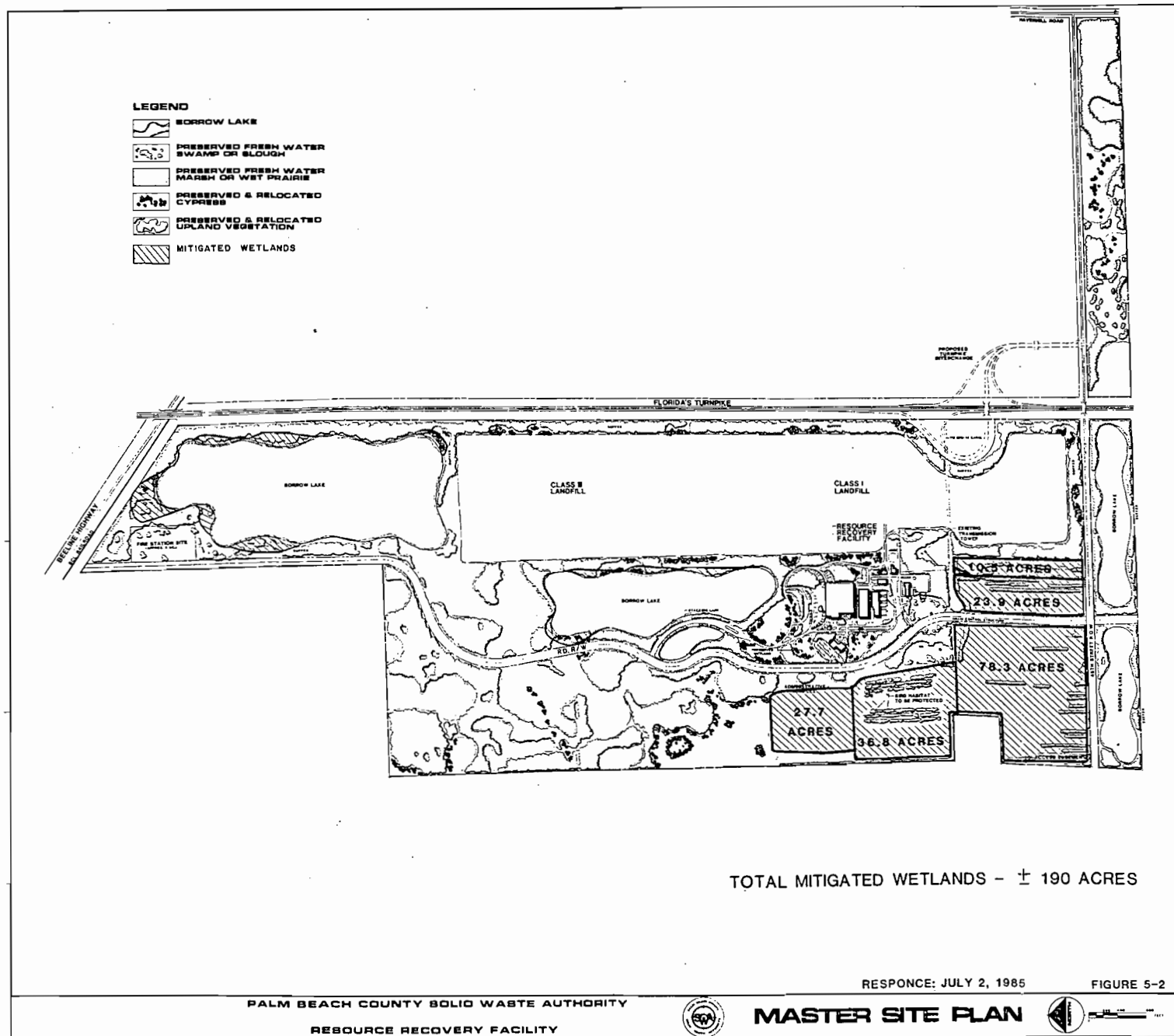
FIGURE 5-1

PALM BEACH COUNTY SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



EXISTING CONDITIONS





RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 6: Table 2.3-13, Table 3.3-1, and Table 3.4-1 do not agree with respect to sulfur content. Please explain.

RESPONSE: The second footnote of Table 2.3-13, Comparison of Impact of Palm Beach County RDF Fired Spreader Stoker Furnaces to De-Minimus Levels (ISC Model), should be corrected to read "Model analysis for SO₂ based on 2,100 TPD and a controlled emission factor of 9 lb/ton."

Tables 3.3-1 and 3.4-1 remain unchanged.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 7: Design criteria on page 3-11 (3.4.1.4.1.2) mentions that the furnaces will have assistance from gas fed auxiliary burners to aid in the combustion process, yet on page 3-7 (section 3.3) it states that no provision is made for auxiliary fuels except for natural gas which is to be used as a start-up fuel. Page 3-18 mentions natural gas and oil firing. Please clarify.

RESPONSE: To clarify the statements made on pages 3-7, 3-11 and 3-18 concerning the use of natural gas to assist the combustion process, the following sentence should be substituted on page 3-7, Section 3.3, Fuel, second paragraph. "Provisions will be made for auxiliary fuel firing of natural gas for start-up and shut-down of the furnace/stoker/boiler systems and also to assist the combustion process when RDF is wet or otherwise difficult to burn."

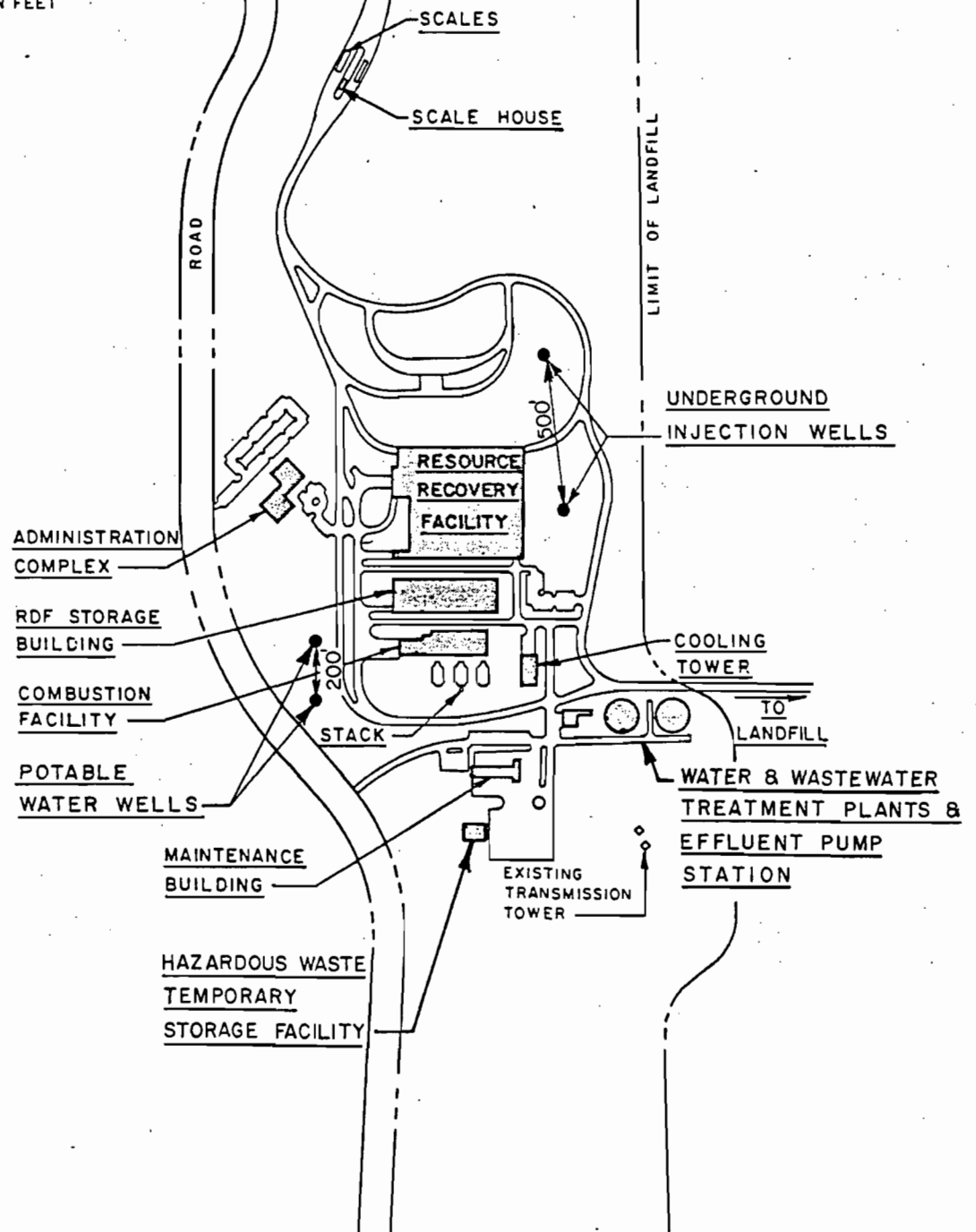
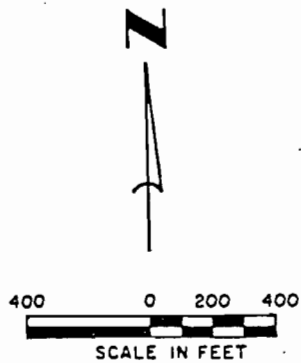
RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 8: Please show on the appropriate Figure or map the location of well DW 10A and its proximity to the proposed landfill.

RESPONSE: The location of the potable wells as described in Section 3.5.3, Potable Water Systems, are shown on the accompanying figure. As discussed, two wells will provide the potable water demands. The well DW 10A as discussed in the application will not be used as a supply source. However, the deep well water quality analysis as presented in Appendix 10.14 is an indication of the quality of water which is available on the site for a potable water system.

As shown on Figure 8-1, the wells will be located on the southwestern portion of the plant site. The two wells will be separated by a distance of approximately 200 feet. Each well will have a minimum separation of 200 feet to the nearest possible source of contamination. As the studies of the groundwater movement have indicated, the movement of groundwater on the site is from west to east. Locating the potable water wells on the southwest portion of the plant site will also protect the wells from sources of groundwater contamination.



RESPONSE: JULY 2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



RESOURCE RECOVERY PLANT
SITE PLAN

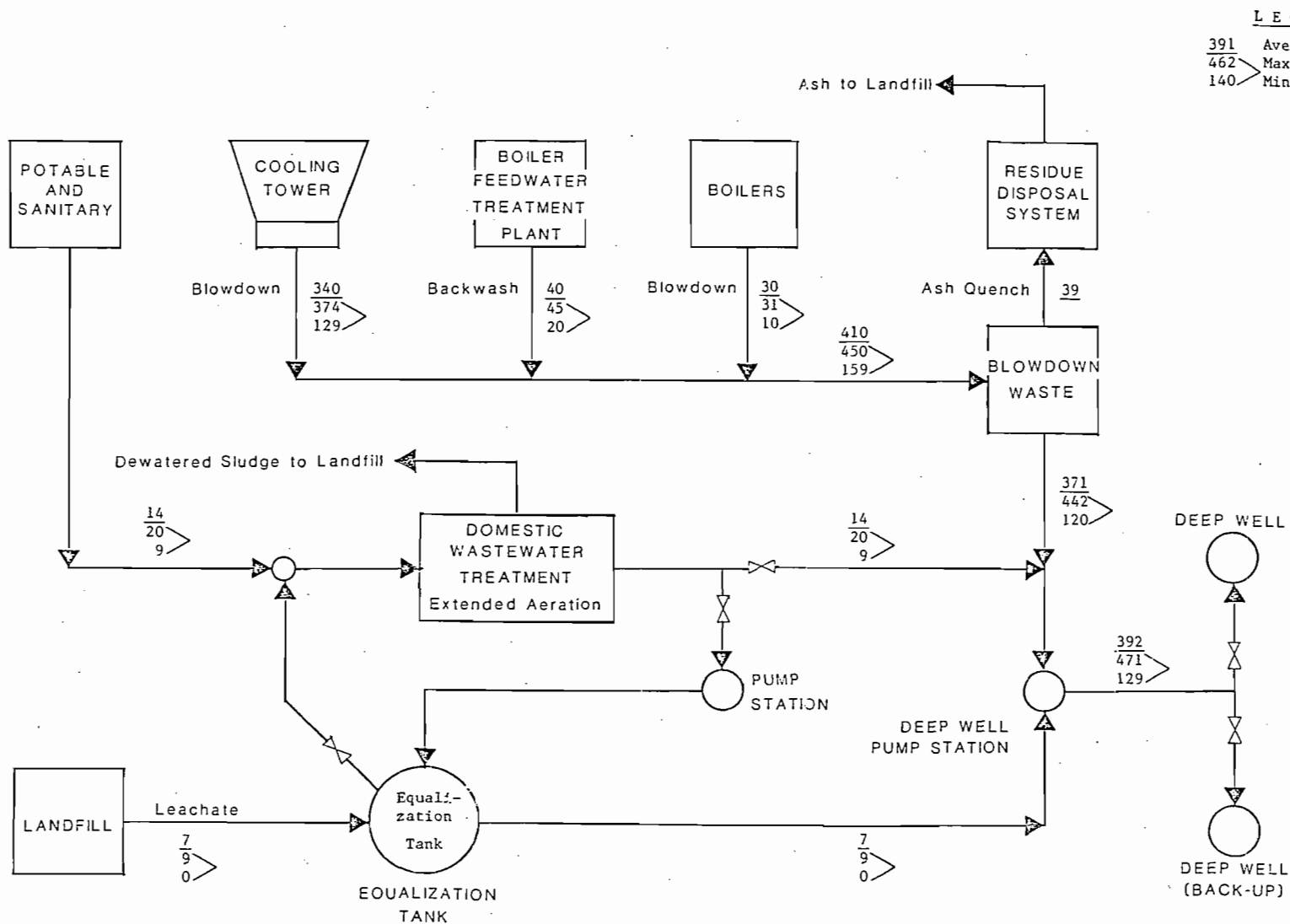
FIG. 8-1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

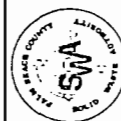
Letter Dated July 2, 1985

ITEM 9: No flow diagrams are provided as asked for in 3.6 of the application format guide for the chemical waste system.

RESPONSE: The chemical waste system flow diagram is shown on Figure 9-1.



RESPONSE: JULY 2, 1985



PALM BEACH COUNTY
 SOLID WASTE AUTHORITY
 RESOURCE RECOVERY FACILITY

CHEMICAL AND BIOCIDES
 WASTE FLOW DIAGRAM

FIGURE 9-1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 10: Does Palm Beach County have any plans to possibly use the ash in road construction, fill or other purposes?

RESPONSE: At the present time the ash will be disposed of in the Class I Landfill as described in the Application. However, the ash will be tested for possible utilization in concrete, road construction or other beneficial uses if it is approved for such uses by the Department of Environmental Regulation.

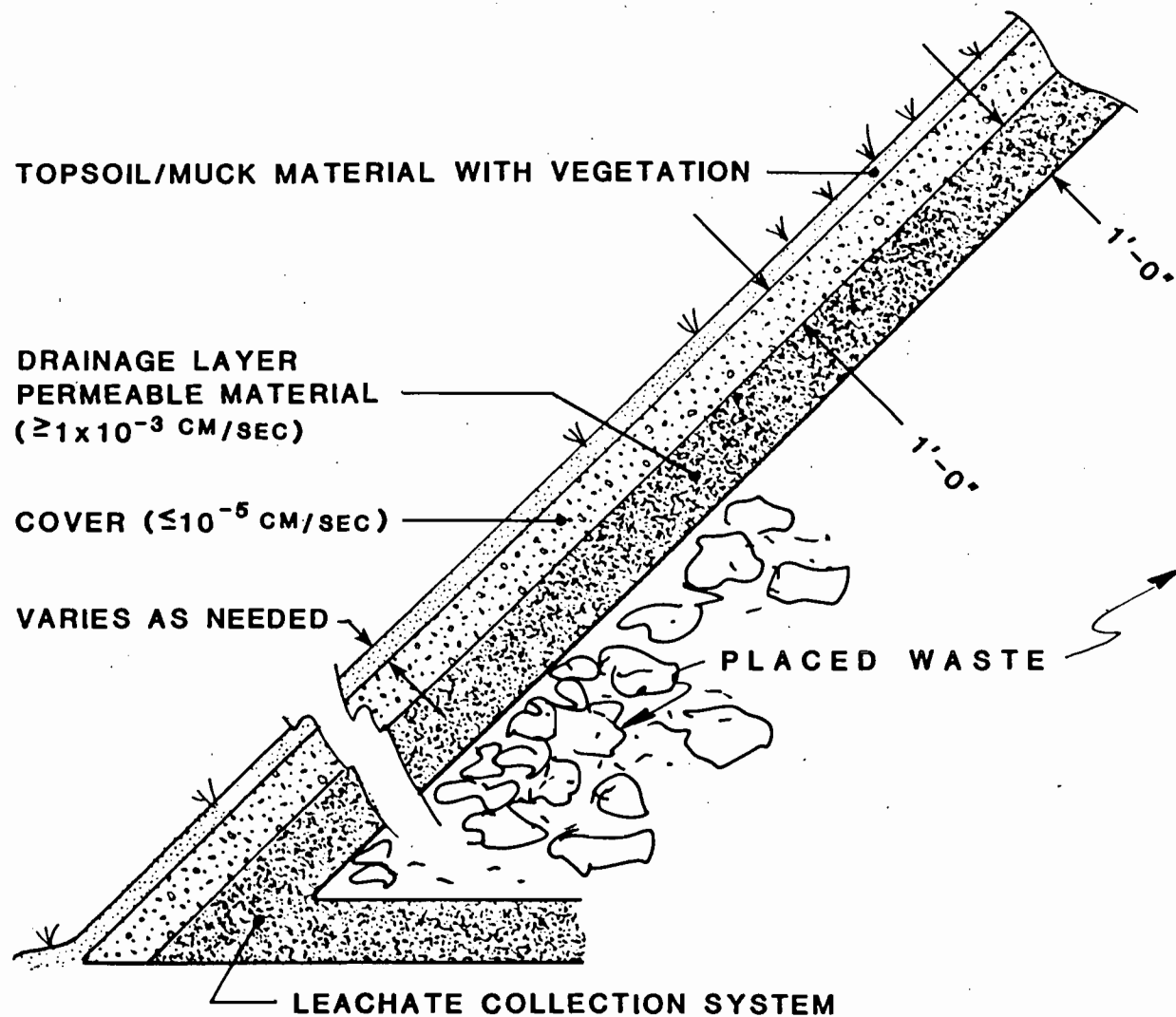
RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 11: Could more specific information be provided on how Palm Beach County plans to keep stormwater run-off and leachate separated while the landfill is active?

RESPONSE: While the landfill is active, a leachate collection system will collect all rainfall which percolates through the landfill and becomes leachate. All runoff not coming into contact with solid waste will be directed to the conservation area via the drainage ditches. These ditches will be constructed during each phase according to the current topography. At closure they will be designed in accordance with the proposed plan.

Also, to insure against lateral seepage of leachate, a side slope drainage layer is proposed. The accompanying drawing illustrates the proposed drainage layer. This permeable drainage layer will be constructed between the outside cover material and the buried waste. If lateral and horizontal seepages occur, the drainage layer will intercept the leachate from migrating horizontally through the cover. In addition, rain water which penetrates through the side slope will be channeled downward by the less permeable layer to the leachate collection system.



RESPONSE: JULY 2, 1985

PROPOSED SIDE SLOPE DETAIL
N.T.S.

FIGURE 11-1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 12: If ash may be used as a daily cover for the Class III Landfill (page 3-43), why will only a single liner leachate collection system be utilized?

RESPONSE: As discussed in Section 3.7.1, ash will be used as weekly cover in the single-lined Class III landfill only if such practice has been proven to be environmentally sound and has received the approval of the Department of Environmental Regulation.

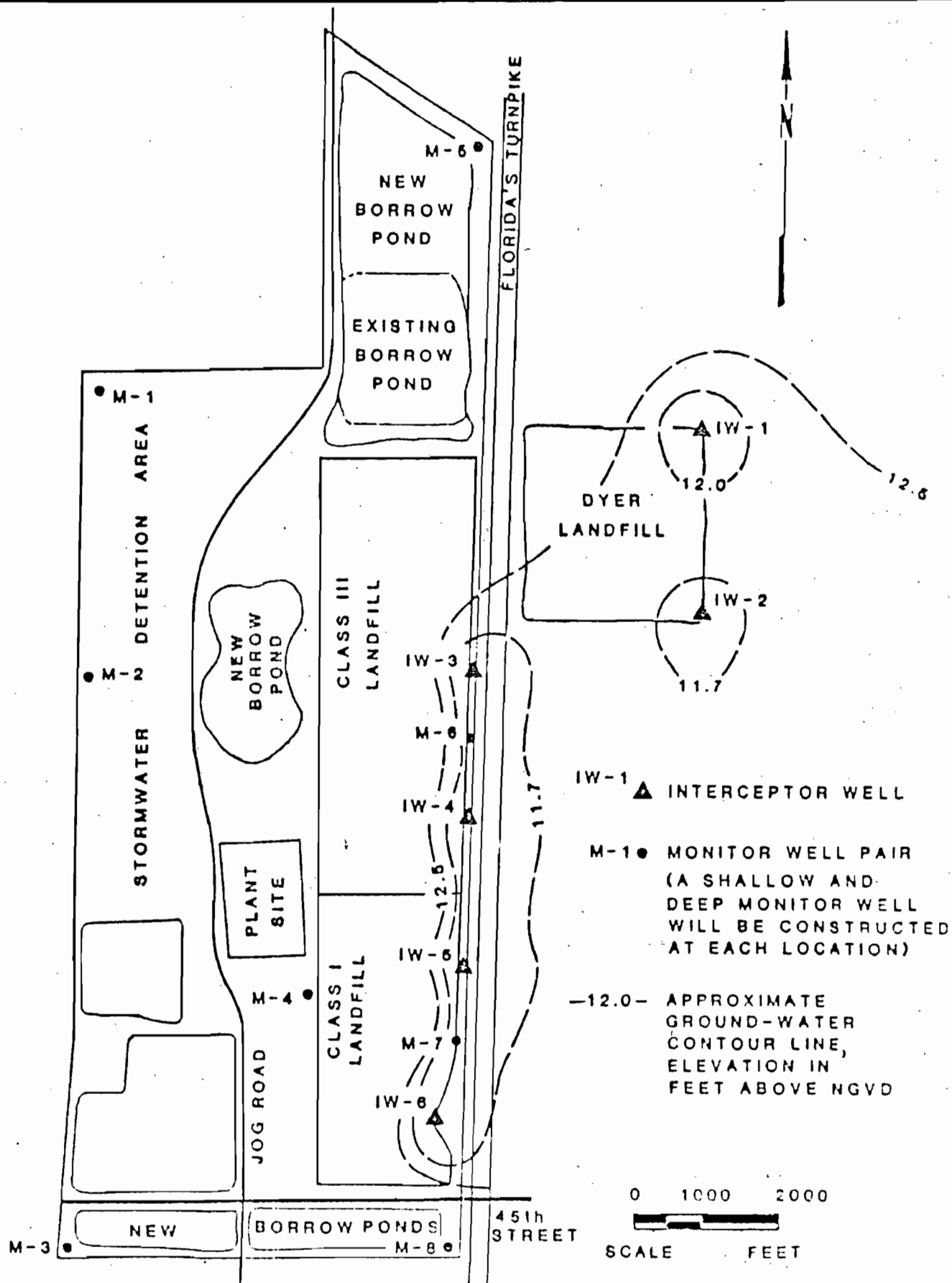
RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

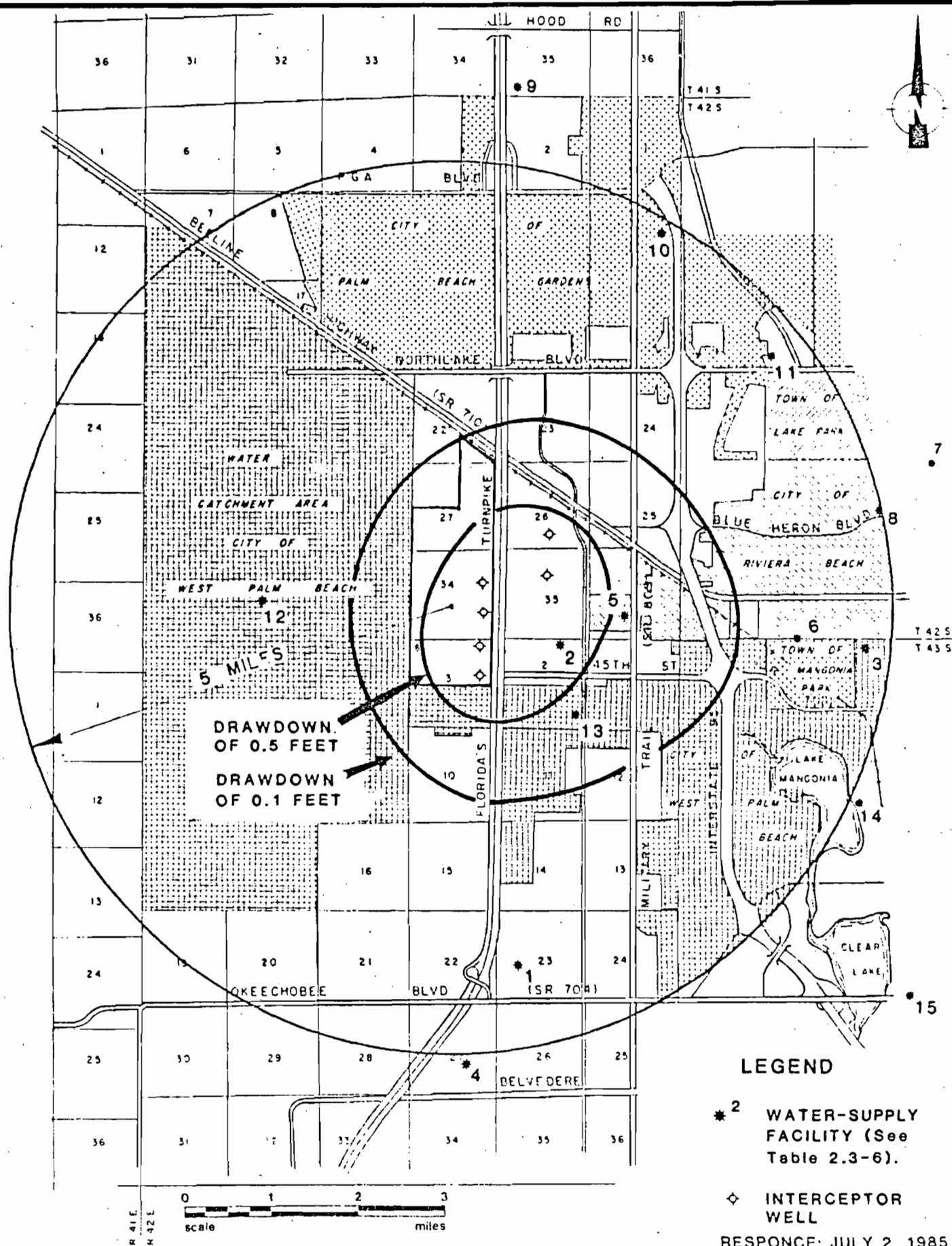
Letter Dated July 2, 1985

ITEM 13: Figure 4.2-1 is referenced to (page 5-9) but is not present in the application. Drawdown contours (plotted) are not present for the area within 5 miles of the plant's water supply wells:

RESPONSE: Figure 4.2-1 was inadvertantly omitted from the Application. This figure is first referred to on page 4-8 and should be placed after that page. Figure 4.2-1 is enclosed.

Drawdowns created by pumping the interceptor wells were calculated with the use of ground-water flow model described in Appendix 10.14.7. Contour lines representing drawdowns of 0.1 feet and 0.5 feet are shown on the accompanying Figure 13-2. These drawdowns were calculated by simulating water-availability during a 1-in-10-year dry-season drought after pumping 2 mgd for 180 days. These drawdowns will have no significant impact on neighboring water-supply wells. This matter also is discussed in Section 5.3.3 and Appendix 10.14.7.





PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



Cones of Depression Within Five Miles of
the Resource Recovery Facility
Caused by Pumping Interceptor Wells.

FIGURE 13-2

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 14: In Section 4.5.2.2 please clarify what chemicals are potentially to be used for dust control.

RESPONSE: As discussed in Section 4.5.2.2, a comprehensive watering program is the best means of dust control in terms of cost effectiveness. The Solid Waste Authority currently uses watering as its primary means of dust control. The Authority also uses calcium chloride on a limited basis during the dry season for dust control.

Authority personnel regularly study the use of other dust control products in terms of economic and environmental feasibility. One product currently being investigated is Coherex, a hard crude-oil resin. No product will be employed without prior approval by appropriate agencies.

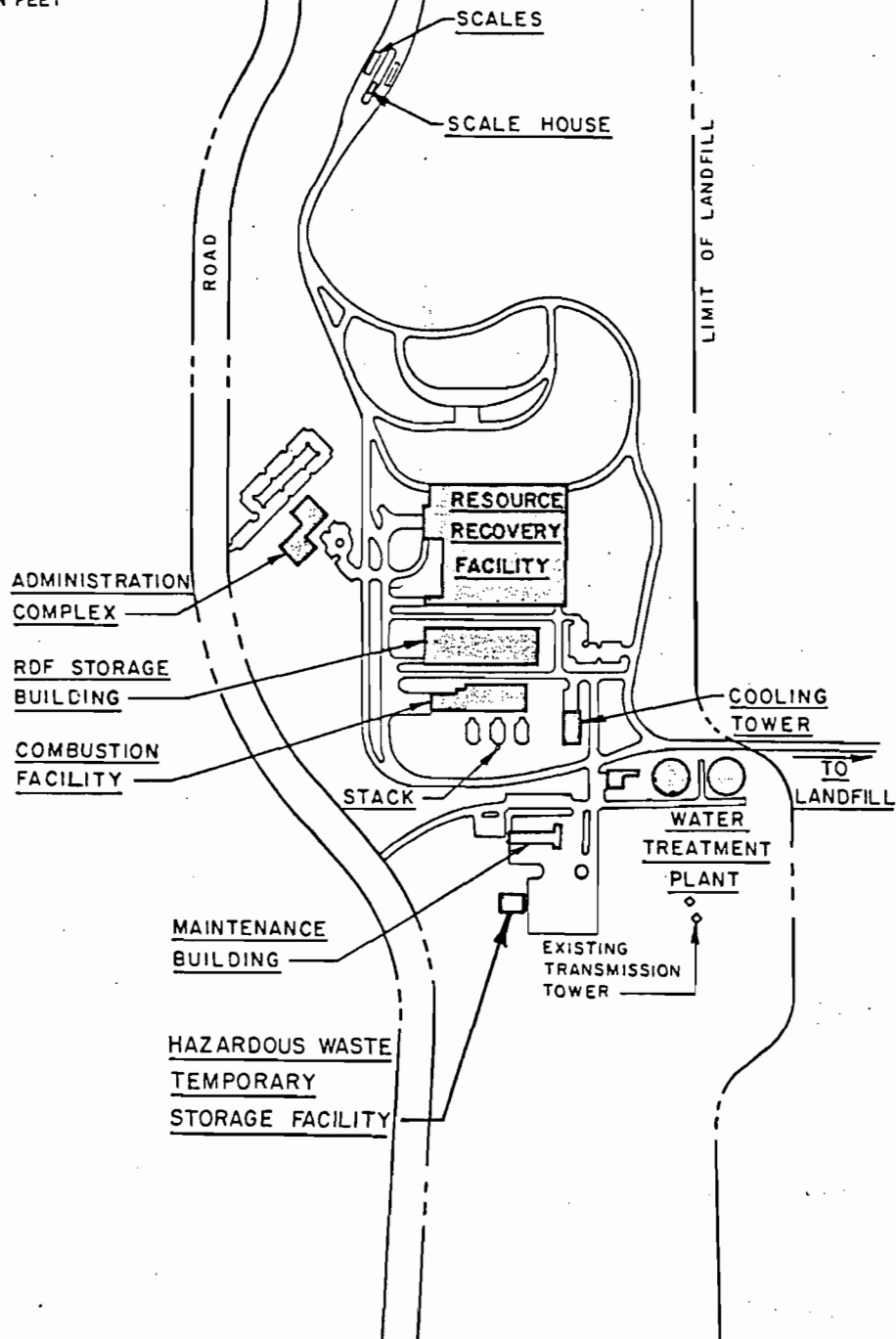
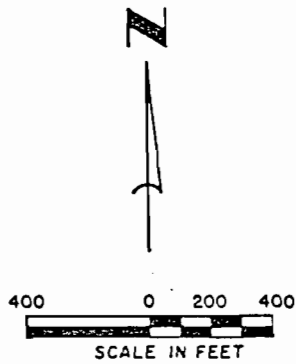
Finally, all permanent roadways on the construction site will have a bituminous prime coat as early as possible in the process, reducing potential particulate emissions and the need for dust control measures.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 15: Location of the hazardous waste storage facility is not shown on any of the provided maps although it is mentioned that it will be located next to the maintenance building.

RESPONSE: The hazardous waste temporary storage facility will be located next to the maintenance building as shown on the accompanying Figure 15-1.



RESPONSE: JULY 2, 1985

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



RESOURCE RECOVERY PLANT
SITE PLAN

FIG. 15-1

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 16: What are the units for Table 5.3.1?

RESPONSE: Table 5.3.1, Soil Loss Summary, represents the expected soil loss in tons per year.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 17: When will Palm Beach County know if they will need a Special Exception to the RS zoning for a switching station?

RESPONSE: As presented in Chapter 6: "Transmission Lines and Other Linear Facilities", three (3) alternatives were presented for interconnecting with Florida Power and Light Company's system. The three alternatives are as follows:

1. A 138kV transmission line from the resource recovery plant substation south along the roadway across 45th Street to the south edge of the Authority's property, east along the south edge of the property across Florida's Turnpike to Haverhill Road, south on the west side of Haverhill Road right-of-way to the existing FP&L transmission corridor. Connection to the transmission line would be by gang operated disconnect switches. The Solid Waste Authority line would be protected as a part of the FP&L line by means of remote tripping.
2. This alternative is the same as No. 1 except that a switching station would be required at the FP&L transmission corridor.
3. The transmission line route is the same as No. 1 and after reaching the FP&L corridor, the transmission line would be continued north-east down the corridor approximately three (3) miles to the Riviera Beach Plant.

Negotiations are presently being held between Florida Power and Light Company and the Palm Beach County Solid Waste Authority to finalize the energy sales agreement and the method, location, and type of interconnection. As described in Chapter 6, only Alternate No. 2 would require a Special Exception to the current RS Zoning.

It is anticipated that negotiations with Florida Power and Light Company will proceed so that a determination of the interconnection will be decided within the next several weeks. For the present, all three (3) alternatives are still being considered.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 18: For section 6.1.9.1, list any herbicides proposed for use and provide aquatic organism toxicity data. Also discuss application techniques and impacts on off-property vegetation.

RESPONSE: The first choice for maintenance of the right of way will be mechanical control. In the event herbicidal control is necessary, only chemicals approved by the Florida Department of Agriculture and the Florida Department of Natural Resources for use in aquatic sites will be utilized. The chemicals to be considered will be:

- 2,4-D
- Glyphosate (ie., RODEO).

These compounds are approved for use in aquatic sites. Both are EPA registered. Aquatic organism toxicity data was developed and evaluated in both the EPA and the State of Florida registration processes. This data is available through both the manufacturer and the agencies responsible for herbicide registration. Generation references on herbicide toxicity to aquatic organisms are available from Mississippi State University¹ and the Weed Science Society of America².

Any herbicide application that may take place will be done through ground application. This eliminates drift problems that

may arise from aerial application. Invert emulsions, polymers and drift control adjuvants approved by the State of Florida and recommended by the manufacturer will be used where appropriate to prevent impacts on off-property vegetation.

1. Mississippi State University - Cooperative Extension Service. Publication 1455: Agricultural Chemical Toxicity to Selected Aquatic Animals: Bluehill, Channel Catfish, Rainbow Trout, Crawfish and Freshwater Shrimp.

2. Herbicide Handbook of the WSSA. 5th Edition. 1983. Published by the Weed Science Society of America.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 19: How many flail mills will there be?

RESPONSE: As shown in the application on Figure 3.1-2, Mass Balance, three (3) flail mills will be provided.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 20: Please fill out DER Form 17-1.209(9) for Construction and Operation of an Underground Injection Well. The information contained in the application insufficiently addresses the injection well.

RESPONSE: The DER Form 17-1.209(9) for the Construction and Operation of an Underground Injection Well accompanies this response.

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated July 2, 1985

ITEM 21: Are the air pollution impact modelling computer runs previously furnished to the department current?

RESPONSE: The air pollution impact modelling computer runs previously submitted to the Department of Environmental Regulation are current.

DER
JUN 19 1985
BACOM



PALM BEACH COUNTY SOLID WASTE AUTHORITY

OFFICIALS

FRANK SINEATH, III
Chairman

KEN SPILLIAS
Vice Chairman

DONALD L. KISELEWSKI
Secretary

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Member

NORMAN LITTAUER
Member

JERRY L. OWENS
Member

TIMOTHY F. HUNT, JR.
Executive Director

PALM BEACH COUNTY SOLID WASTE AUTHORITY



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

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

Re: Application for Power Plant Site Certification
Palm Beach County Solid Waste Authority
Resource Recovery Facility

Gentlemen:

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

The Solid Waste Authority welcomes the opportunity to work with the Department of Environmental Regulation and other agencies involved in reviewing this application for site certification.

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

Also enclosed is our check for \$22,500.00 to cover the application fee.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'Timothy F. Hunt, Jr.', is written over the typed name.

Timothy F. Hunt, Jr.
Executive Director

TH/pc
enclosure

State of Florida
Dept. of Environmental Regulation
Page Two

Engineer Submitting Application: _____


Sumpter H. Barker

Florida Registration Number: _____

#12839

12839



and Trust

P. O. Box 107
140 North County Road
Palm Beach, Florida 33480

050251-9 P B C SOLID WASTE AUTH-ACQ&CONSTR FD

63-659
670

No. 15584

DATE 6/7/85

***22,500.00

PAY TWENTY-TWO THOUSAND FIVE HUNDRED AND NO/100

To
the
order
of

STATE OF FLORIDA DEPARTMENT OF
ENVIROMENTAL REGULATION
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301

TRUST DEPARTMENT

Robert M. Dumbarn

AUTHORIZED SIGNATURE

FIRST AMERICAN BANK AND TRUST - TRUST DEPARTMENT

DETACH AND RETAIN THIS STATEMENT

ACCOUNT NUMBER 050251-9	ACCOUNT NAME P B C SOLID WASTE AUTH-ACQ&CONSTR FD	DATE 6/7/85	1186

DESCRIPTION

DISTRIBUTION PER REQUEST
APPLICATION FEE - POWER PLANT SITE
CERTIFICATION CENTRAL RESOURCE RECOVERY
FACILITY

*****22,500.00

P \$ _____

I \$ _____

Code _____

CONSULTING TEAM

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North Palm Beach, FL 33408
(305) 626-4653
- Hayden/Wegman, Inc.
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Suite 2-B
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(305) 487-6898
- GBS Architects
1080 E. Indiantown Rd.
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(305) 747-6330
- Geraghty & Miller, Inc.
2700 PGA Boulevard
Suite 104
Palm Beach Gardens, FL 33410
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- Gibson & Adams
Professional Association
Florida National Bank Bldg.
303 First St.
Suite 400
West Palm Beach, FL 33402-1629
(305) 655-8686
- Joyce Environmental Consultants, Inc.
619 Industrial Street
Lake Worth, FL 33461
(305) 582-4317
- Kimley-Horn & Associates, Inc.
5800 Corporate Way
West Palm Beach, FL 32407
(305) 683-5500
- Post, Buckley, Schuh & Jernigan, Inc.
889 North Orange Ave.
Orlando, FL 33801-1088
(305) 423-7275
- York Services, Inc.
1 Research Drive
Stamford, CT 06906
(203) 325-1371

PALM BEACH COUNTY SOLID WASTE AUTHORITY

RESOURCE RECOVERY FACILITY APPLICATION FOR POWER PLANT SITE CERTIFICATION

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ABBREVIATIONS AND ACRONYMS

AAL	—	Ambient air level
AADT	—	Average annual daily traffic
AAQS	—	Ambient air quality standard
ADT	—	Average daily traffic
agl	—	Above grade level
AQCR	—	Air Quality Control Region
AQS	—	Air quality standards
Authority	—	Palm Beach County Solid Waste Authority
BACT	—	Best available control technology
Be	—	Beryllium
BCC	—	Palm Beach County Board of County Commissioners
CARB	—	California Air Resources Board
CDMOC	—	Long term urban dispersion program
CDS	—	Compliance data system
CEC	—	Cation exchange capacity
CO	—	Carbon monoxide
CO ₂	—	Carbon dioxide
Complex I	—	Complex terrain dispersion program
CPC	—	Palm Beach County Planning Commission
CRYSTER	—	Single source dispersion model
CUPS	—	Consumptive Use Permits
CY	—	Cubic yards
DAHRM	—	Division of Archives History and Records Management (Florida Department of State)
dBA	—	Decibel (A-weighted scale)
DER	—	Department of Environmental Regulation
DNR	—	Department of Natural Resources
DO	—	Dissolved oxygen
DRI	—	Development of Regional Impact
DSCF	—	Dry standard cubic foot
EDS	—	Environmental Data Service
EPA	—	United States Environmental Protection Agency
ESP	—	Electrostatic precipitator
FAA	—	Federal Aviation Administration
FAAQS	—	Florida Ambient Air Quality Standards
FAC	—	Florida Administrative Code
FDER	—	Florida Department of Environmental Regulation
FEMA	—	Federal Emergency Management Agency
FGFWFC	—	Florida Game and Freshwater Fish Commission
FHWA	—	Federal Highway Administration
FIRM	—	Flood Insurance Rate Map
FLUCCS	—	Florida Land Use and Cover Classification System

FP&L	—	Florida Power & Light Company
FS	—	Florida Statutes
GEP	—	Good engineering practice of stack height
gpd	—	Gallons per day
gpm	—	Gallons per minute
gr/dscf	—	Grains per dry standard cubic foot
HCL	—	Hydrochloric acid
Hf	—	Hydroflouric acid
Hg	—	Mercury
HHV	—	Higher heating value
HSR	—	Highest second highest concentration
HUD	—	Federal Department of Housing and Urban Development
Hz	—	Hertz
ISC	—	Industrial Source Complex Dispersion Model
ISCLT	—	Industrial source complex long term dispersion model
ISCST	—	Industrial source complex short term dispersion model
JTU	—	Jackson Turbidity Units
kips	—	kilopounds (1000 pounds)
km	—	kilometers
kv	—	kilovolt
kw	—	kilowatt
LAER	—	Lower available emission rate
LCD	—	Local climatological data
Leq	—	Energy equivalent noise level
LOS	—	Level of service
m ³	—	Cubic meter
MCL	—	Maximum contaminant level
mgd	—	Million gallons per day
mps	—	Meters per second
MPTR	—	Multiple point gaussian disperssion program
MSL	—	Mean sea level
MSW	—	Municipal Solid Waste
MW	—	Megawatts
NAAQS	—	National Ambient Air Quality Standards
NCC	—	National climatic center, Asheville, N.C.
NEDS	—	National emissions data system
NGVD	—	National Geodetic Vertical Datum
NHPA	—	National Historic Preservation Act
NOAA	—	National Oceanic & Atmospheric Administration
NO _x	—	Nitrogen oxides
NPDES	—	National Pollutant Discharge Elimination System
NSPS	—	New Source Performance Standards
NTIS	—	National Technical Information Service
NWI	—	National Wetlands Inventory
OCC	—	Organic carbon concentration
OSHA	—	Occupational Safety and Health Administration
O ₂	—	Oxygen
Oz	—	Ozone
Pb	—	Lead
PFU	—	Plaque forming units

PM	—	Particulate matter
ppm	—	Parts per million
PSD	—	Prevention of Significant Deterioration
psi	—	Pounds per square inch
PTDIS	—	Interactive version of point source dispersion program
PTMAX	—	Interactive version of point source dispersion program
PTMTP	—	Interactive version of point source dispersion program
PTPLU	—	Single source gaussian dispersion program
PUD	—	Planned Unit Development
PURPA	—	Public Utility Regulatory Policies Act
PZB	—	Palm Beach County Department of Planning, Zoning & Building
RAM	—	Short term urban dispersion program
RCRA	—	Resource Conservation & Recovery Act
RDF	—	Refuse derived fuel
RFP	—	Requests for proposals
SCC	—	Source classification code
SCS	—	Soil Conservation Service
SHPO	—	State Historic Preservation Officer
SHORTZ	—	Short term dispersion program for ground-level concentrations
SIA	—	Significant impact area
SIC	—	Standard industrial classification code
SIL	—	Significant impact level
SIP	—	State Implementation Plan
SO ₂	—	Sulfur dioxide
SR	—	State Road
SFWMD	—	South Florida Water Manage District
STAR	—	Wind distribution by Pasquill stability classes
tpd ₇	—	Tons per day; seven days per week
tpy	—	Tons per year
TSP	—	Total suspended particulates
UG/M3	—	Micrograms per cubic meter
USDA	—	United States Department of Agriculture
USDEP. COMM.	—	United States Department of Commerce
USEPA	—	United States Environmental Protection Agency
USFWS	—	United States Fish and Wildlife Service
VOC	—	Volatile organic compounds
vpd	—	Vehicles per day
vph	—	Vehicles per hour
WCA	—	City of West Palm Beach Water Catchment Area

APPLICATION INFORMATION

Applicant's Official Name: Palm Beach County
Solid Waste Authority

Address: 5114 Okeechobee Blvd.
Suite 2-C
West Palm Beach, FL 33417

Name, Title and Phone Number
of Official Representative Responsible
for Obtaining Certification: Mr. Timothy F. Hunt, Jr.
Executive Director
(305) 471-5770

Site Location: Palm Beach County

Nearest Incorporated City: West Palm Beach

Latitude & Longitude: 26° 46' 00" N
80° 08' 45" W

UTM Zone 17: 0585820 meters East
2960180 meters North

Section	Township	Range
22	42S	42E
27	42S	42E
34	42S	42E
2	43S	42E
3	43S	42E

Location of any directly
associated transmission facility: Palm Beach County

Name Plate Generating Capacity: 50 megawatts

Ultimate Capacity for Certification: 75 megawatts

APPLICANT INFORMATION

Remarks: The Palm Beach County Solid Waste Authority was created by the Florida Legislature under the Palm Beach County Solid Waste Act, Chapter 75-473, Laws of Florida. In creating the Authority, the legislative intent was to form a countywide authority for a coordinated management of solid waste in order to meet expanding problems within Palm Beach County relating to safe and sanitary processing and disposal of solid waste and to require the municipalities and county to plan for and develop adequate solid waste collection systems. The Authority may require that all waste disposed of by public and/or private agencies from any municipality or unincorporated area of the county be transported to Authority designated processing and disposal facilities in a manner and form as mandated in accordance with the Solid Waste Act.

The Authority does not operate, maintain nor construct facilities for the purpose of electric power generation. Neither does the Authority 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. The proposed facility will provide Palm Beach County with a method of solid waste disposal that will replace present traditional landfilling operations.

EXECUTIVE SUMMARY

INTRODUCTION

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

The decision to build a Resource Recovery Facility is the culmination of nine years of dedicated solid waste management planning. Since 1975, the Palm Beach County Solid Waste Authority (the Authority) has been working to find a long-term alternative to sanitary landfilling. The Authority started its effort shortly after the State of Florida enacted legislation (Chapter 403.706 Florida Statutes, FS) requiring heavily populated counties like Palm Beach to submit resource recovery and management plans. Numerous studies, commissioned by the Authority since 1975, have concluded that resource recovery is the prudent long-term solution to the County's refuse disposal needs. By using the energy obtainable from solid waste to generate electricity, resource recovery makes the most sense economically and environmentally.

SITE LOCATION

Pursuant to Section 403.505 FS, Palm Beach County is applying for certification of a resource recovery plant with landfills at a 1,320 acre site located in the unincorporated north-central area of the county. The site is bounded on the north by the Beeline Highway (SR 710), on the east by the Florida Turnpike, on the south by a line approximately 610 feet south of 45th Street, on the west by the City of West Palm Beach Water Catchment Area, and on the northwest by a large privately-owned property. The site is due west (across the Turnpike) of the existing Dyer Boulevard Landfill and is within 2 miles of a Florida Power & Light Company (FP&L) transmission line corridor. A 73 acre parcel east of the southernmost portion of the site will serve as the corridor for the 138 kv transmission line from the resource recovery plant to the existing FP&L transmission line corridor.

PURPOSE OF THE PROPOSED FACILITY

The primary purpose of the facility is to dispose of the municipal solid waste generated within the County. Non-combustibles and inert ash residue resulting from the plant's combustion process will be disposed of on the site. The power derived from the combustion

of the refuse is an additional benefit. Its sale to FP&L will help offset the overall cost of operating the facility. An affirmative determination of need from the Florida Public Service Commission has been applied for as part of this document. Other materials may be recovered as market conditions warrant.

The Authority will contract with a full-service vendor to design, construct, and operate the plant. The Authority will own the facility.

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

FACILITY DESCRIPTION

The proposed project will be a RDF Resource Recovery Facility with an initial continuous design rate processing capacity of 2,000 tons per day of municipal solid waste (MSW) and a gross electrical generating capacity of approximately 50 megawatts (MW). In anticipation of future disposal needs, Palm Beach County is seeking certification for ultimate site electrical generating capacity of approximately 75 MW (gross), using 3,000 tons per day of MSW.

The landfill associated with the Resource Recovery Facility will consist of a 150 acre Class I landfill of double-liner technology with a leachate collection system and a 235 acre Class III landfill of single-liner technology with a leachate collection system. Borrow lakes consisting of approximately 243 acres will be developed over the life of the landfill to provide fill for construction and cover material for the landfill contents.

APPLICATION OVERVIEW

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

The application consists of four (4) volumes:

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

Volume II and III (Appendices) — contain the appendices of the application (Chapter 10). In addition to those appendices specifically required in the DER Instruction Guide, included are thirteen (13) additional appendices which are more appropriately included in Volume II or III than in the application text of Volume I.

Volume IV (Air Quality) — contains DER Form 17-1.202(1), Application to Operate/Construct Air Pollution Sources; the specific requirements of the Prevention of Significant Deterioration (PSD) review; a Best Available Control Technology (BACT) analysis and an air quality impact analysis.

As required by Chapter 17-17.121(3)(a) FAC, also submitted, under separate cover, are three (3) copies of materials which show the procedures taken to accomplish compliance of the site with existing land use plans and zoning ordinances. This compilation of information is referred to as the "Compliance Document".

PRINCIPAL FINDINGS

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

- **Air Quality** — As discussed in the Appendix 10.1.5 — Air Quality Impact Analysis, the combustion process for the facility will be environmentally sound. The results of the Prevention of Significant Deterioration (PSD) analysis indicate:
 - Best Available Control Technology (BACT) for the proposed source is the use of emission controls inherent to the system design with an Electrostatic Precipitator (ESP) designed to meet an outlet grain loading of 0.03 gr/dscf corrected to 12% CO₂;
 - The facility will operate in compliance with the Prevention of Significant Deterioration (PSD) increments, National Ambient Air Quality Standards (NAAQS), and Florida Ambient Air Quality Standards (FAAQS) for all criteria pollutants;
 - Fugitive dust created during construction of the facility is addressed in Section 4.5. With suggested standard mitigative measures there will be no adverse effects due to fugitive emissions.
 - Total Suspended particulates (TSP) are examined in Section 5.6.1 and Appendix 10.1.5. The proposed resource recovery plant emissions will result in an ambient impact equal to approximately 1.3 percent of the Florida Ambient Air Quality Standard for TSP;
 - As discussed in Section 3.4.1, the tipping area and RDF plant will be enclosed and under negative air pressure. Thus, odors will not be able to leave the resource recovery plant. Odors within the building will be drawn into the furnace and destroyed in the combustion process; and
 - The emissions from the facility will not have an adverse effect on surrounding soils, vegetation or visibility.
- **Land Use and Zoning** — (Section 2.2.2 and Compliance Document) A series of advertised formal public hearing have been conducted concerning the awarding of a Special Exception to the Agricultural Residential Zoning of the site. At those hearings public input, testimony and documents were entered into the official record as land use and zoning issues were evaluated. Even though the Palm Beach County

Planning Commission (CPC) voted against the requested Special Exception, the staff of the County Planning, Zoning and Building Department had recommended to the CPC approval of the Special Exception, indicating that the requested use conformed to the County Zoning Code and the Land Use Plan. The Board of County Commissioners (BCC) concluded that the proposed Resource Recovery Facility is compatible with the Land Use Plan and zoning patterns in the area. Accordingly, the Board of County Commissioners approved the Special Exception with a number of conditions.

- Noise — The Environmental Noise Study (Section 5.7 and Appendix 10.15) indicated that the predicted noise levels resulting from the operation of the facility will not exceed recommended noise level criteria for any location off of the Resource Recovery Facility site. There are a few areas on-site where the level of noise will exceed recommended levels; however these areas are localized or enclosed and no personnel would work within any of the areas for extended periods of time. The effects of these noise levels can be mitigated using standard equipment and procedures.
- Traffic — (Section 5.9.1 and Appendix 10.16) The potential traffic impact which the proposed Resource Recovery Facility would have on the adjacent roadway network was determined. The facility will meet the County's Traffic Performance Standards as a Category C Project. The Authority has committed itself to construct or upgrade a number of vicinity roads, insuring continued acceptable levels of service.
- Groundwater — This facility will lie over portions of the Turnpike Aquifer, a principal source of drinking water in Palm Beach County. Thorough hydro-geologic investigations were conducted to determine existing groundwater quality and to serve as a basis for future monitoring programs (Section 2.3.1). The current groundwater quality beneath the site is good. A plume of mineralized water has been identified beneath the existing Dyer Boulevard Landfill, adjacent to the site. Some of the non-potable water for the resource recovery plant use will be drawn from this plume, eliminating what could have become a serious problem. (Section 3.5)
- Surface Water — Existing hydraulic connections of on-site and adjacent waters were identified and the surface water quality on site was determined by sampling and analysis. (Section 2.3.4) The only problems identified related to color and turbidity, otherwise the surface water quality was satisfactory. The design of the resource recovery plant and landfills will insure adequate retention and natural treatment of stormwater run-off on-site. This same surface water management plan is closely tied to the site wetlands mitigation scheme. Any long-term effects on surface water associated with the operation of the Resource Recovery Facility will not be adverse. (Sections 3.8, 4.2 and 5.3.1)
- Soil And Foundation Conditions — Preliminary investigations have indicated that there appears to be a competent bearing layer starting at a depth of 50 to 70 feet over most of the site. Piles or piers placed into this stratum will be used as the foundation for major structures. However, the present position, density, composition and degree of cementation of the soils beneath the site are quite variable, particularly in reference to depth. Therefore, a careful determination will be made of the subsurface conditions in order to insure adequate foundation design for the resource recovery plant and associated facilities. (Section 2.3.1.1 and 2.3.1.2.2)

- Plant and Animal Communities — (Sections 2.3.5 and 2.3.6) The presence of extensive wetlands within a 5 mile radius of the site increases the possibility that important species associated with wetlands may occur. However, this site presents no outstanding or exceptional features to attract important species. The populations that utilize the site would be present in approximately equal amounts in any similar area in the region. Although the development of the Resource Recovery Facility will have a significant effect on the ecology of the site it does not pose a threat to any plant or animal communities.

- Archaeological Sites and Historic Preservation Areas — (Section 5.10) There are no historical or prehistoric resources known to be present within the project site boundaries as confirmed by field investigations. Projected use of the project site will not impact any historic or prehistoric cultural resources.

PROJECT STATUS

The Palm Beach County solid waste energy recovery facility will be designed, constructed and operated by a full-service vendor under contract to the Authority. The selected contractor will have to guarantee compliance with the terms and all conditions of the site certification and rezoning conditions. As currently envisioned, construction of the facility will begin in 1986 with startup expected in 1989.

CHAPTER 1: NEED FOR POWER AND THE PROPOSED FACILITIES

The primary objective of the proposed Resource Recovery Facility is to dispose of all municipal solid waste (MSW) generated in Palm Beach County. After several years of investigation into alternative methods of disposal including the present practice of landfilling solid waste with its accelerating costs and undesirable economic and environmental consequences led to the Authority's decision to construct a Resource Recovery Facility.

Presently, most of the solid waste (88%) disposed of in Palm Beach County is delivered to the Authority's two active landfills, the Lantana Road and Dyer Boulevard facilities. Both facilities accept Class I materials (garbage; putrescible waste) as well as Class III materials (trash/yard trash; nonputrescible wastes) for disposal. The City of Lake Worth presently operates the only other Class I landfill in the County, which is scheduled to close in 1986. Upon closure of the Lake Worth Landfill, it is estimated that the Authority's disposal facilities will be processing 92.5% of the total waste stream of Palm Beach County.

The capacity in the Lantana Road Landfill will be exhausted by the middle of 1986, leaving the Dyer Boulevard Landfill as the only permitted Class I sanitary landfill in Palm Beach County. At the anticipated rate of utilization following the closure of all other Class I landfills in the County, the Dyer Boulevard Landfill is estimated to reach its capacity by late 1987.

Because of the depleting landfill capacity, the Authority has provided plans for Class I and Class III waste disposal at a new site by the end of 1987. The selected site is centrally located within the County and of adequate size to accommodate a Class I and a Class III sanitary landfill operation, together with the planned Resource Recovery Facility. The site contains approximately 1,320 acres and is located west of Florida's Turnpike and east of the West Palm Beach Water Catchment Area.

It has been determined that the traditional means of disposing of MSW is inadequate to meet the needs of this rapidly growing county for two primary reasons: (1) there is a paucity of land which could feasibly be used for landfilling and land which is available is inordinately expensive; (2) the landfilling of putrescible garbage poses a serious long-term threat to the quality of the groundwater which supplies the domestic water needs of county residents. The best alternative for Palm Beach County to eliminate these concerns is through the construction of a Resource Recovery Facility. The volume of the MSW processed through the Resource Recovery Facility would be reduced by up to 90% (weight is reduced up to 80%) resulting in the life of the co-located landfill being extended by 4 to 6 times. Moreover, the inert ash rather than putrescible garbage will be the material landfilled, reducing the potential for degradation of water quality, gas generation and attendant risks to public health.

The combustion of refuse derived fuel (RDF) from MSW produces steam. Since there are no steam customers available in Palm Beach County, the generation of electricity represents the most feasible alternative for implementation of the resource recovery operation. The electric power derived from the MSW is beneficial resulting in the net effect of stabilizing or possibly reducing the rapidly escalating cost of solid waste disposal.

In Chapter 84-198, Laws of Florida (1984), the Florida Legislature has declared that "it is critical to encourage energy conservation in order to protect the health, prosperity, and general welfare of this State and its citizens". The Legislature has further declared that the "combustion of solid waste by small power production facilities for the production of electricity not only represents conservation efforts well directed towards that goal, but also represents an environmentally preferred alternative to conventional solid waste disposal in this State".

The 2,000 TPD of MSW expected to be processed at initial operations replaces the need of 600,000 barrels of oil per year for electric energy generation. In addition, the ash generated from the combustion process will require less landfill space, reduce leachate generation, and eliminate methane gas generation. This will conserve land, improve the environment, and result in greater protection to water quality than continued sanitary landfilling in Palm Beach County.

The proposed resource recovery plant will also recover marketable materials such as ferrous metals and aluminum. The system has the flexibility to recover other materials as market conditions may warrant.

Under Section 403.501, FS, (Electrical Power Plant Siting), the Legislature has charged the Florida Public Service Commission with the responsibility of determining whether construction of a proposed electrical generating facility is necessary to meet the present or expected need for electricity in penninsular Florida as a whole. Certification under the Act must be obtained for the construction of any generating facility greater than 50 megawatts (MW), and may be obtained for a small facility under Section 403.503, Florida Statutes and Chapter 75-473, Laws of Florida, Special Acts of 1975, as amended and supplemented. (Palm Beach County Solid Waste Act.)

The Authority is seeking certification of its proposed 75 MW small power production facility, and is filing a petition with the Public Service Commission. The Commission's report to the Florida Department of Environmental Regulation, as required by Section 403.507(1)(b) of the Florida Electrical Power Plant Siting Act is expected to conclude that the proposed facility will increase electrical system reliability and integrity and will maintain the supply of adequate electricity at a reasonable cost while reducing our dependence on fossil fuel. In addition, the construction of such a plant is a conservation measure which may mitigate the need for additional construction by electric utilities.

The Authority is filing an application with the Federal Energy Regulatory Commission (FERC) for certification of its proposed resource recovery plant as a qualifying small power production facility pursuant to Section 201 of the Public Utility Regulatory Policies Act of 1978 (PURPA) and rules promulgated by FERC.

CHAPTER 2: SITE AND VICINITY CHARACTERIZATION

2.1 SITE AND ASSOCIATED FACILITIES DELINEATION

2.1.1 Site Location

The location of the proposed Resource Recovery Facility within Palm Beach County is illustrated in Figure 2.1-1. The 1,320 acre site is bordered on the north by the Beeline Highway, on the east by Florida's Turnpike, on the south by a line approximately 610 feet south of 45th Street, on the west by the City of West Palm Beach Water Catchment Area, and on the northwest by the Grier Property. A topographical map (showing site perimeter) of the site is included in Appendix 10.4.

The transmission corridor to the existing Florida Power and Light Company (FP & L) transmission lines will traverse the south side of the 73 acre parcel east of Florida's Turnpike and south of 45th Street (Figure 2.1-2). A detailed description of this parcel is contained in Chapter 6.

2.1.2 Existing Uses

At present, there is limited use of the property proposed for development. An occupied house located on a 6.6 acre parcel in the south central portion of the site will be purchased and removed in the course of site development. In the vicinity of the house, there is an operational radio transmission tower. This tower will remain in place during and after construction of the plant and all facilities. A privately-owned unoccupied 10 acre parcel in the southwestern portion of the site may be acquired in the future, but is not essential to the development of the facility. Past and present property use has changed the topography of the site in certain areas. In the northeast portion of the site, there is a 82-acre (approximately) borrow lake which supports an active dredge operation. Dredged material is used for construction fill and cover material at the Dyer Boulevard Landfill located east of Florida's Turnpike. Areas to the north of this borrow lake have been scraped below natural ground elevations, including a 22-acre flooded area which has been excavated to an elevation of three feet below the natural ground elevation. A similar condition exists in the east central portion of the site, approximately 4,000 feet north of 45th Street where a 6.2-acre flooded parcel has been excavated to an elevation of three feet below the natural ground elevation.

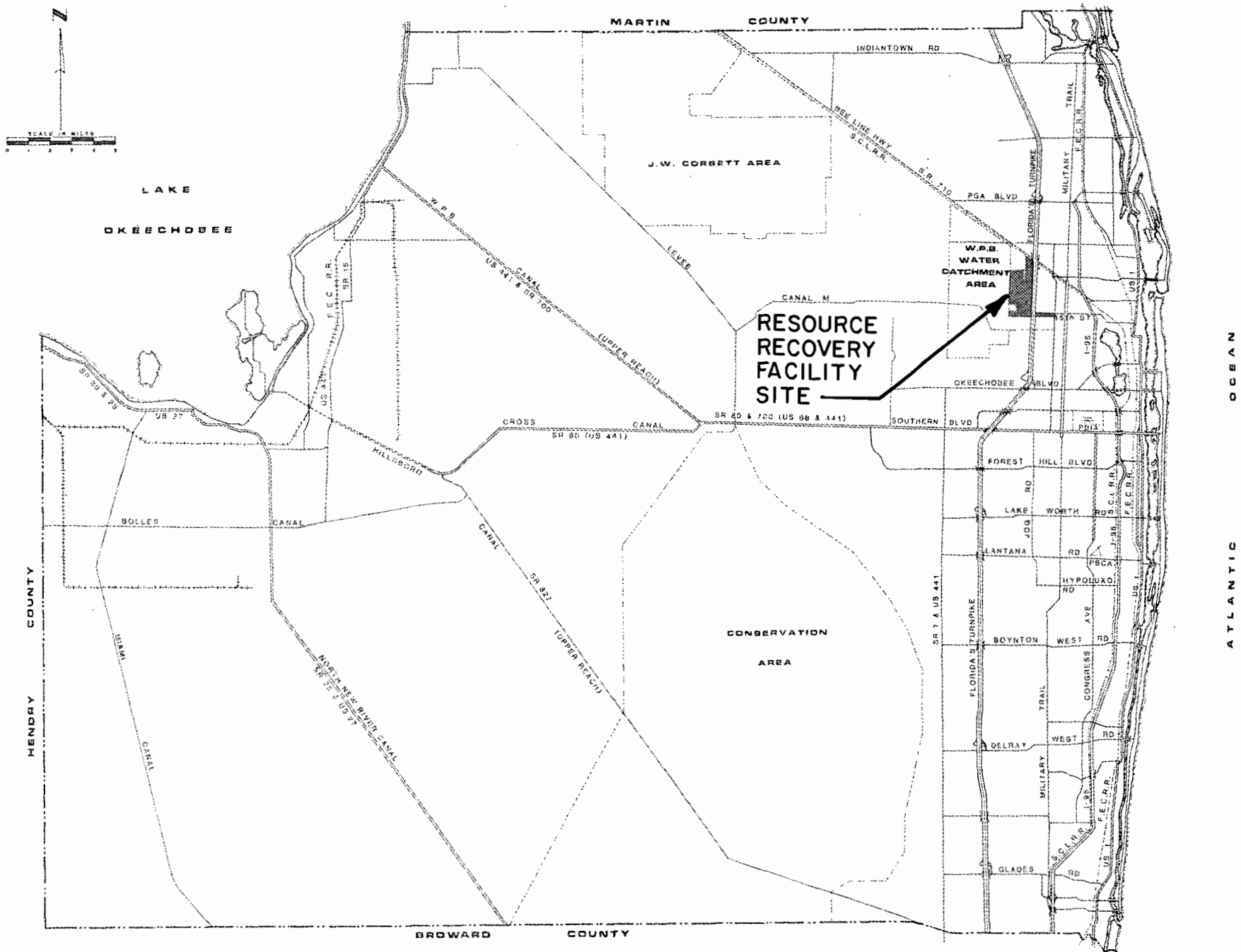
Three abandoned shell pit operations, which encompass approximately 171 acres, occupy the southwest corner of the site north of 45th Street. The bottom of the shell pits are approximately six feet below surrounding ground elevations; and the elevations of the berms adjacent to the shell pits are approximately six feet above ground elevations.

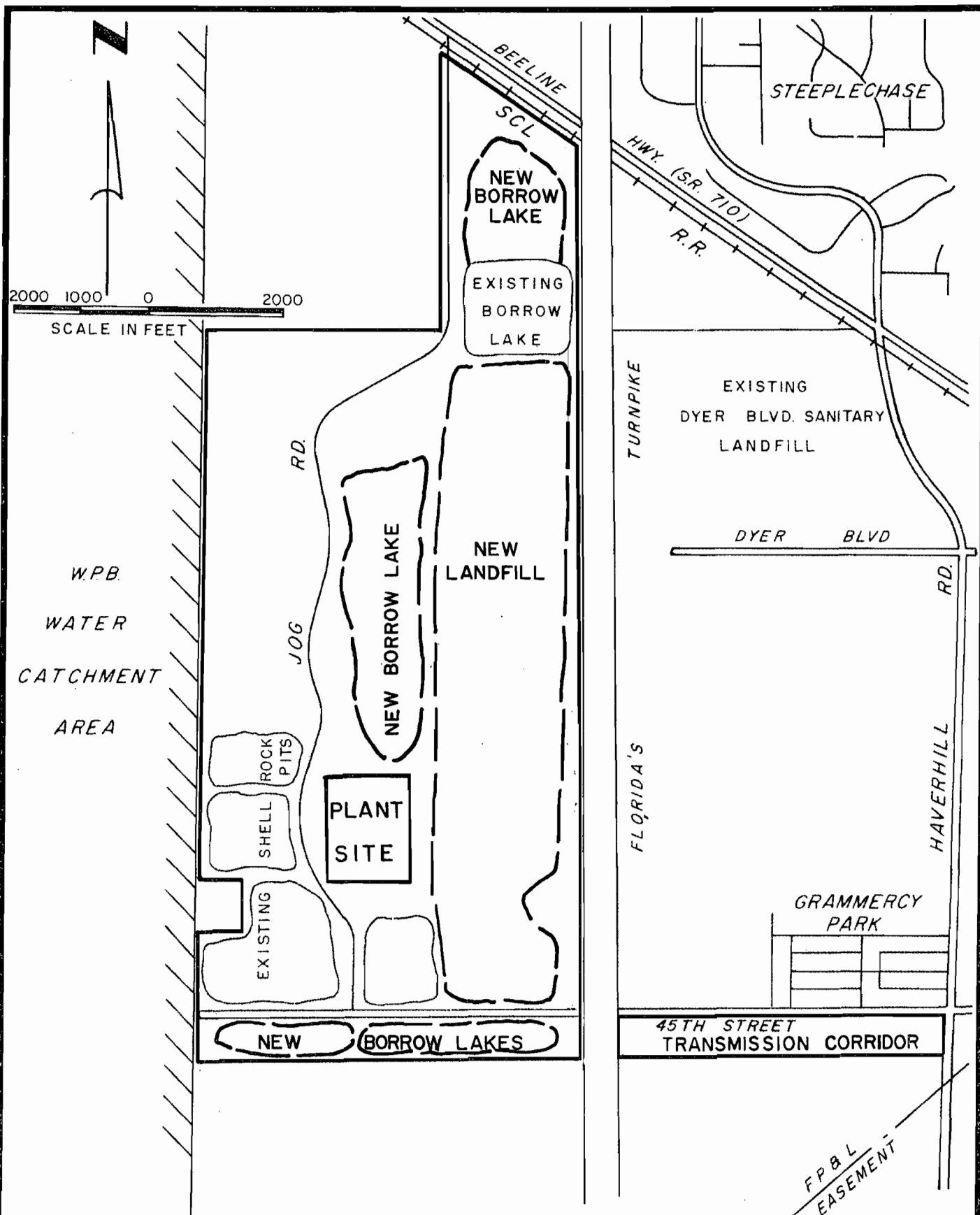
**PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY**



**LOCATION OF RESOURCE RECOVERY
FACILITY WITHIN PALM BEACH COUNTY**

FIG. 2.1-1





**PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY**



**RESOURCE RECOVERY FACILITY
AND ADJACENT PROPERTIES**

FIG. 2.1-2

Access to the site is made from 45th Street by traveling north on a shell rock road located between the two shell pits bordering on 45th Street. At the northern boundary of the shell pits, this road proceeds east to the eastern site boundary. Within the site, the road meanders in a northerly direction, terminating at the active borrow lake.

2.1.3 Site Modifications

The proposed site development plan for the site is shown in Figure 2.1-2. Space has been allocated for Class I and Class III Sanitary Landfills, a north-south roadway, borrow lakes, the resource recovery plant, and perimeter buffer zones. The western portion of the site will serve as a multiple-purpose conservation area — habitat preservation, buffer, stormwater retention and wetlands mitigation will all be accomplished in this area. Throughout the rest of the text, these specific usages are discussed with no general reference to the conservation area.

In accordance with the Water Quality Assurance Act of 1983, a landfill cannot be constructed within 3,000 feet of a Class I water body. The West Palm Beach Water Catchment Area (WCA) is classified as a Class I surface water body. (DER Docket Number 83-32R, Rule Number 17-3.161, Classified Waters.) Therefore, all landfill activities will occur within the eastern 1,900 feet of the site in order to comply with these minimum setback requirements. The existing borrow lake in the northeast portion of the site will be expanded to allow maximum utilization of the designated area for dredging fill material to be used at the Dyer Boulevard Landfill, as well as the landfill areas to be constructed on the site.

The western region of the site within the 3,000-foot setback from the WCA will be utilized to accommodate the 40-acre resource recovery plant, including a laydown area, employee parking, wastewater treatment plant and other associated facilities, roadway right-of-way, additional borrow areas, wetlands mitigation and stormwater management. Two borrow lakes will be developed on the property south of 45th Street within the boundaries of the site while allowing for the extension of the north-south roadway south of 45th Street. An access service road for the landfill will be maintained within the 200-foot setback west of the Turnpike canal.

The landfill height has been established to provide the capacity for a Class I and a Class III landfill to serve the County in excess of twenty years. Existing ground elevations on the site average + 17.5 feet NGVD (National Geodetic Vertical Datum) (± 1 foot). The base of landfill operation will begin at an elevation of + 30 feet NGVD. The proposed final elevations of the designated Class I and Class III landfill areas of the site are + 130 feet NGVD.

The proposed land use for the site is summarized as follows:

Class I Landfill	150 acres
Class III Landfill	235 acres
Borrow Lakes	243 acres
Roadway	30 acres
Conservation Area	427 acres
Resource Recovery Plant	40 acres
Buffer, Roads, Ditches, etc.	195 acres
TOTAL SITE	1,320 acres

After the landfill capacity has been exhausted, the landfill area is planned to be developed as a recreation facility.

2.1.4 100-Year Flood Zone

As indicated in Figure 2.1-3, none of the proposed site lies within a 100-Year Flood Zone.

2.2 SOCIO-POLITICAL ENVIRONMENT

2.2.1 Governmental Jurisdictions

Available maps and literature were examined to identify local, regional, State and Federal areas stipulated in the application guide. In addition to this review, the governmental units listed in Table 2.2-1 were contacted to provide supplemental information.

Information on the special category areas is listed in Table 2.2-2 and shown graphically in Figure 2.2-1 and Figure 2.2-2. Local parks of the Cities of Palm Beach Gardens, Riviera Beach and West Palm Beach, and the Towns of Lake Park and Mangonia Park are located within 5 miles of the site. None of these lie within 1 mile of the plant. The City of West Palm Beach Water Catchment Area is directly adjacent to the western border of the site. This area of approximately 19 square miles is the drinking water source for West Palm Beach, and is a wetland area. While it is not strictly a private holding as indicated in Table 2.2-2, the catchment area is managed for environmental protection by the City.

The existing Dyer Boulevard Landfill is scheduled for closure in 1987. This area is planned to be developed as a recreational facility, and is anticipated to be managed as a Palm Beach County Park.

Table 2.2-1
Agencies Contacted in Survey of Governmental Jurisdictions

FEDERAL	U.S. Fish and Wildlife Service
STATE	Florida Department of State -Bureau of Historical Preservation Florida Department of Natural Resources -Recreation and Parks Division Florida Agricultural and Consumer Services -Forestry Division Florida Game and Freshwater Fish Commission
COUNTY	Parks and Recreation Department Planning, Zoning and Building Department -Planning Division
LOCAL	City of Palm Beach Gardens City of Riviera Beach City of West Palm Beach Town of Lake Park Town of Mangonia Park

It is anticipated that a survey of the site will be conducted on an annual basis. If the monitoring program indicates a decline in positive species abundance or conditions, or an increase in negative species abundance, more detailed analysis will be initiated to determine the causes for the change and potential solutions.

TABLE 2.3-8
INDICATOR SPECIES

Positive Species	Negative Species
Cypress	Melaleuca
Sawgrass	Torpedograss
Spikerush	Brazilian Pepper
Red Maple	Hydrilla
Willow	Cattails
Slash Pine	Myrtle

NOTE: No correspondence between positive and negative species is implied by their position in the table.

2.3.7 **Meteorology and Ambient Air Quality**

2.3.7.1 **Meteorology**

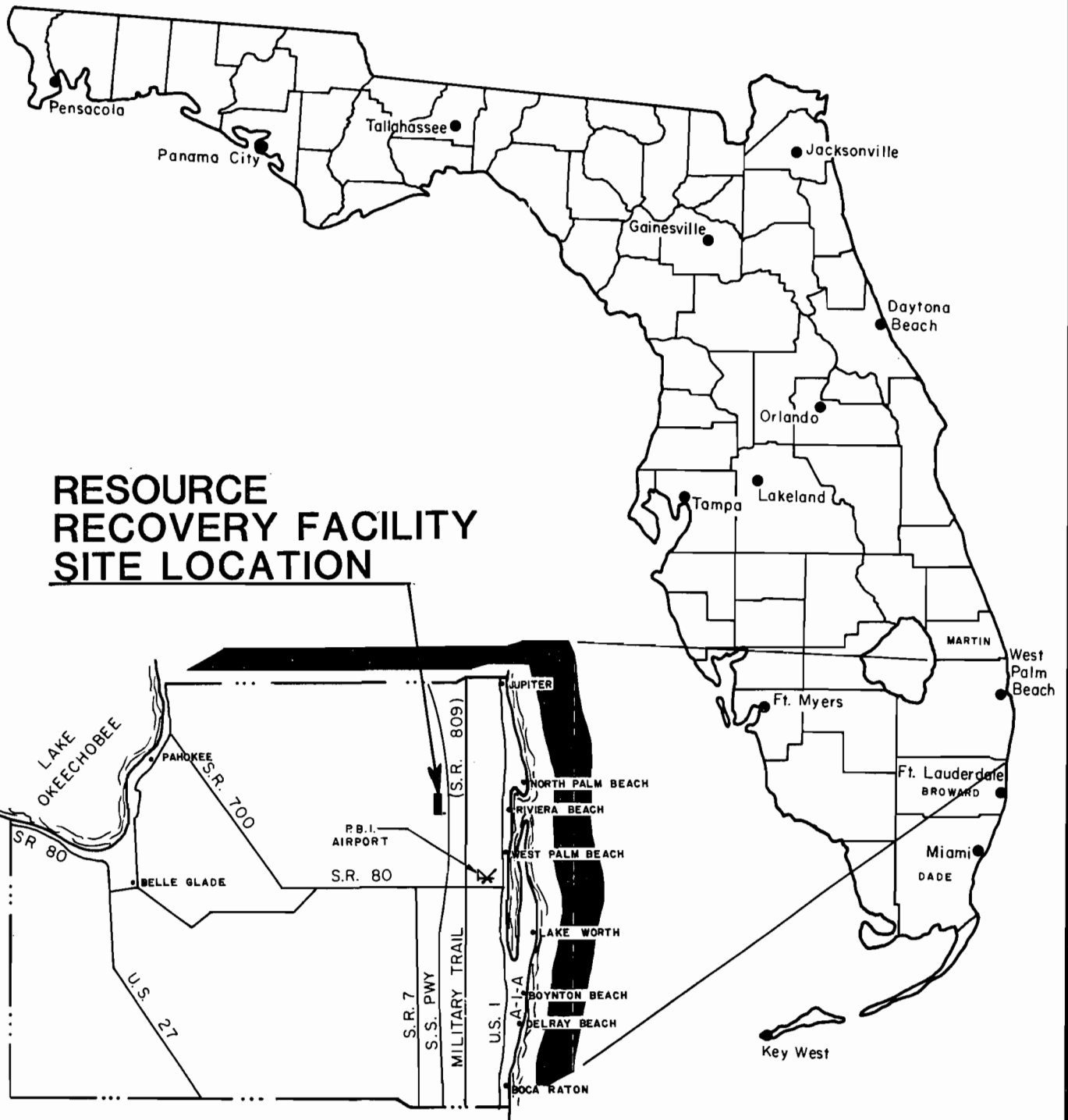
The proposed Resource Recovery Facility is to be located in Palm Beach County in the lower east coast climatological regime of Florida (Figure 2.3-19). The site is approximately 10 kilometers west of the Intercoastal Waterway and 11.5 kilometers from the Atlantic Ocean shoreline. There is no significant relief to the terrain in the vicinity.

Summer temperatures are warm and humid while the winter temperatures are moderated slightly by an occasional influx of cool air from the north. The region is dominated by the effects of the Gulf Stream which flows northward following the contours of the lower east coast and a dominant trade wind that blows from east to west (Figures 2.3-20 and 2.3-21).

The water trajectory is a moderating influence that cools the region in the summer and gives warmth in the winter. The local seawater temperature is approximately 75°F in February and 84°F in August (Neumann & Pierson, **Principles of Oceanography**, 1966). Average mean winter (January) and summer (July) maximum and minimum temperatures for Florida are shown in Figures 2.3-22 and 2.3-23.

The primary rainy season occurs during the six month period from May through October when the daytime ambient air temperatures exceed that of the water temperature. With an easterly flow instability results in most of the precipitation being associated with thunderstorms. The maximum average rainfalls are during the months of September and October. The heaviest rains may be associated with tropical storms. The chances of hurricane force winds at West Palm Beach, in any given year, are 1 in 7.

Meteorological conditions that aggravate air pollution are least likely to occur in the lower east coast region due to the prevailing easterly trade winds and the overall prevailing instability of the air. The trade winds are sufficiently pervasive so as to minimize any true sea breeze effect.



**PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY**



LOCATION MAP

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
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WIND ROSE

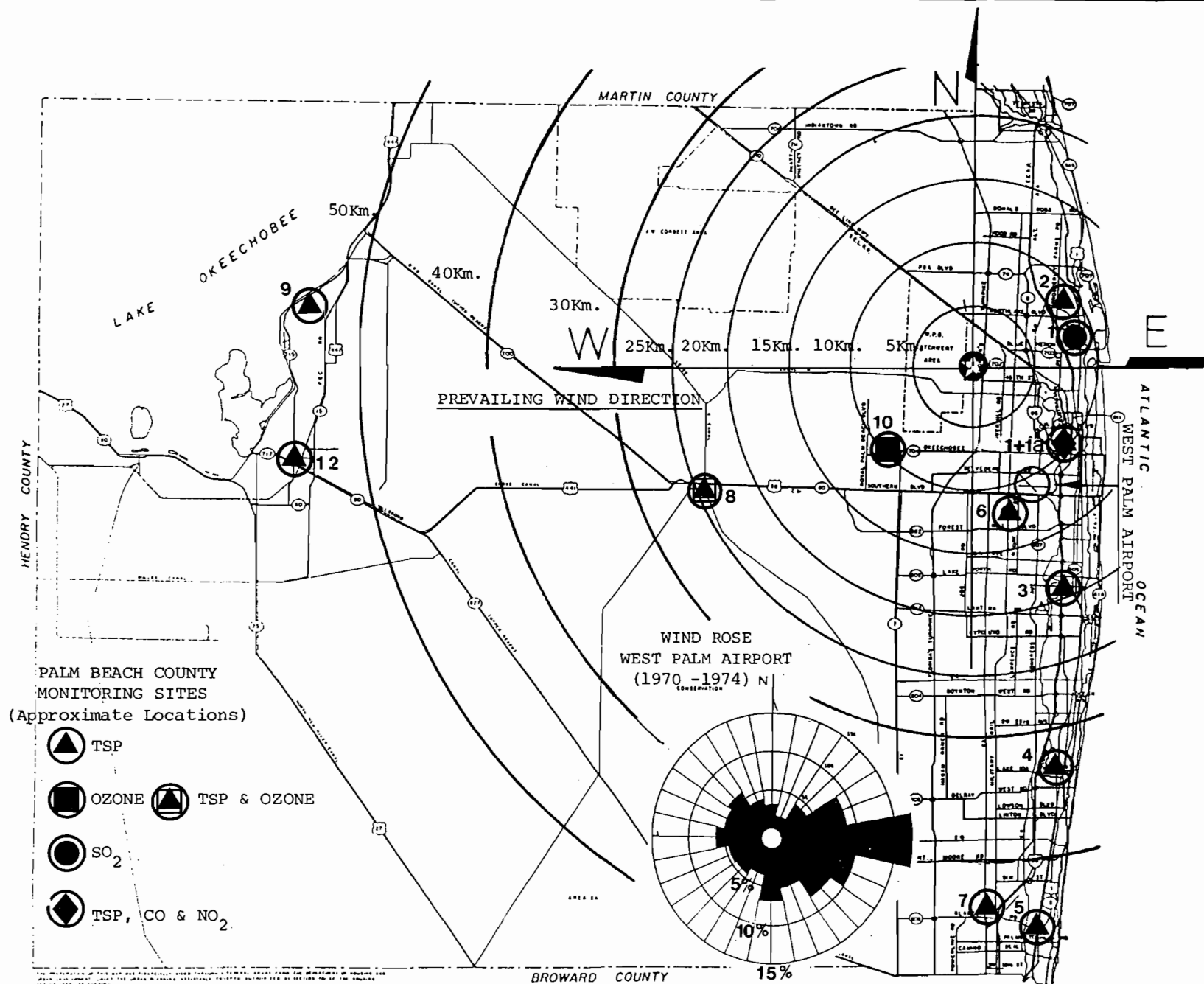
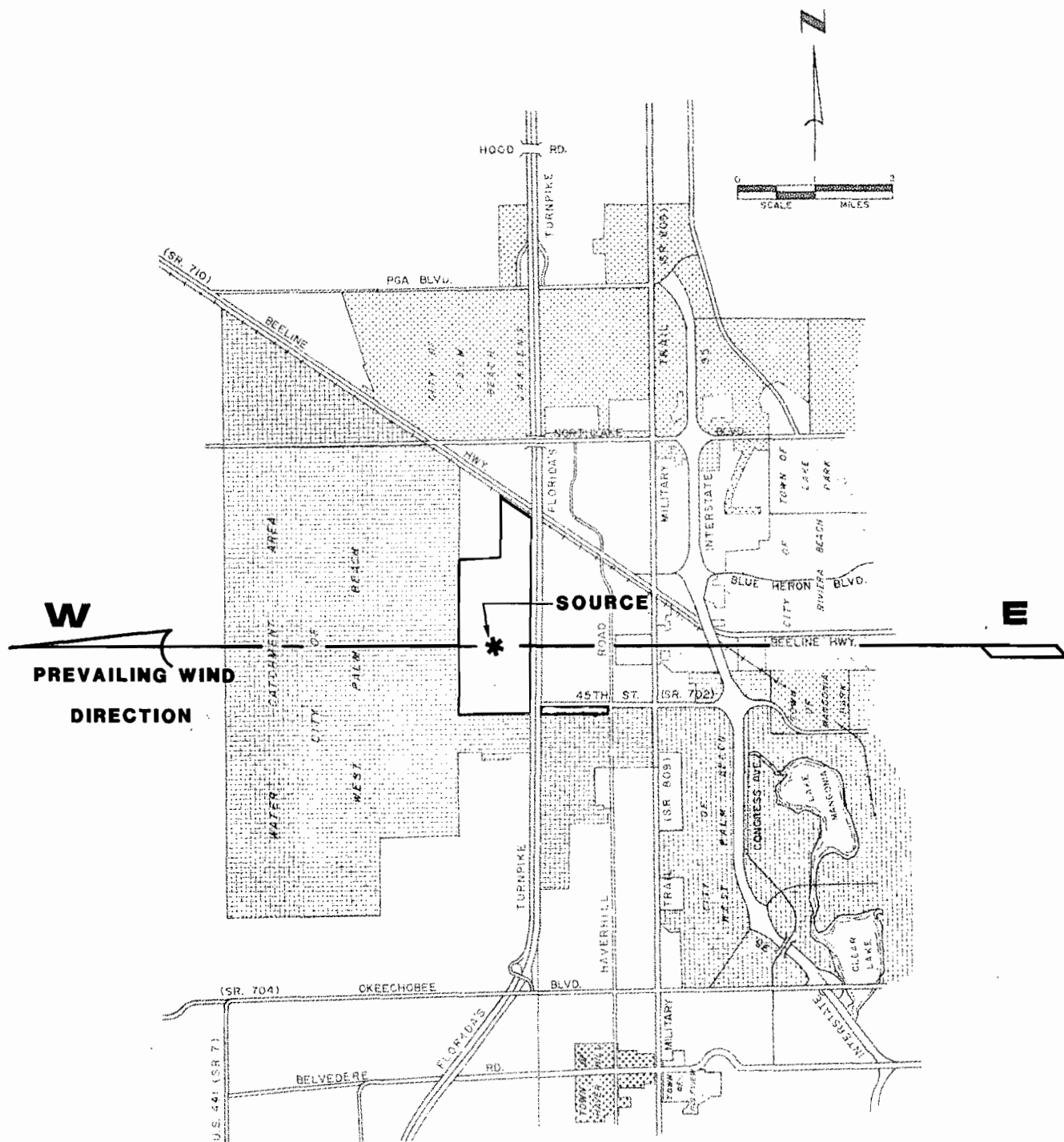


FIG. 2.3 - 20



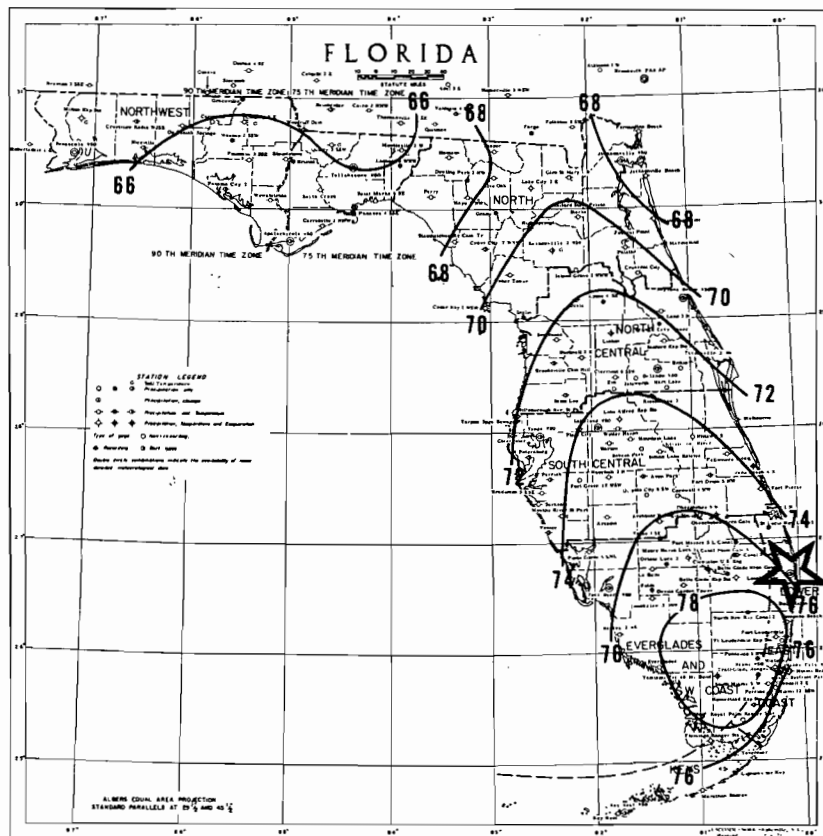
**PALM BEACH COUNTY
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RESOURCE RECOVERY FACILITY**



PREVAILING WIND DIRECTION

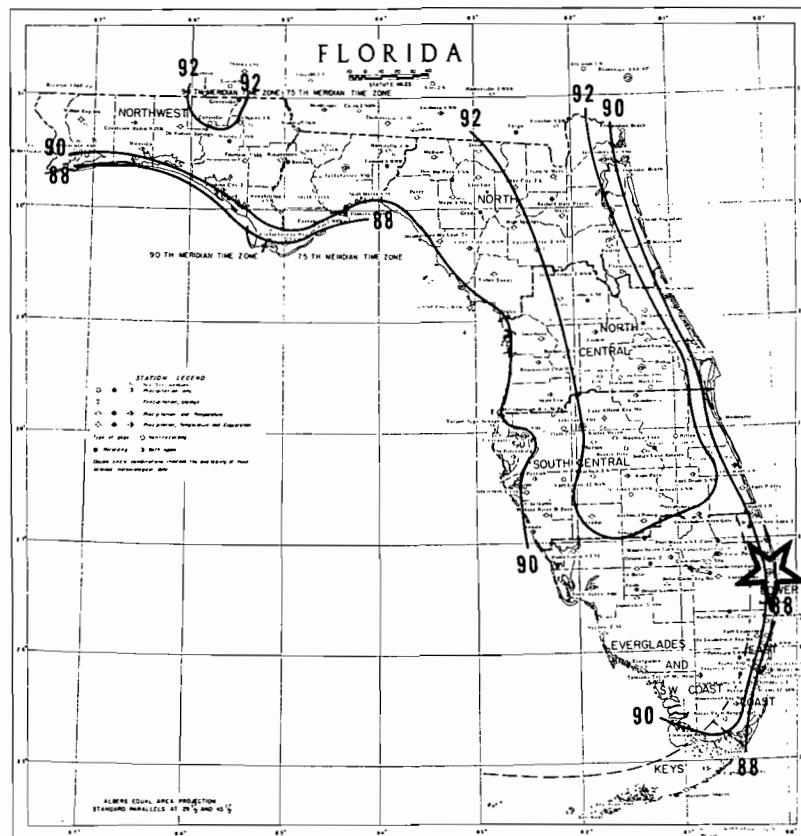


MEAN MAXIMUM TEMPERATURE (°F.), JANUARY



Data are based on the period 1931-52. Isolines are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

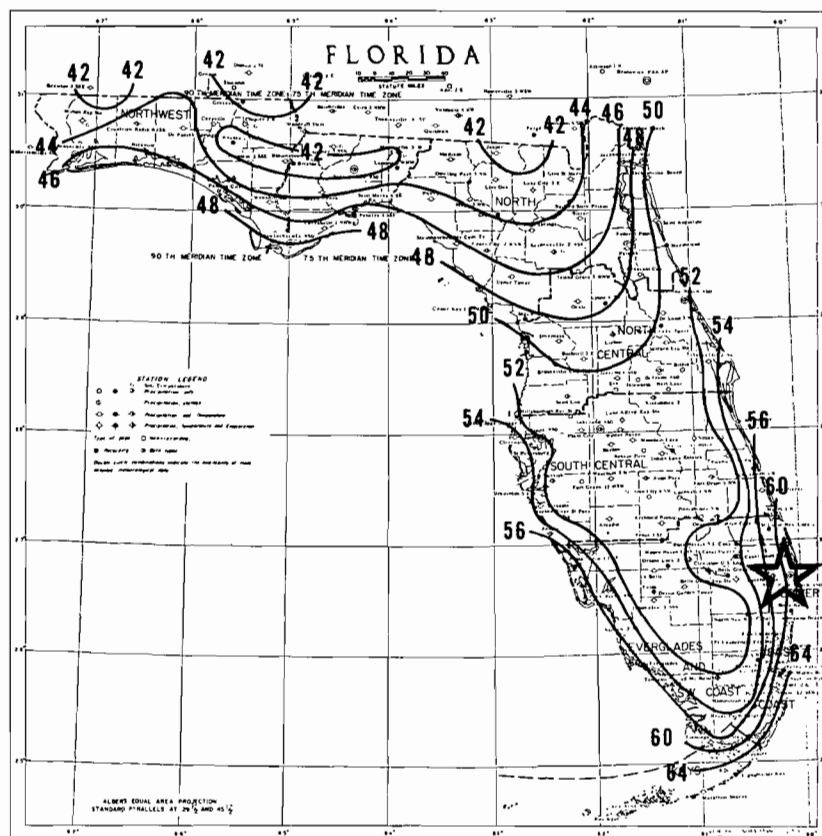
MEAN MAXIMUM TEMPERATURE (°F.), JULY



Data are based on the period 1931-52. Isolines are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

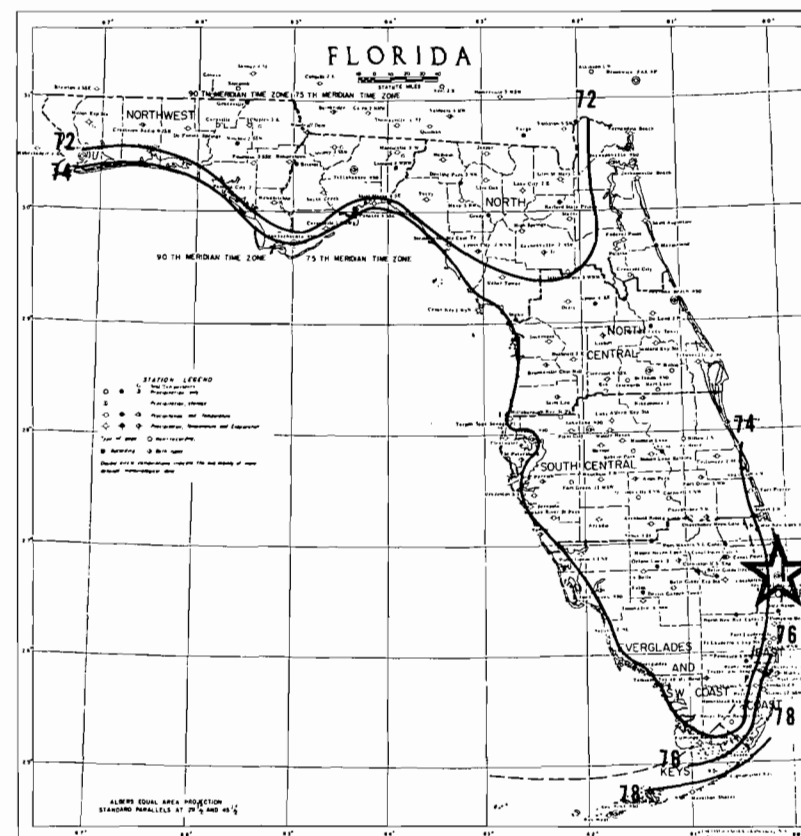


MEAN MINIMUM TEMPERATURE (°F.), JANUARY



Data are based on the period 1931-52. Isolines are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

MEAN MINIMUM TEMPERATURE (°F.), JULY



Data are based on the period 1931-52. Isolines are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

2.3.7.1.1 Regional Climatology

There are two full time, full service weather stations within 100 km of the proposed facility:

- Palm Beach International Airport
- Miami International Airport

The Palm Beach International Airport is approximately 9.5 kilometers (5.9 miles) southeast of the proposed facility. The Miami International Airport is approximately 100 kilometers (62 miles) south of the proposed facility. Both stations lie within the Florida lower east coast climatological regime. Meteorological normals for these two stations are shown in Tables 2.3-9 and 2.3-10.

2.3.7.1.2 Atmospheric Dispersion

Local atmospheric dispersion is a function of wind speed, wind direction, atmospheric stability and mixing heights. Five years (1970-1974) of pre-processed hourly data have been provided by the Florida DER in a format suitable for diffusion analyses in the West Palm Beach vicinity. These data are based on surface weather observations from Palm Beach International Airport and upper air data from Miami International Airport.

Wind speed, wind direction and atmospheric stability data for the same years were also available in "Star" format. In these data local atmospheric stability are derived from wind speed, local sky cover and time of day, in accordance with the procedures of B. Turner (Journal Applied Meteorology, Feb. 1964).

A wind frequency distribution, summarized for the data collection period from 1970-1974, is available for the Palm Beach International Airport. The joint distributions of these data as a function of wind speed and direction are shown in Figure 2.3-24. A directional summary of these data, in wind rose format, is shown in Figure 2.3-25, along with the average speed for each direction.

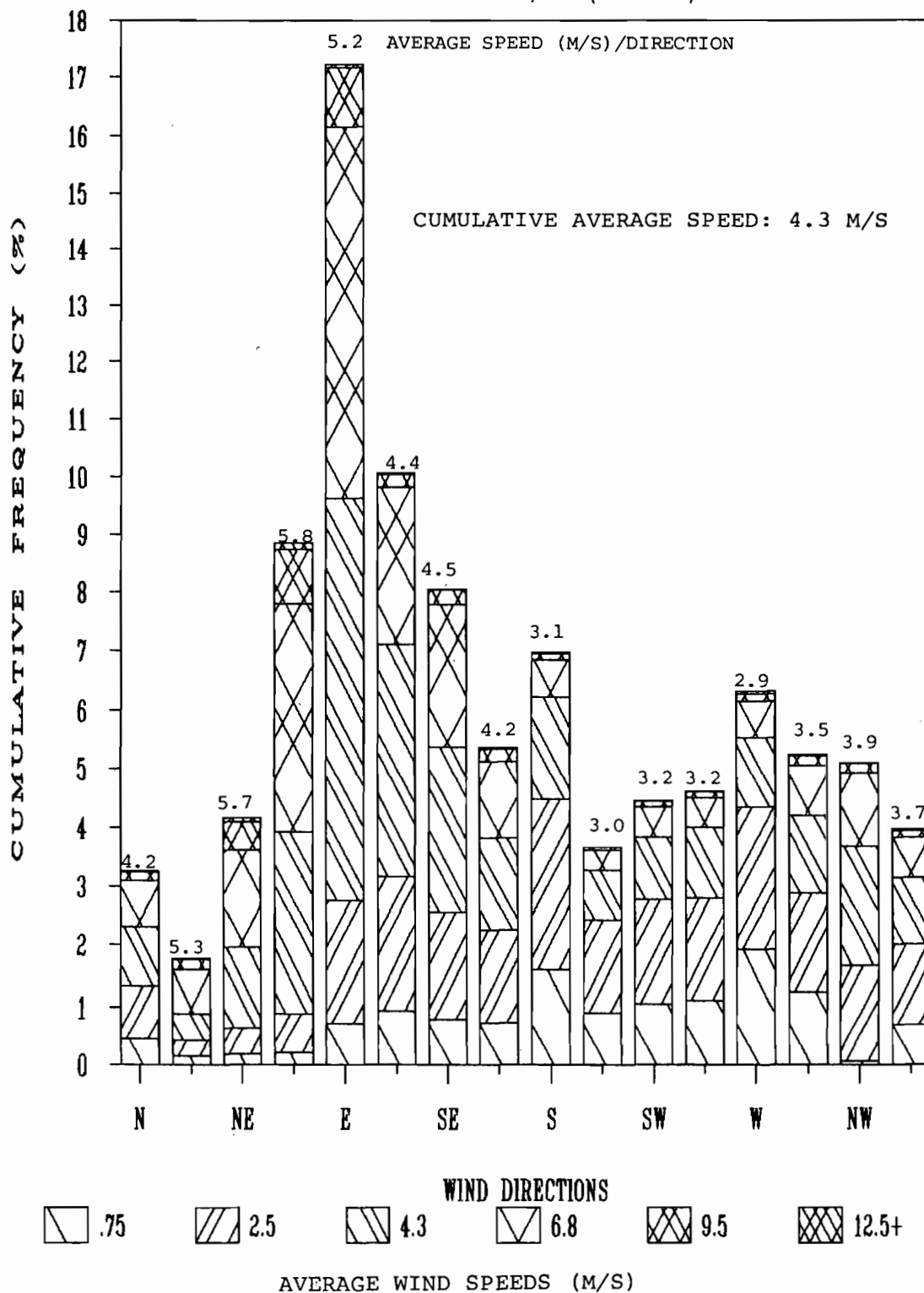
The annual average wind speed derived from the 1970-1974 summary wind frequency distribution is approximately 4.3 m/s (9.6 mph). The highest average speed as a function of wind direction is approximately 5.8 m/s (13.0 mph) for winds from the ENE. The winds with the highest annual frequency of occurrence are from the E (17.2%). Winds from the E and ESE account for 27.3% of all occurrences and winds from an expanded sector ENE through SE account for 44.2% of all occurrences.

The summary joint distributions of the wind directions and stability classes are shown in Figure 2.3-26 and 2.3-27. Stability classes 1-6 correspond to Pasquill categories A-F respectively, where 1 (A) is extremely unstable and 6 (F) is stable. The proportion of stable stability classes 5 and 6 per total frequency for each wind direction exceeds 50% for the directions SSW through NW. These two classes are 62% of all the winds from the west (W). These two classes represent less than 20% of the observations for winds from the NNE through E. For extremely unstable to neutral (1-4) stability classes, 39% out of a possible 48% total wind frequency are from the NE through SW wind directions.

The wind distribution, average speeds and stability category data are based on USDEP COMM, NOAA, EDS, NCC STAR Program results.

WIND SPEED FREQUENCY DISTRIBUTIONS

WEST PALM BEACH, FL. (1970-1974)

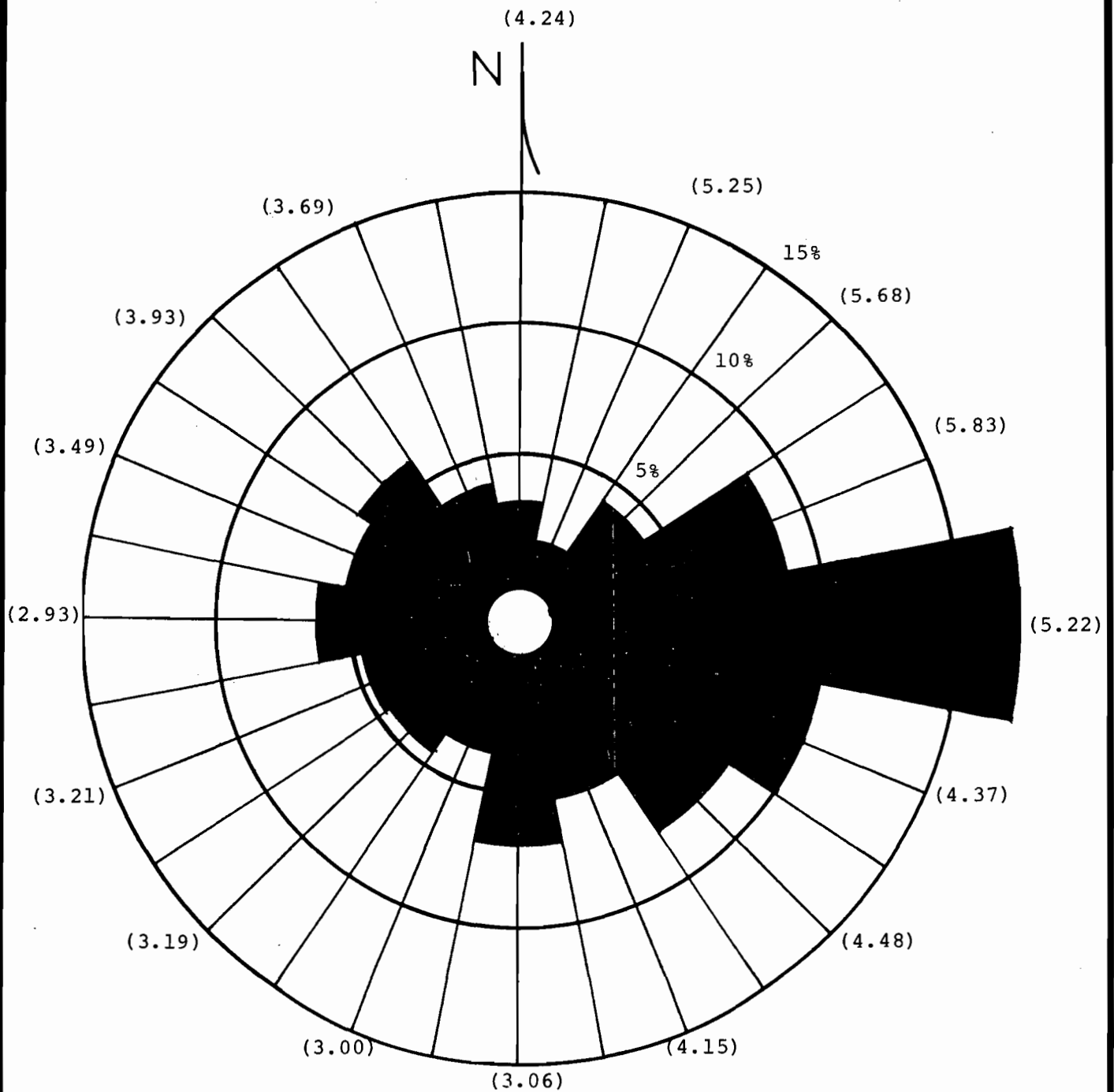


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WIND SPEED FREQUENCY DISTRIBUTIONS
WEST PALM BEACH, FL. (1970-1974)

FIG. 2.3 - 24



Average Wind Speed: (4.3 m/s)

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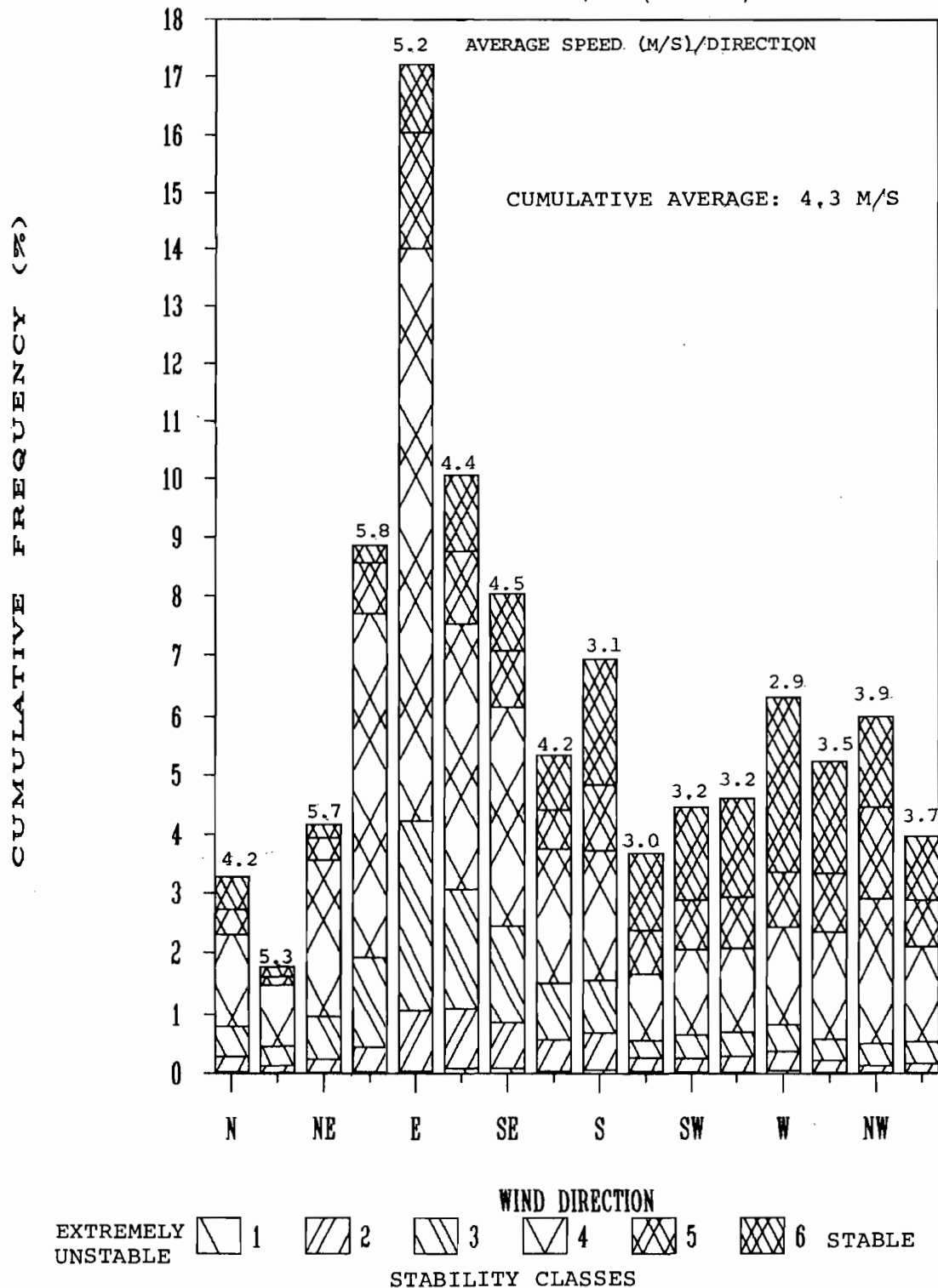


**WIND DIRECTION FREQUENCY DISTRIBUTION
WEST PALM BEACH, FL. (1970-1974)**

FIG. 2.3-25

STABILITY CLASS FREQUENCY DISTRIBUTIONS

WEST PALM BEACH, FL. (1970-1974)



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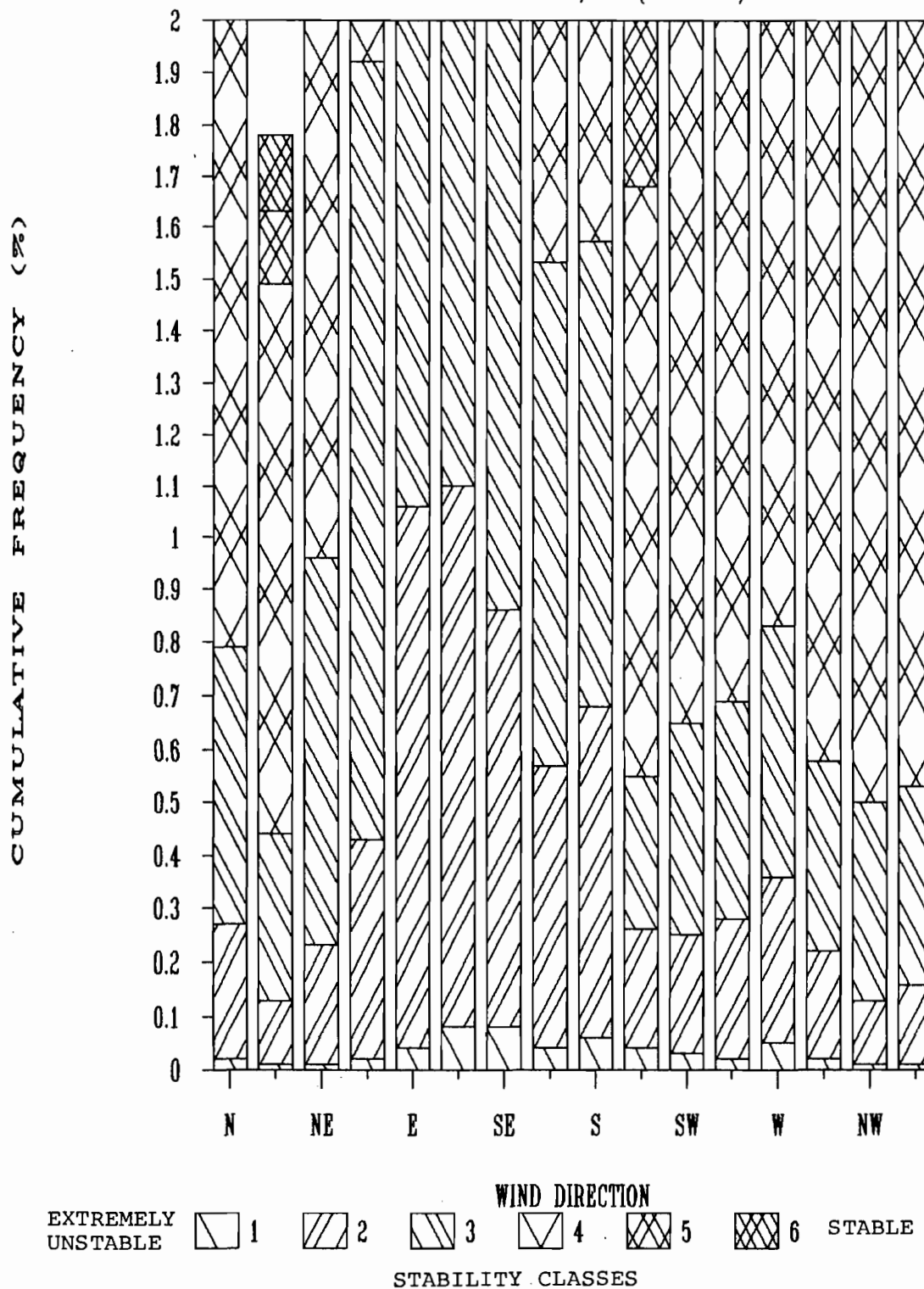
STABILITY CLASS FREQUENCY DISTRIBUTIONS
WEST PALM BEACH, FL. (1970-1974)

FIG. 2.3 - 26

STABILITY CLASS FREQUENCY DISTRIBUTIONS

UNSTABLE CLASS EXTENTIONS

WEST PALM BEACH, FL. (1970-1974)



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STABILITY CLASS FREQUENCY DISTRIBUTIONS
UNSTABLE CLASS EXTENTIONS
WEST PALM BEACH, FL. (1970-1974)
FIG. 2.3 - 27

TABLE 2-3-9
NORMALS, MEANS, AND EXTREMES

Station: MIAMI, FLORIDA										INTERNATIONAL AIRPORT										Standard time used: EASTERN										Latitude: 25° 48' N Longitude: 80° 16' W										Elevation (ground): 7 feet									
Month	Temperature							Normal heating degree days (Base 65°)	Precipitation										Relative humidity				Wind &				Pct. of possible sunshine	Mean sky cover	Mean number of days										Average daily solar radiation - langley										
	Normal			Extremes					Snow, ice pellets					Snow, ice pellets					Hour		Hour		Fastest mile		Sunrise to sunset				Sunrise to sunset		Temperatures																		
	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year		Normal total	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year	Mean total	Maximum monthly	Year	Maximum in 24 hrs.	Year	Mean speed	Prevailing direction	Speed	Direction	Year	Clear			Partly cloudy	Cloudy	Precipitation 0.1 inch or more	Thunderstorms	Heavy fog	90° and above	32° and below	32° and below	0° and below												
	(a)	(b)	(b)	(b)	7	Year	Record lowest		Year	(b)	(b)	29	29	29	29	29	29	29	29	29	7	7	7	7	22	13			14	14	23	22	22	22	29	22	22	22		7	7	7	7	20					
J	75.8	57.9	66.9	86	1967	35	1971	74	2.03	6.66	1969	0.04	1951	2.50	1958	0.0	0.0	0.0	0.0	0.0	81	84	60	69	9.4	NNW	37	31	1966	5.2	10	12	9	6	0	1	2	0	0	0	334								
F	77.0	58.8	67.9	87	1971	36	1967	56	1.87	6.56	1966	0.01	1964	5.73	1966	0.0	0.0	0.0	0.0	0.0	78	82	57	66	10.1	ESE	38	30	1964	5.2	8	12	8	5	0	1	1	0	0	0	397								
M	79.8	61.1	70.5	90	1971	37	1968	19	2.27	7.22	1949	0.02	1956	7.07	1949	0.0	0.0	0.0	0.0	0.0	77	82	56	65	10.3	SE	46	04	1966	5.3	9	14	8	6	0	2	1	0	0	0	475								
A	82.6	65.8	74.2	96	1971	46	1971	0	3.88	10.21	1960	0.07	1971	5.18	1960	0.0	0.0	0.0	0.0	0.0	76	81	55	64	10.4	ESE	32	23	1958	5.4	8	15	7	6	0	3	1	2	0	0	572								
M	85.4	69.7	77.6	93	1967	61	1971	0	6.44	18.54	1968	0.44	1965	8.82	1958	0.0	0.0	0.0	0.0	0.0	78	81	60	69	9.4	ESE	37	32	1961	5.8	6	19	10	10	0	7	8	2	0	0	540								
J	88.0	73.5	80.8	94	1967	67	1967	0	7.37	22.36	1968	1.81	1945	7.63	1966	0.0	0.0	0.0	0.0	0.0	84	86	67	75	8.1	SE	37	13	1967	6.8	5	14	13	15	0	7	0	0	0	0	506								
J	88.8	74.7	81.8	96	1969	70	1965	0	6.75	13.51	1947	1.77	1963	4.55	1952	0.0	0.0	0.0	0.0	0.0	82	85	64	72	7.8	SE	38	18	1962	6.5	5	17	11	16	0	10	0	0	0	0	539								
A	89.7	74.9	82.8	96	1970	70	1967	0	6.97	16.86	1943	1.65	1954	6.92	1964	0.0	0.0	0.0	0.0	0.0	82	86	65	73	7.6	SE	38	36	1964	6.5	5	18	10	16	0	11	0	0	0	0	510								
S	88.0	74.6	81.3	93	1968	70	1966	0	9.47	24.40	1960	2.63	1951	7.58	1960	0.0	0.0	0.0	0.0	0.0	80	86	67	77	8.2	ESE	69	06	1965	6.8	2	15	13	17	0	12	0	0	0	0	440								
O	84.7	70.9	77.8	90	1969	56	1968	0	8.21	21.08	1952	1.50	1962	9.95	1948	0.0	0.0	0.0	0.0	0.0	84	88	66	75	9.1	ESE	41	03	1966	6.1	6	13	12	15	0	6	0	0	0	0	387								
N	80.2	64.6	72.4	87	1969	40	1970	0	2.83	13.15	1959	0.09	1970	7.93	1959	0.0	0.0	0.0	0.0	0.0	81	85	59	69	9.2	N	32	08	1966	5.2	9	13	8	8	0	1	1	0	0	0	350								
O	77.1	59.1	68.1	85	1968	34	1968	65	1.67	6.39	1958	0.13	1968	4.38	1964	0.0	0.0	0.0	0.0	0.0	79	84	58	69	8.8	N	38	32	1967	5.2	10	12	9	6	0	1	1	0	0	0	319								
YR	83.1	67.1	75.1	96	APR. 1971	34	DEC. 1968	214	59.76	24.40	SEP. 1960	0.01	FEB. 1944	9.95	OCT. 1948	0.0	0.0	0.0	0.0	0.0	81	84	61	70	9.0	ESE	74	36	AUG. 1964	5.8	77	170	118	127	0	76	7	37	0	0	0	447							

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows:
Highest temperature 100 in July 1942; lowest temperature 28 in January 1940; maximum precipitation in 24 hours 12.58 in April 1942. Old City Office:
Lowest temperature 27 in February 1917; maximum precipitation in 24 hours 15.10 in November 1925.

Station: WEST PALM BEACH, FLORIDA										PALM BEACH INTERNATIONAL AP										Standard time used: EASTERN										Latitude: 26° 41' N Longitude: 80° 06' W										Elevation (ground): 15 feet																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Month	Temperature							Normal heating degree days (Base 65°)	Precipitation										Relative humidity				Wind &				Pct. of possible sunshine	Mean sky cover	Mean sunrise to sunset	Mean number of days										Average daily solar radiation - langley																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	Normal			Extremes					Snow, ice pellets					Snow, ice pellets					Hour		Hour		Hour		Hour					Fastest mile		Sunrise to sunset		Sunrise to sunset		Sunrise to sunset		Temperatures																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year		Normal total	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year	Mean total	Maximum monthly	Year	Maximum in 24 hrs.	Year	01	07	13	19	Mean speed	Prevailing direction				Speed	Direction	Year	Clear	Partly cloudy	Cloudy	Precipitation	01 inch or more	0.01 inch or more	Thunderstorms		Heavy fog	90° and above	32° and below	32° and below	0° and below																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	(a)	(b)	(c)	(d)	(e)	(f)	(g)		(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)	(v)	(w)	(x)	(y)				(z)	(aa)	(ab)	(ac)	(ad)	(ae)	(af)	(ag)	(ah)	(ai)		(aj)	(ak)	(al)	(am)	(an)	(ao)	(ap)	(aq)	(ar)	(as)	(at)	(au)	(av)	(aw)	(ax)	(ay)	(az)	(ba)	(bb)	(bc)	(bd)	(be)	(bf)	(bg)	(bh)	(bi)	(bj)	(bk)	(bl)	(bm)	(bn)	(bo)	(bp)	(bq)	(br)	(bs)	(bt)	(bu)	(bv)	(bw)	(bx)	(by)	(bz)	(ca)	(cb)	(cc)	(cd)	(ce)	(cf)	(cg)	(ch)	(ci)	(cj)	(ck)	(cl)	(cm)	(cn)	(co)	(cp)	(cq)	(cr)	(cs)	(ct)	(cu)	(cv)	(cw)	(cx)	(cy)	(cz)	(da)	(db)	(dc)	(dd)	(de)	(df)	(dg)	(dh)	(di)	(dj)	(dk)	(dl)	(dm)	(dn)	(do)	(dp)	(dq)	(dr)	(ds)	(dt)	(du)	(dv)	(dw)	(dx)	(dy)	(dz)	(ea)	(eb)	(ec)	(ed)	(ee)	(ef)	(eg)	(eh)	(ei)	(ej)	(ek)	(el)	(em)	(en)	(eo)	(ep)	(eq)	(er)	(es)	(et)	(eu)	(ev)	(ew)	(ex)	(ey)	(ez)	(fa)	(fb)	(fc)	(fd)	(fe)	(ff)	(fg)	(fh)	(fi)	(fj)	(fk)	(fl)	(fm)	(fn)	(fo)	(fp)	(fq)	(fr)	(fs)	(ft)	(fu)	(fv)	(fw)	(fx)	(fy)	(fz)	(ga)	(gb)	(gc)	(gd)	(ge)	(gf)	(gg)	(gh)	(gi)	(gj)	(gk)	(gl)	(gm)	(gn)	(go)	(gp)	(gq)	(gr)	(gs)	(gt)	(gu)	(gv)	(gw)	(gx)	(gy)	(gz)	(ha)	(hb)	(hc)	(hd)	(he)	(hf)	(hg)	(hh)	(hi)	(hj)	(hk)	(hl)	(hm)	(hn)	(ho)	(hp)	(hq)	(hr)	(hs)	(ht)	(hu)	(hv)	(hw)	(hx)	(hy)	(hz)	(ia)	(ib)	(ic)	(id)	(ie)	(if)	(ig)	(ih)	(ii)	(ij)	(ik)	(il)	(im)	(in)	(io)	(ip)	(iq)	(ir)	(is)	(it)	(iu)	(iv)	(iw)	(ix)	(iy)	(iz)	(ja)	(jb)	(jc)	(jd)	(je)	(jf)	(jg)	(jh)	(ji)	(jj)	(jk)	(jl)	(jm)	(jn)	(jo)	(jp)	(jq)	(jr)	(js)	(jt)	(ju)	(jv)	(jw)	(jx)	(jy)	(jz)	(ka)	(kb)	(kc)	(kd)	(ke)	(kf)	(kg)	(kh)	(ki)	(kj)	(kk)	(kl)	(km)	(kn)	(ko)	(kp)	(kq)	(kr)	(ks)	(kt)	(ku)	(kv)	(kw)	(kx)	(ky)	(kz)	(la)	(lb)	(lc)	(ld)	(le)	(lf)	(lg)	(lh)	(li)	(lj)	(lk)	(ll)	(lm)	(ln)	(lo)	(lp)	(lq)	(lr)	(ls)	(lt)	(lu)	(lv)	(lw)	(lx)	(ly)	(lz)	(ma)	(mb)	(mc)	(md)	(me)	(mf)	(mg)	(mh)	(mi)	(mj)	(mk)	(ml)	(mm)	(mn)	(mo)	(mp)	(mq)	(mr)	(ms)	(mt)	(mu)	(mv)	(mw)	(mx)	(my)	(mz)	(na)	(nb)	(nc)	(nd)	(ne)	(nf)	(ng)	(nh)	(ni)	(nj)	(nk)	(nl)	(nm)	(nn)	(no)	(np)	(nq)	(nr)	(ns)	(nt)	(nu)	(nv)	(nw)	(nx)	(ny)	(nz)	(oa)	(ob)	(oc)	(od)	(oe)	(of)	(og)	(oh)	(oi)	(oj)	(ok)	(ol)	(om)	(on)	(oo)	(op)	(oq)	(or)	(os)	(ot)	(ou)	(ov)	(ow)	(ox)	(oy)	(oz)	(pa)	(pb)	(pc)	(pd)	(pe)	(pf)	(pg)	(ph)	(pi)	(pj)	(pk)	(pl)	(pm)	(pn)	(po)	(pp)	(pq)	(pr)	(ps)	(pt)	(pu)	(pv)	(pw)	(px)	(py)	(pz)	(qa)	(qb)	(qc)	(qd)	(qe)	(qf)	(qg)	(qh)	(qi)	(qj)	(qk)	(ql)	(qm)	(qn)	(qo)	(qp)	(qq)	(qr)	(qs)	(qt)	(qu)	(qv)	(qw)	(qx)	(qy)	(qz)	(ra)	(rb)	(rc)	(rd)	(re)	(rf)	(rg)	(rh)	(ri)	(rj)	(rk)	(rl)	(rm)	(rn)	(ro)	(rp)	(rq)	(rr)	(rs)	(rt)	(ru)	(rv)	(rw)	(rx)	(ry)	(rz)	(sa)	(sb)	(sc)	(sd)	(se)	(sf)	(sg)	(sh)	(si)	(sj)	(sk)	(sl)	(sm)	(sn)	(so)	(sp)	(sq)	(sr)	(ss)	(st)	(su)	(sv)	(sw)	(sx)	(sy)	(sz)	(ta)	(tb)	(tc)	(td)	(te)	(tf)	(tg)	(th)	(ti)	(tj)	(tk)	(tl)	(tm)	(tn)	(to)	(tp)	(tq)	(tr)	(ts)	(tt)	(tu)	(tv)	(tw)	(tx)	(ty)	(tz)	(ua)	(ub)	(uc)	(ud)	(ue)	(uf)	(ug)	(uh)	(ui)	(uj)	(uk)	(ul)	(um)	(un)	(uo)	(up)	(uq)	(ur)	(us)	(ut)	(uu)	(uv)	(uw)	(ux)	(uy)	(uz)	(va)	(vb)	(vc)	(vd)	(ve)	(vf)	(vg)	(vh)	(vi)	(vj)	(vk)	(vl)	(vm)	(vn)	(vo)	(vp)	(vq)	(vr)	(vs)	(vt)	(vu)	(vv)	(vw)	(vx)	(vy)	(vz)	(wa)	(wb)	(wc)	(wd)	(we)	(wf)	(wg)	(wh)	(wi)	(wj)	(wk)	(wl)	(wm)	(wn)	(wo)	(wp)	(wq)	(wr)	(ws)	(wt)	(wu)	(wv)	(ww)	(wx)	(wy)	(wz)	(xa)	(xb)	(xc)	(xd)	(xe)	(xf)	(xg)	(xh)	(xi)	(xj)	(xk)	(xl)	(xm)	(xn)	(xo)	(xp)	(xq)	(xr)	(xs)	(xt)	(xu)	(xv)	(xw)	(xx)	(xy)	(xz)	(ya)	(yb)	(yc)	(yd)	(ye)	(yf)	(yg)	(yh)	(yi)	(yj)	(yk)	(yl)	(ym)	(yn)	(yo)	(yp)	(yq)	(yr)	(ys)	(yt)	(yu)	(yv)	(yw)	(yx)	(yy)	(yz)	(za)	(zb)	(zc)	(zd)	(ze)	(zf)	(zg)	(zh)	(zi)	(zj)	(zk)	(zl)	(zm)	(zn)	(zo)	(zp)	(zq)	(zr)	(zs)	(zt)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)	(v)	(w)	(x)	(y)	(z)	(aa)	(ab)	(ac)	(ad)	(ae)	(af)	(ag)	(ah)	(ai)	(aj)	(ak)	(al)	(am)	(an)	(ao)	(ap)	(aq)	(ar)	(as)	(at)	(au)	(av)	(aw)	(ax)	(ay)	(az)	(ba)	(bb)	(bc)	(bd)	(be)	(bf)	(bg)	(bh)	(bi)	(bj)	(bk)	(bl)	(bm)	(bn)	(bo)	(bp)	(bq)	(br)	(bs)	(bt)	(bu)	(bv)	(bw)	(bx)	(by)	(bz)	(ca)	(cb)	(cc)	(cd)	(ce)	(cf)	(cg)	(ch)	(ci)	(cj)	(ck)	(cl)	(cm)	(cn)	(co)	(cp)	(cq)	(cr)	(cs)	(ct)	(cu)	(cv)	(cw)	(cx)	(cy)	(cz)	(da)	(db)	(dc)	(dd)	(de)	(df)	(dg)	(dh)	(di)	(dj)	(dk)	(dl)	(dm)	(dn)	(do)	(dp)	(dq)	(dr)	(ds)	(dt)	(du)	(dv)	(dw)	(dx)	(dy)	(dz)	(ea)	(eb)	(ec)	(ed)	(ee)	(ef)	(eg)	(eh)	(ei)	(ej)	(ek)	(el)	(em)	(en)	(eo)	(ep)	(eq)	(er)	(es)	(et)	(eu)	(ev)	(ew)	(ex)	(ey)	(ez)	(fa)	(fb)	(fc)	(fd)	(fe)	(ff)	(fg)	(fh)	(fi)	(fj)	(fk)	(fl)	(fm)	(fn)	(fo)	(fp)	(fq)	(fr)	(fs)	(ft)	(fu)	(fv)	(fw)	(fx)	(fy)	(fz)	(ga)	(gb)	(gc)	(gd)	(ge)	(gf)	(gg)	(gh)	(gi)	(gj)	(gk)	(gl)	(gm)	(gn)	(go)	(gp)	(gq)	(gr)	(gs)	(gt)	(gu)	(gv)	(gw)	(gx)	(gy)	(gz)	(ha)	(hb)	(hc)	(hd)	(he)	(hf)	(hg)	(hh)	(hi)	(hj)	(hk)	(hl)	(hm)	(hn)	(ho)	(hp)	(hq)	(hr)	(hs)	(ht)	(hu)	(hv)	(hw)	(hx)	(hy)	(hz)	(ia)	(ib)	(ic)	(id)	(ie)	(if)	(ig)	(ih)	(ii)	(ij)	(ik)	(il)	(im)	(in)	(io)	(ip)	(iq)	(ir)	(is)	(it)	(iu)	(iv)	(iw)	(ix)	(iy)	(iz)	(ja)	(jb)	(jc)	(jd)	(je)	(jf)	(jg)	(jh)	(ji)	(jj)	(jk)	(jl)	(jm)	(jn)	(jo)	(jp)	(jq)	(jr)	(js)	(jt)	(ju)	(jv)	(jw)	(jx)	(jy)	(jz)	(ka)	(kb)	(kc)	(kd)	(ke)	(kf)	(kg)	(kh)	(ki)	(kj)	(kk)	(kl)	(km)	(kn)	(ko)	(kp)	(kq)	(kr)	(ks)	(kt)	(ku)	(kv)	(kw)	(kx)	(ky)	(kz)	(la)	(lb)	(lc)	(ld)	(le)	(lf)	(lg)	(lh)	(li)	(lj)	(lk)	(ll)	(lm)	(ln)	(lo)	(lp)	(lq)	(lr)	(ls)	(lt)	(lu)	(lv)	(lw)	(lx)	(ly)	(lz)	(ma)	(mb)	(mc)	(md)	(me)	(mf)	(mg)	(mh)	(mi)	(mj)	(mk)	(ml)	(mm)	(mn)	(mo)	(mp)	(mq)	(mr)	(ms)	(mt)	(mu)	(mv)	(mw)	(mx)	(my)	(mz)	(na)	(nb)	(nc)	(nd)	(ne)	(nf)	(ng)	(nh)	(ni)	(nj)	(nk)	(nl)	(nm)	(nn)	(no)	(np)	(nq)	(nr)	(ns)	(nt)	(nu)	(nv)	(nw)	(nx)	(ny)	(nz)	(oa)	(ob)	(oc)	(od)	(oe)	(of)	(og)	(oh)	(oi)	(oj)	(ok)	(ol)	(om)	(on)	(oo)	(op)	(oq)	(or)	(os)	(ot)	(ou)	(ov)	(ow)	(ox)	(oy)	(oz)	(pa)	(pb)	(pc)	(pd)	(pe)	(pf)	(pg)	(ph)	(pi)	(pj)	(pk)	(pl)	(pm)	(pn)	(po)	(pp)	(pq)	(pr)	(ps)	(pt)	(pu)	(pv)	(pw)	(px)	(py)	(pz)	(qa)	(qb)	(qc)	(qd)	(qe)	(qf)	(qg)	(qh)	(qi)	(qj)	(qk)	(ql)	(qm)	(qn)	(qo)	(qp)	(qq)	(qr)	(qs)	(qt)	(qu)	(qv)	(qw)	(qx)	(qy)	(qz)	(ra)	(rb)	(rc)	(rd)	(re)	(rf)	(rg)	(rh)	(ri)	(rj)	(rk)	(rl)	(rm)	(rn)	(ro)	(rp)	(rq)	(rr)	(rs)	(rt)	(ru)	(rv)	(rw)	(rx)	(ry)	(rz)	(sa)	(sb)	(sc)	(sd)	(se)	(sf)	(sg)	(sh)	(si)	(sj)	(sk)	(sl)	(sm)	(sn)	(so)	(sp)	(sq)	(sr)	(ss)	(st)	(su)	(sv)	(sw)	(sx)	(sy)	(sz)	(ta)	(tb)	(tc)	(td)	(te)	(tf)	(tg)	(th)	(ti)	(tj)	(tk)	(tl)	(tm)	(tn)	(to)	(tp)	(tq)	(tr)	(ts)	(tt)	(tu)	(tv)	(tw)	(tx)	(ty)	(tz)	(ua)	(ub)	(uc)	(ud)	(ue)	(uf)	(ug)	(uh)	(ui)	(uj)	(uk)	(ul)	(um)	(un)	(uo)	(up)	(uq)	(ur)	(us)	(ut)	(uu)	(uv)	(uw)	(ux)	(uy)	(uz)	(va)	(vb)	(vc)	(vd)	(ve)	(vf)	(vg)	(vh)	(vi)	(vj)	(vk)	(vl)	(vm)	(vn)	(vo)	(vp)	(vq)	(vr)	(vs)	(vt)	(vu)	(vv)	(vw)	(wx)	(wy)	(wz)	(xa)	(xb)	(xc)	(xd)	(xe)	(xf)	(xg)	(xh)	(xi)	(xj)	(xk)	(xl)	(xm)	(xn)	(xo)	(xp)	(xq)	(xr)	(xs)	(xt)	(xu)	(xv)	(xw)	(xx)	(xy)	(xz)	(ya)	(yb)	(yc)	(yd)	(ze)	(zf)	(zg)	(zh)	(zi)	(zj)	(zk)	(zl)	(zm)	(zn)	(zo)	(zp)	(zq)	(zr)	(zs)	(zt)	(zu)	(zv)	(zw)	(zx)	(zy)	(zz)																																																				
J	75.5	58.3	66.9	86	1965	29	1970	87	2.48	7.92	1958	0.22	1960	6.36	1957	0.0	0.0	0.0	0.0	0.0	80	82	58	73	9.9	NW	48	29	1955	5.8	8	11	12	7	0	1	2	0	0	0	334																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
F	76.3	58.6	67.6	87	1964	35	1967	64	2.35	6.88	1966	0.29	1968	4.70	1966	0.0	0.0	0.0	0.0	0.0	80	78	57	60	10.4	SE	46	29	1956	5.7	8	10	10	6	0	1	1	0	0	0	397																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
M	78.6	61.1	70.5	92	1965	31	1968	31	3.44	11.99	1970	0.37	1956	4.88	1956	0.0	0.0	0.0	0.0	0.0	76	79	54	66	10.7	ESE	51	27	1957	5.5	8	13	9	7	0	4	1	3	0	0	572																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
A	82.4	65.4	73.9	99	1971	45	1971	0	4.34	18.26	1942	0.04	1967	15.23	1942	0.0	0.0	0.0	0.0	0.0	75	77	53	64	10.8	E	53	32	1958	5.3	8	13	9	7	0	4	1	3	0	0	540																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
M	85.9	69.2	77.6	96	1971	56	1971	0	5.11	14.10	1946	0.39	1967	7.04	1958	0.0	0.0	0.0	0.0	0.0	76	76	57	68	9.6	ESE	45	27	1954	5.8	8	13	10	11	0	7	8	3	0	0	540																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
J	89.2	72.7	81.0	95	1971	62	1965	0	7.53	17.91	1966	1.07	1952	9.21	1945	0.0	0.0	0.0	0.0	0.0	84	83	67	77	8.0	ESE	71	09	1957	6.8	4	12	14	14	0	13	6	6	0	0	506																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
J	90.8	74.3	82.6	96	1969	68	1965	0	6.66	17.74	1941	1.22	1961	3.38	1965	0.0	0.0	0.0	0.0	0.0	85	85	65	76	7.5	ESE	45	20	1950	6.0	4	13	14	15	0	16	0	0	0	0	539																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
A	91.1	74.8	83.0	97	1970	68	1969	0	6.74	13.32	1950	2.16	1955	5.89	1949	0.0	0.0	0.0	0.0	0.0	83	84	65	75	7.4	ESE	46	13	1964	6.5	5	16	12	16	0	16	0	14	0	0	510																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
S	89.7	74.5	82.1	92	1971	68	1967	0	9.06	24.86	1960	2.73	1959	8.71	1960	0.0	0.0	0.0	0.0	0.0	76	79	54	66	10.7	ESE	51	27	1957	5.5	8	13	10	8	0	2	1	1	0	0	440																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
D	85.2	71.1	78.2	93	1971	68	1968	0	7.96	18.74	1965	2.16	1962	9.58	1965	0.0	0.0	0.0	0.0	0.0	84	86	67	78	9.8	ENE	54	03	1965	6.1	2	14	14	17	0	16	0	8	0	0	387																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
O	80.2	64.8	72.5	87	1971	37	1970	6	2.86	10.77	1971	0	1970	5.44	1971	0.0	0.0	0.0	0.0	0.0	78	80	57	71	9.8	NNW	36	07	1958	5.9	9	13	9	7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

The Summary by Hour analyses given in the monthly Local Climatological Data (LCD) for West Palm Beach for the period 1970-1974 were used to generate seasonal diurnal distributions for the resultant wind directions and average wind speeds. Winter consists of all available data for the months of December, January and February. Spring consisted of all available data for the months of March, April and May. The derived seasonal diurnal variations for wind direction are shown in Figure 2.3-28.

The diurnal variations of the wind directions for the spring and summer seasons are almost identical and uniquely different from the diurnal curve for the fall season. The winter season curve is erratic, particularly during the early morning hours, but tends to correspond with that of the fall season during the daylight and early evening hours.

The diurnal wind direction patterns give no indication of a diurnal shift that would be consistent with a persistent ocean sea breeze. They confirm instead the dominant easterly trade winds that were observed in the annual wind direction frequency roses. The seasonal diurnal wind speed distributions shown in Figure 2.3-29 all have the same general form. The minimum wind speeds occurred at or between 0400-0700. The minimum average speed was 1.9 m/s (4.3 mph) at 0400 during the summer season. The maximum wind speeds occurred at 1300. The highest average speed was 6.6 m/s (14.8 mph) during the spring season. The spring season (except at 0400) has the highest diurnal average wind speeds and the summer season (without exception) has the lowest diurnal average wind speeds.

Seasonal mixing heights for the West Palm Beach, based on G.C. Holtzworth, differ slightly from those of Miami when they are extracted from Holtzworth's isopheth maps. These values are given in Table 2.3-11.

TABLE 2.3-10
*** NORMALS BY CLIMATOLOGICAL DIVISIONS**

Taken from "Climatology of the United States No. 81-4, Decennial Census of U. S. Climate"

STATIONS (By Divisions)	TEMPERATURE (°F)												PRECIPITATION (In.)													
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANN	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANN
LOWER EAST COAST																										
FORT LAUDERDALE	67.8	68.4	70.7	74.3	77.5	80.4	81.8	82.6	81.5	77.9	72.6	69.0	75.4	2.20	2.06	2.84	4.19	5.29	7.42	5.96	6.88	8.98	8.39	3.18	2.90	60.29
HOMESTEAD EXP STA	65.6	66.5	69.2	72.8	75.9	79.2	80.2	80.7	80.0	76.3	70.7	66.9	73.7	1.75	1.71	2.38	3.69	6.46	8.77	8.81	8.29	10.61	8.72	2.28	1.22	64.69
MIAMI BEACH	69.1	69.6	71.6	74.9	78.2	81.1	82.3	82.9	81.7	78.4	73.8	70.3	76.2	1.68	1.65	1.95	2.92	4.54	5.63	4.45	5.06	7.36	6.71	2.53	1.78	66.26
MIAMI WSO	66.9	67.9	70.5	74.2	77.6	80.8	81.8	82.3	81.3	77.8	72.4	68.1	75.1	2.03	1.87	2.27	3.88	6.44	7.37	6.75	6.97	9.47	8.21	2.83	1.67	59.76
MIAMI 12 SSW	66.5	67.4	70.4	74.2	77.5	80.4	81.6	82.0	81.0	77.2	71.6	67.7	74.8	2.05	1.80	2.44	3.75	6.13	7.00	6.58	6.25	9.03	8.23	2.59	1.63	57.48
WEST PALM BEACH WSO	66.9	67.6	69.9	73.9	77.6	81.0	82.6	83.0	82.1	78.2	72.5	68.2	75.3	2.48	2.35	3.44	4.34	5.11	7.53	6.66	6.74	9.66	7.96	2.86	2.57	61.70
DIVISION	66.9	67.6	70.0	73.6	77.0	80.2	81.5	82.0	81.0	77.4	72.0	68.2	74.8	2.16	2.02	2.82	3.90	5.49	7.44	6.65	6.82	9.47	8.15	2.84	2.17	60.00
KEYS																										
KEY WEST WSO	69.6	70.4	72.5	75.8	79.0	81.8	83.3	83.6	82.3	79.0	74.1	70.6	76.8	1.53	1.98	1.77	2.48	2.73	3.97	4.16	4.33	6.73	5.82	2.80	1.69	39.99
KEY WEST	70.4	71.3	73.6	77.1	80.2	82.8	84.0	84.3	83.0	79.6	74.9	71.4	77.7	1.49	2.00	1.73	2.51	2.77	4.01	4.16	4.25	6.53	5.87	2.81	1.71	39.84
DIVISION	70.2	71.0	73.3	76.6	79.8	82.4	83.5	83.8	82.5	79.2	74.5	71.2	77.3	1.71	1.88	1.92	2.29	3.10	4.33	4.54	4.68	7.05	6.73	2.43	1.88	42.55

* Normals for the period 1931-1960. Divisional normals may not be the arithmetical average of individual stations published, since additional data for shorter period stations are used to obtain better areal representation.

CONFIDENCE - LIMITS

In absence of trend or record changes, the chances are 9 out of 10 that the true mean will lie in the interval formed by adding and subtracting the values in the following table from the means for any station in the State. Because of the wider variation in mean precipitation, the corresponding monthly means and annual mean must be substituted for "p" in the precipitation table below to obtain mean precipitation confidence limits.

1.3 | 1.3 | 1.1 | .5 | .5 | .4 | .4 | .3 | .4 | .5 | .8 | 1.2 | .4 | .39√p | .37√p | .44√p | .48√p | .47√p | .48√p | .38√p | .43√p | .53√p | .59√p | .44√p | .35√p | .44√p

COMPARATIVE DATA

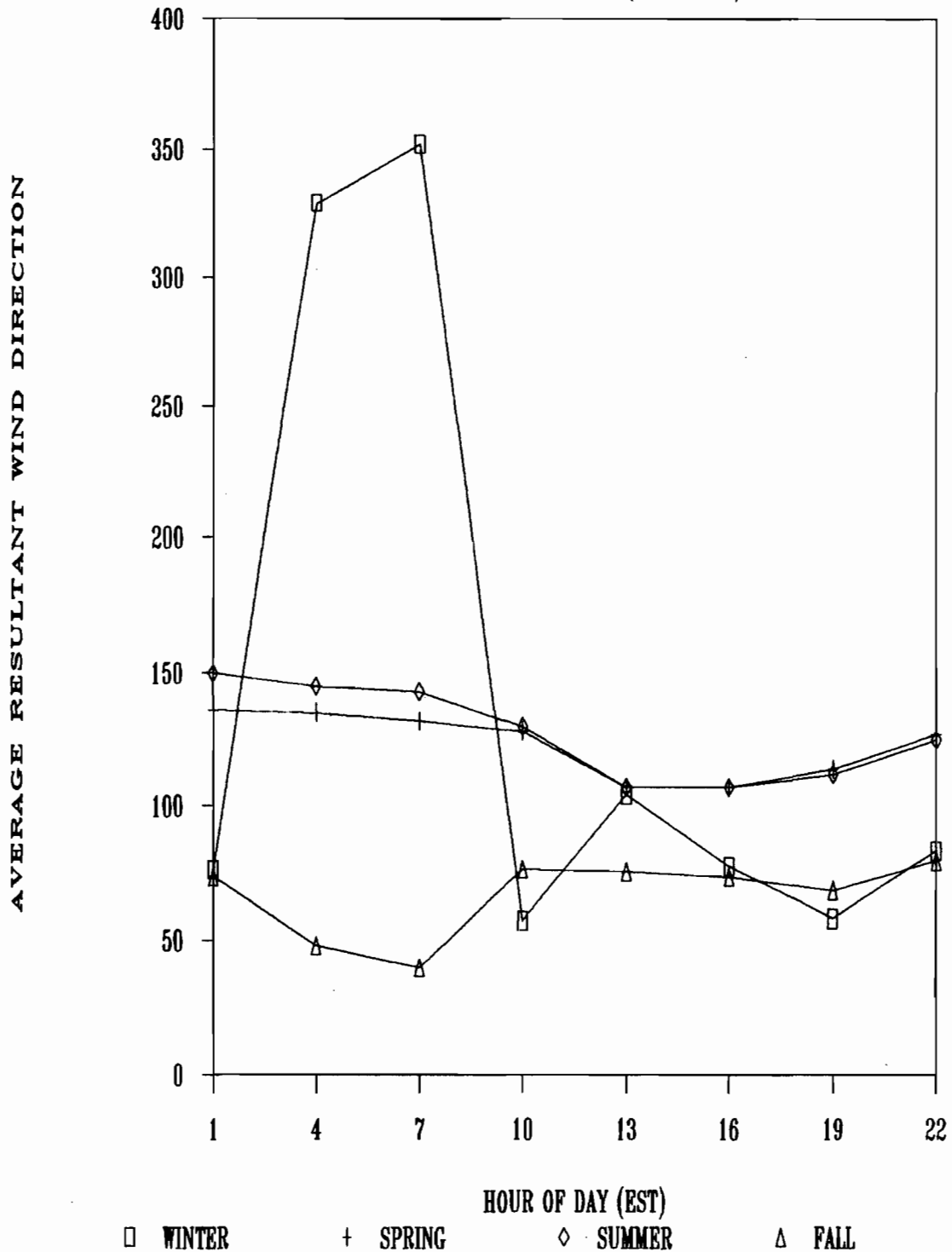
Data in the following table are the mean temperature and average precipitation for St. Leo's Abbey, Florida, for the period 1901-1930 and are included in this publication for comparative purposes.

60.3 | 61.7 | 66.3 | 70.6 | 75.8 | 79.2 | 80.5 | 80.7 | 79.2 | 73.2 | 65.4 | 60.3 | 71.1 | 2.87 | 2.54 | 2.90 | 2.20 | 4.44 | 8.19 | 8.22 | 8.48 | 6.91 | 3.70 | 2.20 | 2.51 | 55.16

Data Source: CLIMATE OF THE STATES, Vol. 1, Water Information Center, Inc., 1974

SEASONAL DIURNAL WIND DIRECTIONS

WEST PALM BEACH, FL. (1970-1974)



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY

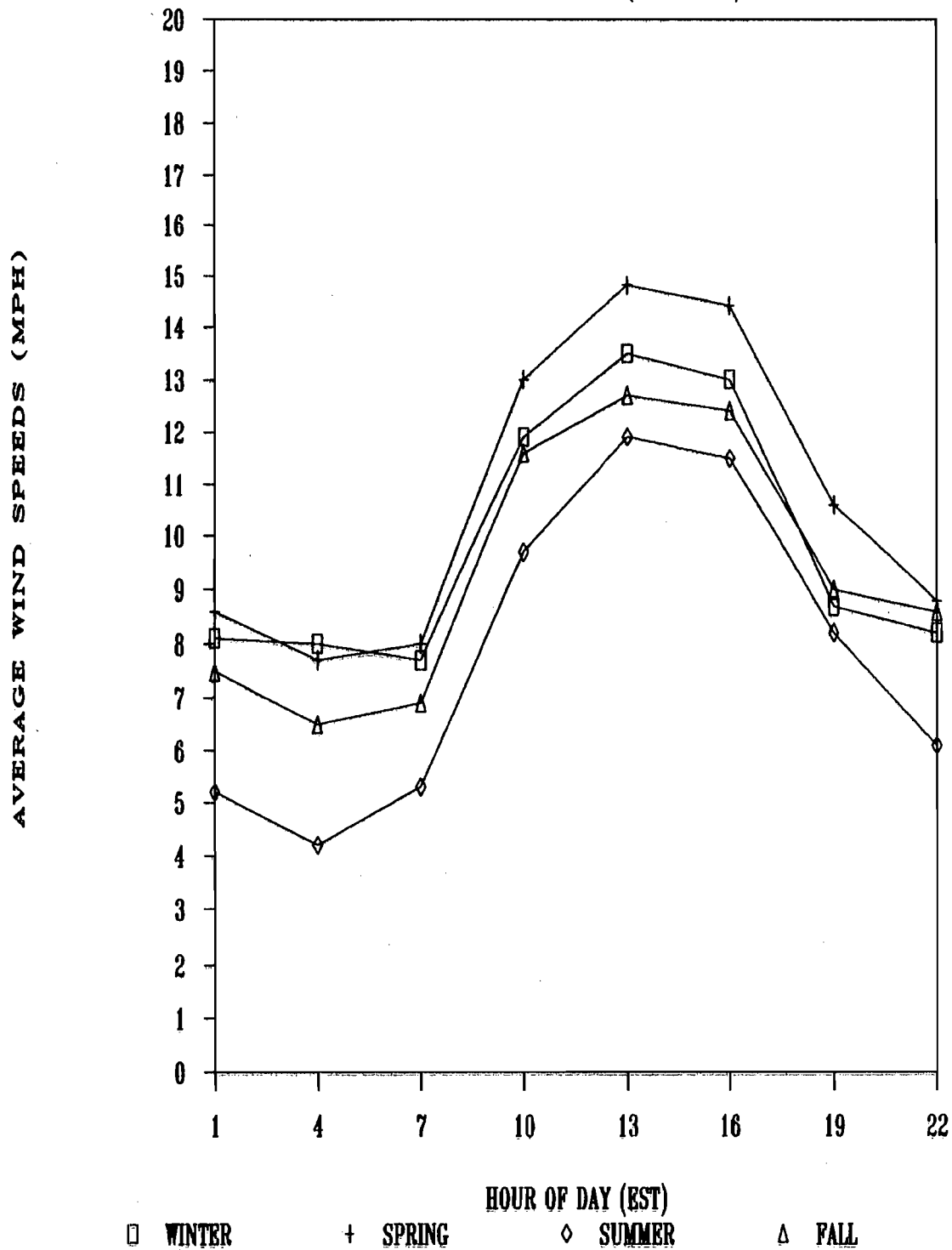


SEASONAL DIURNAL WIND DIRECTIONS
WEST PALM BEACH, FL. (1970-1974)

FIG. 2.3-28

SEASONAL DIURNAL WIND SPEEDS

WEST PALM BEACH, FL. (1970-1974)



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



SEASONAL DIURNAL WIND SPEEDS
WEST PALM BEACH, FL. (1970-1974)

FIG. 2.3 - 29

Processed hourly meteorological data and stabilities, as derived from the Palm Beach Airport and Miami Airport, were used to generate hourly and 24 hour air quality impacts. These data are presented, by year in Appendix IV.

The meteorological data from the Palm Beach Airport, along with upper air data from Miami Airport, can be considered as sufficiently representative of the proposed RRF site so as to preclude the need for additional on-site monitoring.

TABLE 2.3-11
HOLTZWORTH* MIXING HEIGHTS FOR WEST PALM BEACH AND MIAMI

Period	Morning		Afternoon	
	West Palm	Miami#	West Palm	Miami#
ANNUAL	800	923	1,375	1,351
SPRING	800	980	1,400	1,457
SUMMER	900	1,071	1,400	1,383
FALL	800	933	1,350	1,341
WINTER	700	707	1,175	1,221

* G.C. Holtzworth, Mixing Heights, Winds Speeds, and Potential for Urban Air pollution Throughout the contiguous United States; USEPA AP-101, January, 1972.

#Appendix B, Table B-1; all cases, Holtzworth, 1972.

2.3.7.2 Ambient Air Quality

In accordance with Rule 17-2.500(5)(f)(FAC), pollutants subject to New Source Review (NSR) may require ambient air monitoring to define background concentrations. These concentrations are used to assess the extent that the emissions from the proposed source may contribute to violations of applicable ambient air quality standards and/or the extent to which applicable PSD allowable increments may be consumed.

The Florida DER requested emission estimates for sixteen (16) pollutants including the criteria pollutants. These estimates have been prepared. In addition, estimates of dioxin (2,3,7,8-TCSS) have been prepared. The estimates have been prepared based on design total capacities of 1800 and 2100 TPD through-puts of RDF generated from the processing of 3,000 TPD of municipal solid waste (MSW). The total emission rates are compared to PSD significant levels in Table 2.3-12. Significant levels are exceeded for TSP, CO, NO_x, SO₂, VOC, mercury and fluorides.

Particulate matter, particulate lead, beryllium and particulate mercury (Hg) will be controlled by BACT -- tentatively, an electrostatic precipitator (ESP) with an outlet grain loading of 0.03 gr/dscf at 12% CO₂. Low sulfur auxiliary fuel is, tentatively, the BACT for SO₂ and acid gases. NO_x, CO and VOC will be controlled by good combustion design and practices.

Source may be exempt from air quality monitoring if the impact of a given pollutant falls below the specified minimum concentrations [17-2.500(3)(e) (FAC)]. Air quality diffusion analyses were conducted using the EPA-ISCST and ISCMT models and five years of meteorological data (1970-1974). The highest second highest impact concentrations generated are compared to these de-minimus values in Table 2.3-13 for those pollutants that did not meet de-minimus levels based on emission potential. From these results only SO₂ is found to exceed its de-minimus value.

TABLE 2.3-12
SIGNIFICANT EMISSION RATES AND TOTAL FACILITY
POTENTIAL TO EMIT (THREE UNITS AT 600 TPD EACH)
VALUES FOR PSD REGULATED POLLUTANTS

Pollutant	Significant Emission* Rates (Tons/Year)	Potential to# Emit (Tons/Year)
Particulate Matter (TSP)	25	214
Carbon Monoxide (CO)	100	3,942
Nitrogen Oxides (NO _x)	40	1,314
Sulfur Dioxide (SO ₂)	40	2,957
Ozone (VOC)	40	65.6
Lead (Pb)	0.6	0.46
Asbestos	7.0 E-2	—
Beryllium (Be)	4.0 E-3	3.0 E-3
Mercury (Hg)	0.1	0.98
Vinyl Chloride	1.0	—
Fluorides	3.0	13.2
Sulfuric Acid Mist	7.0	0.131
Total Reduced Sulfur (including H ₂ S)	10	—
Reduced Sulfur (including H ₂ S)	10	—
Hydrogen Sulfide (H ₂ S)	10	—
Hydrogen Chloride	—	1,150
2,3,7,8-TCDD	—	1.8 E-5

* 17.2 (V) Table 500.2

1,800 TPD RDF fired (based on 3 units at 600 TPD each)

TABLE 2.3-13
COMPARISON OF IMPACT OF PALM BEACH COUNTY RDF FIRED
SPREADER STOKER FURNACES TO DE-MINIMUS LEVELS (ISC MODEL)
SIGNIFICANT MONITORING CONCENTRATIONS

Pollutant	Averaging Time	De-Minimus Guidelines ug/m ³	Highest 2nd High- est# Concentration ug/m ³ *	Distance (km) From Source to De-Minimus Level	
				High	H ₂ ndH
TSP	24 Hour	10	2.0	##	##
SO ₂	24 Hour	13	27.9	9.0	9.0
CO	8 Hour	575	81.1	##	##
NO _x	24 Hour	14	12.3	1.5	##
Ozone (VOC)	1 Hour	*	3.0**	##	##
Mercury	24 Hour	0.25	9.3E-3	##	##
Fluorides	24 Hour	0.25	0.12	##	##
Lead	24 Hour	0.1	4.3E-3	##	##
Beryllium	24 Hour	5.0E-4	9.9E-5	##	##

* No value established. Ambient air standard: 235 ug/m³ not to be exceeded on more than an average of of one day per year over a three year period.

Model analyses for SO₂ based on 2,100 TPD and 9% S. Concentrations for other pollutants based on on their emissions ratio to SO₂.

** Assumes all VOC becomes ozone.

Less than de-minimus values at all distances greater than 0.6 km from the source. Minimum distance tance from RDF source to site boundary: 0.73 km.

There are thirteen active ambient air quality monitoring sites with a range of 50 km from the proposed RDF facility. These sites are listed in Table 2.3-14. The maximum and second highest maximum concentrations and their sites as measured in 1983, are shown in Table 2.3-15 along with the Federal and Florida ambient air quality standards. It has been determined by the Florida DER that the existing monitoring facilities are sufficient to provide ambient air background in the study area. Pre-construction monitoring is not required.

TABLE 2.3-14
MONITORING STATION LOCAL ADDRESSES, UTM COORDINATES AND LOCATION
(DISTANCE & ANGLE) RELATIVE TO THE PROPOSED PALM BEACH COUNTY RDF
FIRED WATERWALL FURNACE FACILITY

(FACILITY UTM COORDINATES 2960180N; 585820E; UTM ZONE 17)

Site No.	Address (Monitoring Capability)	UTM Coordinates Zone 17	Distance From Proposed Facility (Meters)	Direction Relative To Proposed Facility (North = 0(360) Degrees (Degrees)
1	West Palm Beach Water Treatment Plant First St. & Tamarind Ave. West Palm Beach, Florida (CO, NO ₂ , Meteorology)	2955030N 0593232E	9,026	125
1A	Palm Beach County Health Dept. 901 Evernia Street West Palm Beach, Florida (Suspended Particulate)	2955030N 0593232E	9,026	125
2	North Palm Beach Water Treatment Plant 603 Anchorage Drive North Palm Beach, Florida (Suspended Particulate)	2965817N 0592780E	8,956	51
3	Lake Worth Water Treatment Plant 301-303 College Street Lake Worth, Florida (Suspended Particulate)	2943537N 0592793E	18,045	157
4	Delray Beach Water Treatment Plant 202 NW First Street Delray Beach, Florida (Suspended Particulate)	2927488N 0592195E	33,308	169

TABLE 2.3-14 (Continued)

Site No.	Address (Monitoring Capability)	UTM Coordinates Zone 17	Distance From Proposed Facility (Meters)	Direction Relative To Proposed Facility (North = 0(360) Degrees (Degrees)
5	Boca Raton Fire Station #1 1151 North Federal Highway Boca Raton, Florida (Suspended Particulate)	2915768N 05913137E	44,750	173
6	Southwest Fire Department 1180 S. Military Trail West Palm Beach, Florida (Suspended Particulate)	2949018N 0588207E	11,414	168
7	College of Boca Raton 1151 North Federal Highway Boca Raton, Florida (Suspended Particulate)	2918354N 0587320E	41,853	178
8	South Florida Water Mgmt. Pump Station Twenty Mile Bend State Road 80 (Suspended Particulate, Ozone, Meteorology)	2951402N 0562879E	24,563	249
9	Pahokee Sewage Treatment Plant 1050 McClure Road Pahokee, Florida (Suspended Particulate)	2964200N 0532300E	53,671	274
10	Royal Palm Beach R.V. Area 10999 Okeechobee Blvd. Royal Palm Beach, Florida (Ozone, Meteorology)	2954150N 0578100E	9,796	232
11	Palm Beach County Health Department Warehouse 2030 Avenue "L" Riviera Beach, Florida (Sulfur Dioxide)	2962350N 0592480E	7,005	72
12	Belle Glade Health Dept. 1024 NW Avenue "D" Belle Glade, Florida (Suspended Particulate)	2953082N 0533160E	53,136	262

**TABLE 2.3-15
AMBIENT AIR QUALITY STANDARDS**

Pollutant	Federal Primary	Federal Secondary	State	Maximum Concentration Measured in 1983 (Site #)	Maximum 2nd Max Concentration(3) Measured in 1983 (Site #)
Sulfur Dioxide					
Max 3-hr Concentration	No Standard	1300 UG/M ³ (0.5 PPM)	1300 UG/M ³ (0.5 PPM)	65 UG/M ³ (11) (0.025 PPM)	63 UG/M ³ (11) (0.024 PPM)
Max 24-Hr Concentration	365 UG/M ³ (0.14 PPM)	No Standard	260 UG/M ³ (0.1 PPM)	39 UG/M ³ (11) (0.015 PPM)	29 UG/M ³ (11) (0.011 PPM)
Annual Arithmetic Mean	80 UG/M ³	No Standard (0.03 PPM)	60 UG/M ³ (0.02 PPM)	7 UG/M ³ (11) (0.0027 PPM)	
Particulate Matter					
Max 24-Hr Concentration (2)	260 UG/M ³	150 UG/M ³	150 UG/M ³	134 UG/M ³ (5)	107 UG/M ³ (4)
Annual Geometric Mean	75 UG/M ³	60 UG/M ³	60 UG/M ³	43.1 UG/M ³ (12)	
Nitrogen Dioxide					
Annual Arithmetic Mean	100 UG/M ³	100 UG/M ³ (.05 PPM)	100 UG/M ³ (.05 PPM)	20 UG/M ³ (1) (.05 PPM)	(0.01 PPM)
Ozone					
Daily Max 1-Hr Concentration (1)	235 UG/M ³ (0.12 PPM)	235 UG/M ³ (0.12 PPM)	235 UG/M ³ (0.12 PPM)	180 UG/M ³ (10) (0.092 PPM)	172 UG/M ³ (10) (0.088 PPM)
Lead					
Quarterly Arithmetic Mean	No Standard	No Standard	1.5 UG/M ³	Not Monitored	
Carbon Monoxide					
Max 1-Hr Concentration	40000 UG/M ³ (35 PPM)	40000 UG/M ³ (35 PPM)	40000 UG/M ³ (35 PPM)	10171 UG/M ³ (1) (8.9 PPM)	9943 UG/M ³ (1) (8.7 PPM)
Max 8-Hr Concentration(2)	10000 UG/M ³ (10 PPM)	10000 UG/M ³ (10 PPM)	10000 UG/M ³ (10 PPM)	6600 UG/M ³ (1) (6.6 PPM)	4500 UG/M ³ (1) (4.5 PPM)

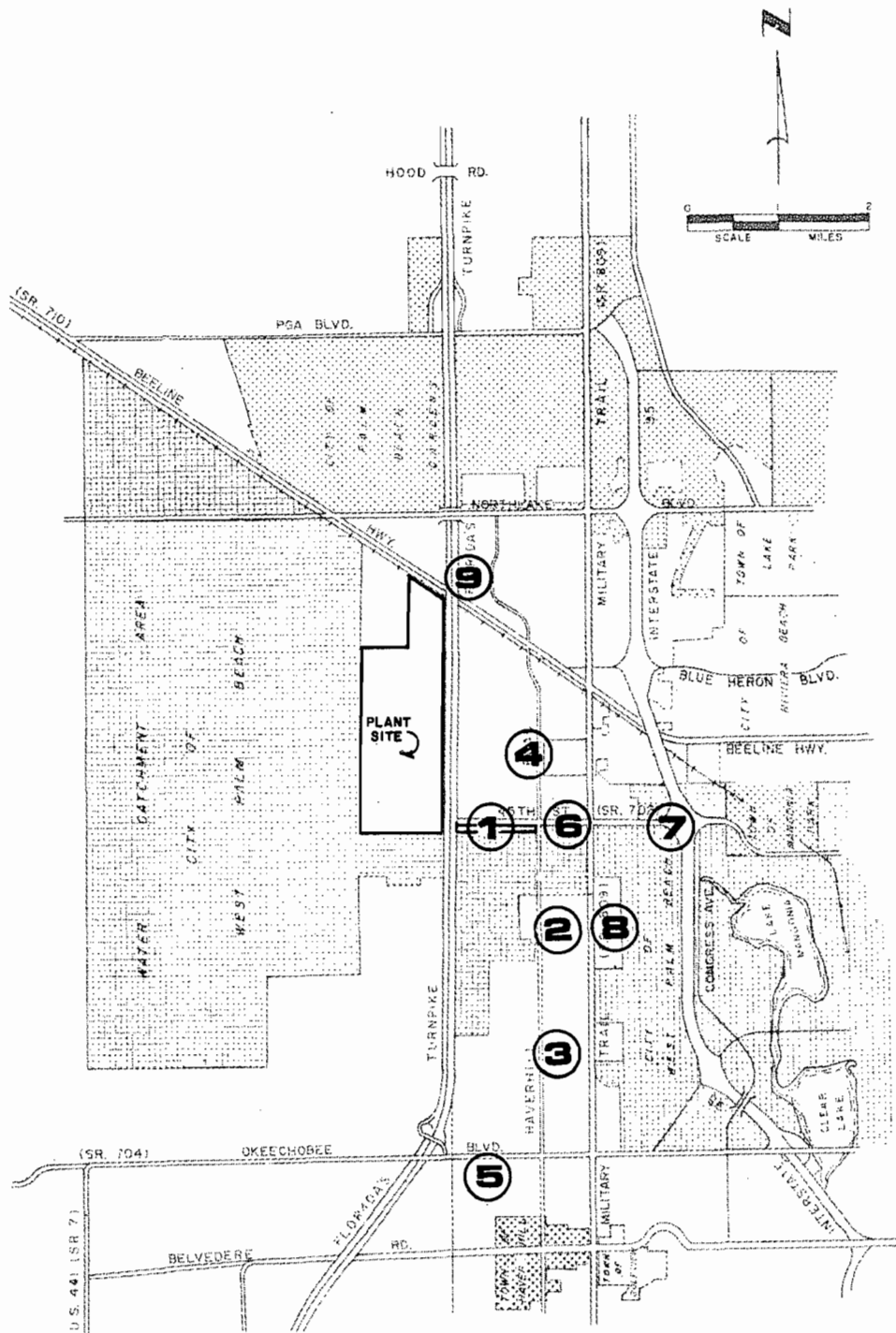
1. The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 PPM is equal to or less than 1.
2. Concentration limits not to be exceeded more than once per year.
3. Since short term concentration limits are not to be exceeded more than once per year, the values presented in column (5) for short short term concentrations reflect the highest values of the second highest concentration measured at the monitoring station.

2.3.8 Noise

An Environmental Noise Study for the Resource Recovery Facility has been completed and is contained in its entirety in Appendix 10.15.

The first phase of the study includes: 1) surveying the area as to land use; 2) identifying noise-sensitive areas; and 3) characterizing existing noise levels for those areas. The noise-sensitive areas are depicted on Figure 2.3-30 and the existing noise level of each is indicated on Table 2.3-16. The characteristics of each of these areas are discussed in Appendix 10.15

The noise levels in the sensitive areas were measured during the daytime hours in order to relate to the anticipated hours during which the facility would be receiving MSW and during which the landfills would be in operation. Noise levels were found to be dominated by the existing vehicular traffic on vicinity roads. None of the existing noise levels exceeded the Federal Highway Administration (FHWA) or Department of Housing and Urban Development (HUD) recommended sound levels.



**PALM BEACH COUNTY
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**AMBIENT NOISE LEVEL
MONITORING LOCATIONS**

FIG. 2.3-30

TABLE 2.3-16
AREAS WITHIN THE OVERALL PROJECT AREA WITH
REPRESENTATIVE EXISTING WEEKDAY SOUND LEVELS

	AREA	DISTANCE TO MAJOR ROAD	WEEKDAY SOUND LEVEL LEQ (dBA)
1.	45th St., West of Haverhill	100'	54
2.	Haverhill, 45th to Roebuck	100'	62
3.	Haverhill, Roebuck to South of 12th	100'	60
4.	Haverhill, 45th to Port Road (Bee Line)	100'	58
5.	Okeechobee, Turnpike to Haverhill	100'	65
6.	45th, Military Trail to Haverhill	100'	58
7.	45th, I-95 to Military Trail	100'	63
8.	Military Trail, Roebuck to Port Road (Bee Line)	100'	60
9.	North of Port Road and East of Turnpike	150'	55

2.3.9 Other Environmental Features

2.3.9.1 Transportation

2.3.9.1.1 Existing Conditions

Existing transportation facilities and characteristics in the vicinity of the proposed Resource Recovery Facility were inventoried in order to provide an input needed to define the extent of transportation impacts related to the facility. Data obtained for this analysis included the following:

2.3.9.1.1.1 Roadway Network

The existing principle street and highway system serving the proposed site is depicted on Figure 2.3-31. Major north-south roadways serving the site include I-95, Military Trail, Haverhill Road, Florida's Turnpike, and a north-south roadway. Major east-west roadways which will serve the site include Blue Heron Boulevard, Beeline Highway, 45th Street, and Okeechobee Boulevard. The cross-section of each of these facilities was determined and the number of through lanes are noted on Figure 2.3-31. In addition to the general cross-section characteristics, critical intersections were inventoried to determine turn lane provisions for capacity analyses which are discussed under Sections 4.6.3 and 5.9.1 of this application.

2.3.9.1.1.2 Traffic Volumes

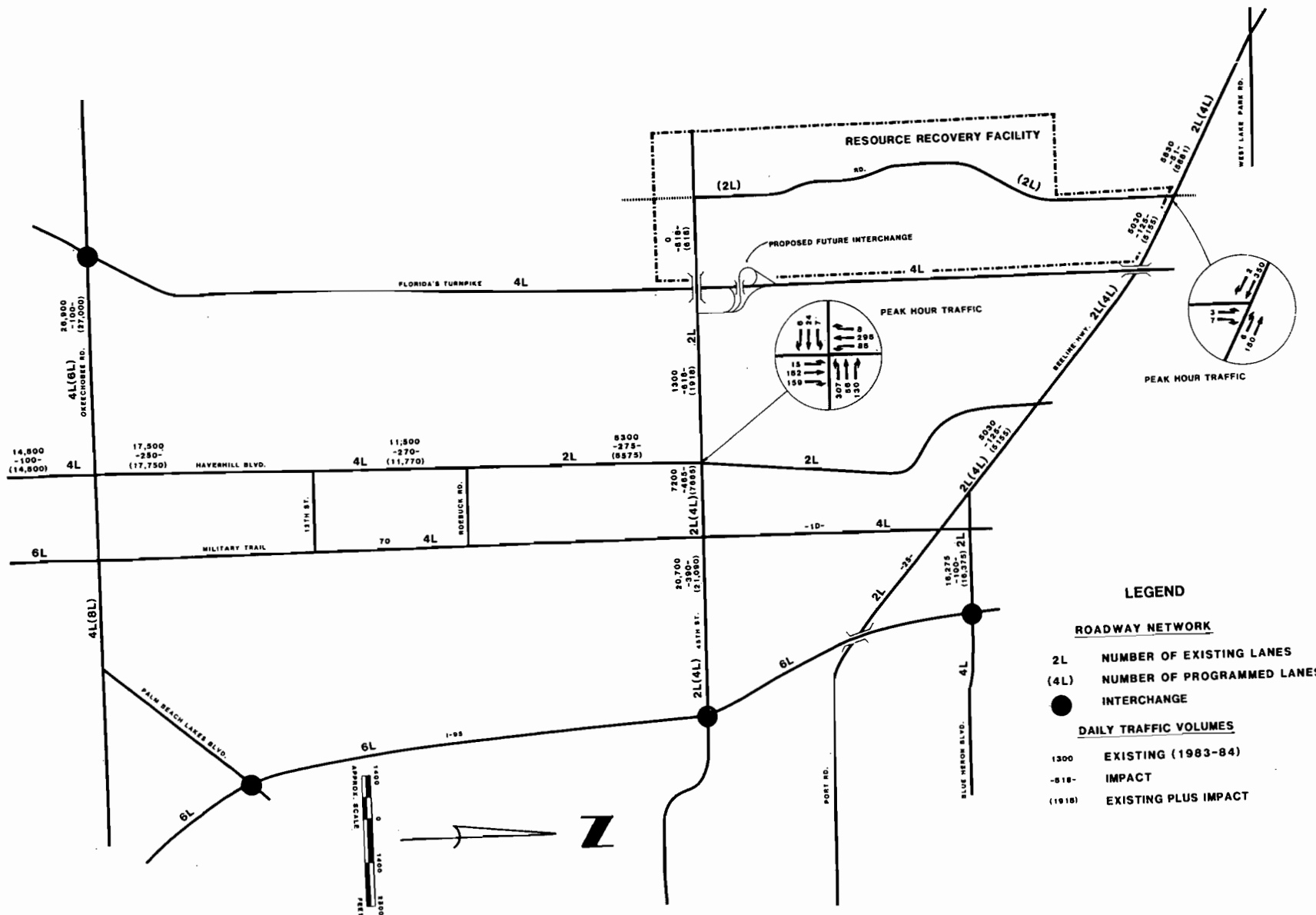
Existing traffic volumes on the roadway network were obtained from Palm Beach County and from field studies performed by Kimley-Horn and Associates, Inc. These data include peak hour (afternoon) intersection turning movements, 1983-84 24-hour traffic volumes and background traffic volumes related to expected area growth (the background traffic volumes were required by Palm Beach County for the zoning application).

PALM BEACH COUNTY
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TRAFFIC ASSIGNMENT

FIG. 2.3 - 31



2.3.9.1.1.3 **Planning Data – Land Use and Development Data**

Land use and development data were provided on a copy of the conceptual plan dated October 18, 1984. The project is scheduled to begin operation in 1989.

In addition, information was provided on the operational characteristics of the proposed Resource Recovery Facility. This included the location of the solid waste transfer facilities and the actual number of trips from each transfer facility, and from the direct haul service area to the Resource Recovery Facility. The solid waste management facility locations are shown on Figure 2.3-32.

2.3.9.1.2 **Future Conditions**

A list of programmed roadway improvements was completed by reviewing the County Transportation Improvement Program which includes funded projects. Travel growth expected in the area also was estimated based on traffic impact analyses required for Palm Beach County Zoning Application related to future conditions include the following:

2.3.9.1.2.1 **Roadway Network**

Several roadway improvements are scheduled, or under construction within the vicinity of the proposed Resource Recovery Facility. Some of these improvements are required to meet existing travel demand, while others will serve the growth that will continue to impact the area. The programmed roadway improvements are depicted on Figure 2.3-31. The only north-south roadway programmed is the construction of a roadway from 45th Street to Beeline Highway through the Resource Recovery Facility site. This will be constructed by the Palm Beach County Solid Waste Authority. Major east-west roadways in the vicinity which are scheduled for improvement include Okeechobee Boulevard (4 lanes to 8 lanes and 6 lanes), 45th Street (2 lanes to 4 lanes), and Beeline Highway (2 lanes to 4 lanes). The limits of these improvements are depicted on Figure 2.3-31.

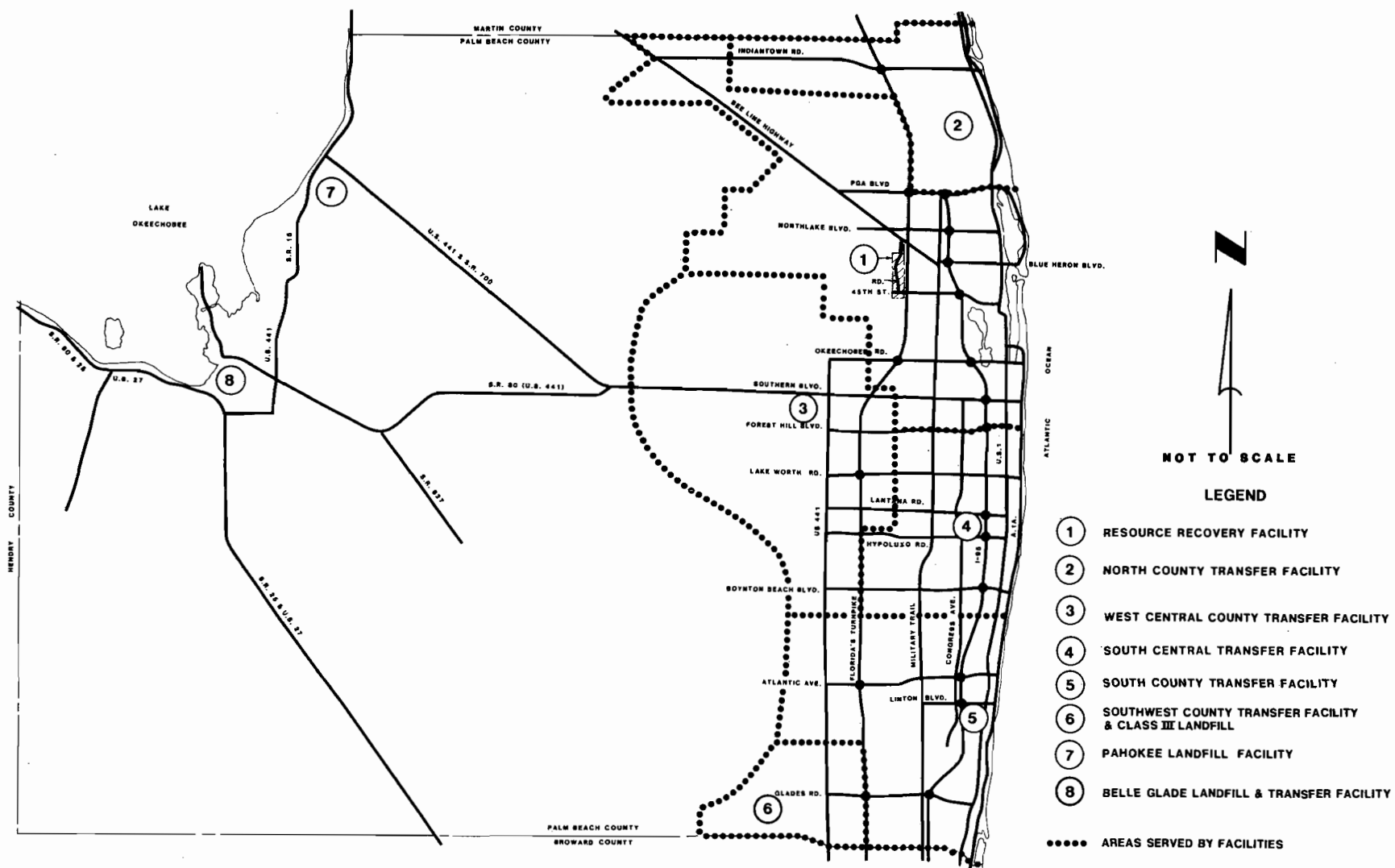
2.3.9.1.2.2 **Traffic Volumes**

Future traffic volumes were estimated based on traffic impact analyses. These analyses are discussed in Chapters 4 and 5 and in Appendix 10.16.

2.3.0.1.2.3 **Land Use Data**

Future land use data related to other growth expected as the Resource Recovery Facility is developed was available from the Palm Beach County Planning Department. These data were used to develop "background traffic volumes" discussed in Appendix 10.16 of this application.

FIG. 2.3-32



2.3.9.1.3 Roadway Capacity Analyses

Using the roadway inventory data, and the traffic volume data traffic capacity analyses were completed to determine the level of service of the roadways which will be impacted by the development of the Resource Recovery Facility. Under existing and "after" conditions, levels of service on the major north-south roadways are as follows:

	Existing	After
I-95	C	C
Military Trail	D	D
Haverhill Blvd.	A to D	B to F
Florida's Turnpike	A	A

while major east-west roadways have levels of service as follows:

Blue Heron Blvd.	C	C
Beeline Highway	C	A to C
45th Street	F	A
Okeechobee Blvd.	D	C

Although the impact of growth expected in the vicinity of the Resource Recovery Facility will mean increased traffic volumes, capacity analyses completed for the programmed improved conditions indicate Levels of Service "A" will be provided at any location where the Resource Recovery Facility will have a significant traffic impact.

Routine inspections of the site will occur as a result of various other monitoring programs. It is anticipated that evaluation of the general ecological conditions of the site will be made coincidentally to these other monitoring programs. Efforts will be made to ensure that individuals making these inspections report any disturbance such as disease or pest outbreaks to appropriate persons in the Solid Waste Authority for corrective measures.

4.5 AIR IMPACT

4.5.1 Landfill Construction

This has been discussed thoroughly in Section 3.4.2.

4.5.2 Resource Recovery Plant Construction

4.5.2.1 Emission Rates

Construction activities have the potential for causing localized, short-term adverse air quality impacts. Possible impacts include: fugitive dust emissions from land clearing and site preparation activities, and mobile source emissions from construction at the construction site.

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

The emissions from present construction across the Turnpike at the Dyer Boulevard Landfill site for expansion and closure would approximate what might be expected at the new site, and therefore not further degrade air quality in the general area.

4.5.2.2 Mitigating Measures for Particulate Emissions

The construction site is located in an attainment area. The emissions are expected to have a short term impact that are typical of those found with other construction activities.

Construction requirements for fill and concrete will result in truck traffic along the site access road. This makes the unpaved roads a source of particulate matter. Several mitigating measures are available to reduce these emissions. Routine watering of the roadway will provide a reduction of roadway emissions of about 50 percent. A watering truck is usually on site for various other activities. Partial dedication of this truck or the addition of a second truck will be accomplished. Surface treatment with penetrating chemicals would provide a 50 percent reduction depending on the frequency of application. The application of penetrating chemicals is more costly than a routine watering but fewer applications are required. The purchase of chemicals, time to mix the chemicals, and the partial use of a watering truck or some other vehicle would contribute to the cost. Soil stabilization alone

can achieve a 50 percent emission reduction by binding up surface soil. The advantage to soil stabilization is that the roadway becomes more drivable. Soil stabilization is done once, as soon as the roadway is developed. Additional emission reductions could be obtained if oil or penetrating chemicals were spread over the stabilized area. Paving achieves the greatest reduction in emissions, 85 percent, and represents the most stringent emission limitation. Road paving can be done either by soil compaction and adding base coarse material or by soil stabilization with an asphalt cap, whichever is most appropriate for the site. Good construction practice requires a developed access road for the number of trucks hauling fill. Since a road capable of handling heavy trucks must eventually be built, any dust control measure less than building the access road up to base coarse level would have to be torn up. Thus the development of the access road is not an excess cost but part of good construction, its early construction is cost effective, and is the recommended method for reducing particulate emissions.

General site emissions, particulate emissions across open and active construction areas, are best controlled by a comprehensive watering program. This method can reduce emissions by 50 percent. Other methods used to control emissions are not practical because soil is usually in a state of transition. An excessive amount of penetrating chemicals would be required and binding agents would continually be broken up. However, since a watering truck is available onsite for other construction activities, its added utilization will not represent a significant cost. Completed cut and fill areas which are vegetated or covered with chemical binders can reduce particulate emissions by 65 to 80 percent. Since these areas are not active and would not receive traffic, vegetation can grow undisturbed and chemical binders need only infrequent applications. Embankments brought up to grade and no longer subject to construction activity will be immediately landscaped or vegetated. Till piles or embankments requiring future activity will be treated with a readily available binder. Good site maintenance practice will be observed. Although not quantifiable, covering trucks carrying fill or loose material and watering down the access road can greatly reduce dust problems. The practices are not costly and what extra effort may be required usually is greatly outweighed by the benefits.

4.6 IMPACT ON HUMAN POPULATIONS

The construction of the proposed Resource Recovery Facility will result in both positive and negative effects in the local and regional population. Positive effects are primarily regional in nature and result from construction jobs created, material purchases and tax revenues. The next section presents a review of potential negative effects on human populations.

4.6.1 Sensitive Receptors

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

As indicated in Section 3.2 major land uses adjacent to the project site include wetlands, residential, light industrial and the existing Dyer Boulevard Landfill. Only the residential areas and the City of West Palm Beach Water Catchment Area (WCA) are considered sensitive receptors for the purpose of this analysis.

There are three residential areas within one mile of the proposed landfill, none within one mile of the proposed resource recovery plant. The Grier property, bordering the site on the northwest, contains two homes, neither of which is within one-half mile of the proposed landfill. Each is at least 7,000 feet from the proposed plant. The Steeplechase/Horseshoe Acres development lies to the northeast of the proposed site, the closest home lying barely within a mile of the northern edge of the proposed landfill and 2 miles from the proposed plant location. The Gramercy Park development lies 3,000 feet to the east of the southernmost section of the proposed landfill and approximately 6,000 feet from the proposed plant. The WCA lies 3,000 feet west of the proposed landfill and approximately 2,300 feet west of the proposed plant.

There are no schools, hospitals, churches or other potentially sensitive institutions or activities within the site vicinity.

4.6.2 **Work Force**

4.6.2.1 **Resource Recovery Plant**

The total construction work force for the plant is expected to average 160 for the 36 months of the plant construction. The lowest work force of 50 will be in place during the initial phase of construction while peak levels of work force are expected to be 350 to 400 during critical stages of construction. It is estimated that up to 700 to 800 different jobs will be available during the project period. The estimated levels of work force over the duration of the Resource Recovery Facility construction are indicated on Figure 4.6-1.

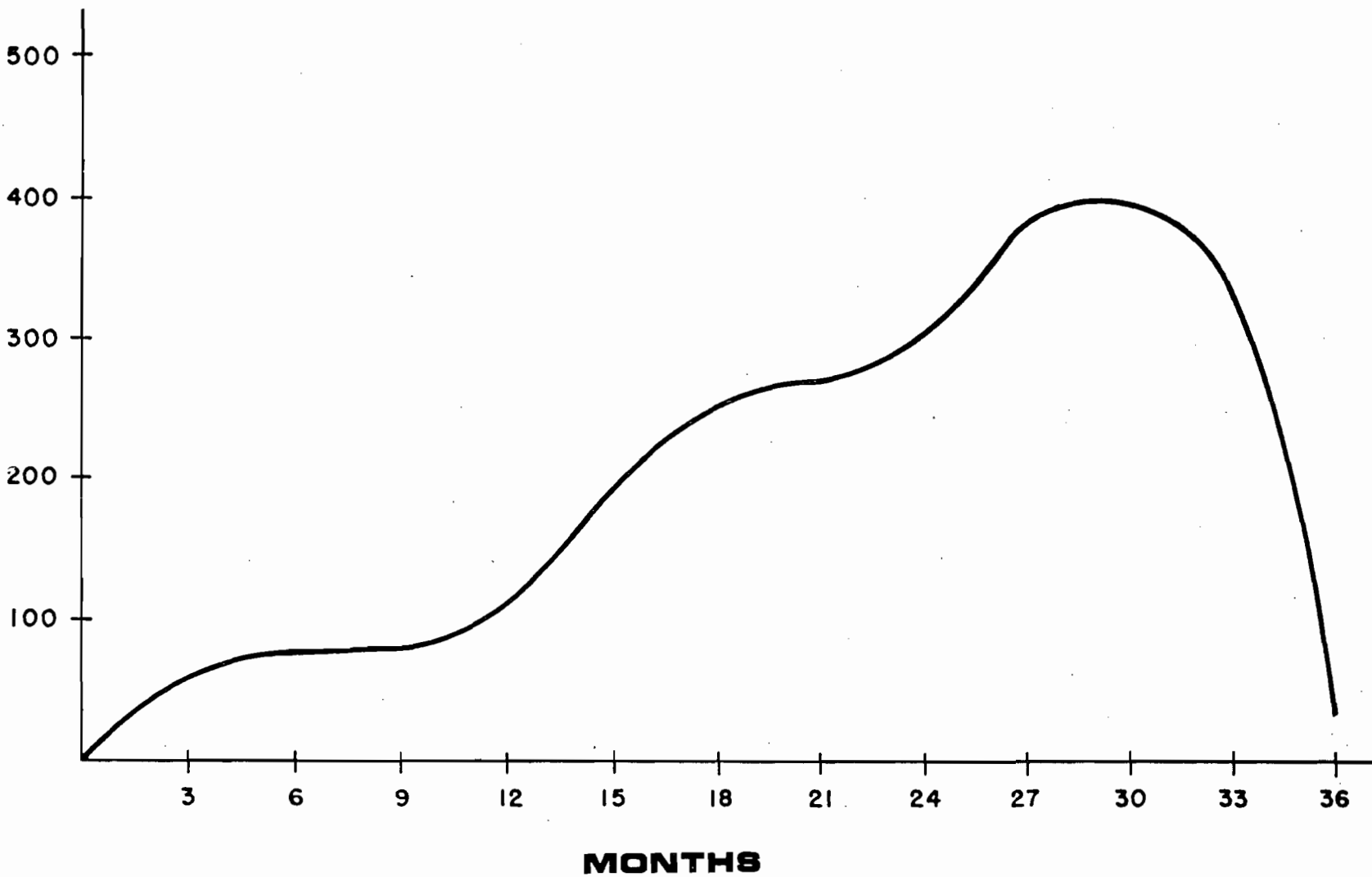
4.6.2.2 **Landfill**

The landfill work force will remain fairly consistent throughout the life of this facility, with land clearing, excavation, access road construction, cell construction and closeout, all continuing on a regular basis throughout the life of the landfill. The landfill workers are included in the work force estimate during the construction of the plant in order to accurately represent the total work force during that period.

4.6.2.3 **Workshifts**

The majority of activities required for the construction of the resource recovery facility will take place on an eight hour per day, five days a week schedule. Dewatering and continuous placement of concrete may be required on a 24 hour basis for short periods, based on final design and the method of construction being utilized. All remaining construction activities will be conducted on an eight hour per day basis.

PERSONNEL



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



ESTIMATED WORK FORCE
DURING CONSTRUCTION

FIG. 4.6-1

4.6.2.4 Work Force Revenues

The construction of the Resource Recovery Facility will provide the economic benefits of a \$200,000,000 construction project to the area. Direct economic benefits include jobs for the construction of the facility and for the manufacturing of capital items to be installed in the facility. Indirect economic benefits include increased earnings and jobs for the companies providing materials and services to the firms actually involved in the construction.

4.6.2.5 Work Force Availability

Most of the personnel requirements for the construction of the proposed facility will be met by the available labor pool in Martin, Palm Beach, and Broward Counties. No significant relocation of construction workers and their families is expected. Therefore, no impact on housing, schools or other community support assets is expected.

4.6.3 Traffic Associated with Construction

Construction of the Resource Recovery Facility will impact the level of traffic at the site access located on 45th Street, but it will not result in a significant traffic impact on 45th Street between the site and I-95. However, levels of service along this route will improve due to the programmed four-laning.

The traffic impact of construction is associated with the number of vehicles which will enter and exit the facility site per day over the duration of construction. The four general categories of traffic which will enter and exit the site include vehicles associated with the general work force, delivery of construction equipment, construction materials, and equipment for installation. The traffic anticipated on the peak days during construction will not exceed 200 vehicles per day. This will result in a less than significant traffic impact. Capacity analyses completed for the full operation facility indicated acceptable levels of service can be made with impacts almost four times as great as during construction (Section 5.9.1). Therefore, the traffic impact of site construction will not affect the area.

4.7 IMPACT ON LANDMARKS AND SENSITIVE AREAS

There are no landmarks or sensitive areas within the limits of the site. None of the areas identified in Section 2.2.1 or 2.2.5 will be impacted by site preparation, or plant and associated facilities construction.

4.8 IMPACT ON ARCHAEOLOGICAL AND HISTORIC SITES

No archaeological or historic sites were identified in the DAHRM survey of the site and vicinity (Section 2.2.6). It is highly unlikely that any significant, unrecorded sites exist in the vicinity. No impact to archaeological or historic sites will result from site preparation of construction.

In the unlikely event an undiscovered site exists, the routine supervision and inspection of construction will reveal it. If a site is found, DAHRM will be notified and necessary measures taken to assure conservation of the site until an assessment of its nature can be made.

4.9 SPECIAL FEATURES

The fill to achieve design elevations for the landfill and resource recovery plant will be dredged from dredge lakes planned on the site. It is not anticipated that the dredge operation will adversely effect ground water.

During construction certain quantities of solid and liquid waste will be generated. This waste may take the form of discarded packaging materials, refuse produced by construction workers, earth spoils, sanitary wastes, or waste oils. Proper handling (Section 4.1.1.1) and disposal of these wastes on site will maintain the aesthetic and ecological integrity of the site and surrounding areas.

4.10 BENEFITS FROM CONSTRUCTION

The primary benefits from construction of the proposed Resource Recovery Facility are related to the employment of construction workers (and, therefore, the creation of jobs) and the benefits to personal income due to work force revenues. These benefits are discussed in Section 4.6.2.

Moreover, site preparation and construction of facilities will benefit the groundwater resource to the extent that 53 acre-feet of water per year will be salvaged from the existing water-table evapotranspiration and become available in the shallow aquifer.

4.11 VARIANCES

No variances from standards or guidelines are anticipated.

in a filtration capacity. Water storage within the volume to be excavated will increase five-fold by virtue of the borrow lakes created. The long-term effects will be some reduction in soil filtration benefits while the short-term availability of water will be substantially increased due to the increase in water stored in the borrow lakes. (Sections 4.3 and 5.3.)

The creation of hard surfaces on landfills and roadways will permanently reduce the water-table evapotranspiration rate and concomitantly increase groundwater availability on the site to a minor extent. (Section 4.3.)

The money spent to obtain permitting, purchase land, finance and construct the Resource Recovery Facility represents an irreversible commitment. However, as discussed in Chapters 1 and 7, this project is probably less costly and certainly poses less danger to Florida's environment than would a continued commitment to dispose of all of Palm Beach County's municipal solid waste by traditional sanitary landfilling. Therefore, the money spent of this project will be, to a great extent, an investment in our future.

5.12 VARIANCES

It is not expected that any variances from applicable standards will be sought in connection with the operation of the facility.

Recently the Florida Electric Power Coordinating Group set up the Florida Electric and Magnetic Field Science Advisory Commission to evaluate the potential for adverse effects of exposure to electro-magnetic fields associated with power transmission lines. The report of the Advisory Commission, which was submitted March, 1985, addressed only lines 230 kV and above. After a full review of available scientific evidence by its members, the Commission concluded that "It is unlikely that human exposure to 60 Hertz electric and magnetic fields can lead to public health problems". The Commission further recommended the "Florida Utilities should adhere to the National Electrical Safety Code or to an equivalent State Code".

In view of the findings of this Commission and due to the fact that the transmission line is only 138 kV and will be constructed primarily on Solid Waste Authority's property, the transmission line should not present a health hazard.

6.1.10.2 Electrical Discharges

Another area of concern is the occurrence of electrical discharges along the transmission line causing the production of corona (an avalanche of ionization and air surrounding the line which in turn may produce ozone, audible noise, and radio frequency noise). Modern transmission line design incorporates techniques which reduce corona effects to a minimum.

6.2 ASSOCIATED LINEAR FACILITIES

There are no other linear facilities extending over mile from the main site.

CHAPTER 9: COORDINATION

Site selection, rezoning and preparation of this application for the proposed Resource Recovery Facility has necessitated coordination with individuals and private firms as well as federal, state, regional, county and local governmental agencies. Assistance and information has been provided to the Palm Beach County Solid Waste Authority and to the members of the engineering consulting team.

Table 9-1 lists the individuals and agencies with which coordination was accomplished and the primary topic of coordination.

Table 9-2 lists the lead members of the consulting team and their responsibilities in connection with this project.

TABLE 9-1

Federal		
Agency	Individual	Subject
United States Fish and Wildlife Service Post Office Box 2676 Vero Beach, FL 32961	Bob Pennington Joe Carroll Joe Johnston	Environmental/Ecological Environmental Effects of Facility
United States Army Corps of Engineers, Miami	Mike Slayton	Wetlands
United States Army Corps of Engineers, Stuart	Chris Dowling	Wetlands
United States Army Corps of Engineers, Jacksonville	Marie Grigsby John Adams	Wetlands
United States Environmental Protection Agency, Atlanta	Eric Hughes	Wetlands
United States Geological Survey, Miami	Ellis Dunskey	Surface Water Management Plan
State		
Agency	Individual	Subject
Florida Department of Environmental Regulation West Palm Beach	Larry O'Donnell Steve Burian Joe Lurix John Guidry	Ecology Surface Water Management Plan Wetlands

State (Continued)

Agency	Individual	Subject
Florida Department of Environmental Regulation Tallahassee	Mike Nagy	Ecology Surface Water Management Plan Wetlands
Florida Game and Freshwater Fish Commission, West Palm Beach	Biff Lampton	Ecology
Florida Game and Freshwater Fish Commission, Vero Beach	Steve Lau	Ecology
Florida Department of Transportation, Tallahassee	Claude White	Turnpike Access
Florida Turnpike Authority	Sam Roddenberry	Turnpike Access

Regional

Agency	Individual	Subject
South Florida Water Management District Post Office Box V 3301 Gun Club Road West Palm Beach, FL 33402 (305)686-8800	Charles W. Pemble, P.E. Richard S. Tomasello, P.E. Charles A. Padera Bill Hellfrich Sally Lockhard	Surface Water Management Plan Wetlands

County

Agency	Individual	Subject
Palm Beach County Planning, Zoning & Building Div. 3400 Bevedere Road West Palm Beach, FL 33406 (305)471-3500	Robert E. Basehart Patsy McKernan John Lehner Pat Bush	Rezoning
Palm Beach County Health Department 901 Evernia Street West Palm Beach, FL 33401 (305)837-3052	Frank J. Gargiulo, P.E.	Water & Sewer Services, Rezoning
Northern Palm Beach County Water Control District 5725 Corporate Way, Suite 203 West Palm Beach, FL 33407 (305)471-4105	Peter L. Pimentel	Surface Water Management Plan Drainage Outfall

Local

Agency	Individual	Subject
City of West Palm Beach	Richard Simmons, City Manager Allan Frefry	Water Catchment Area

Private Firms		
Agency	Individual	Subject
Babcock & Wilcox 400 S. Tyson Street Charlotte, NC 28285 (704) 334-4742	Dennis Williams	Operation of Resource Recovery Plant
CSI Resource Systems, Inc. 88 Broad Street Boston, MA 02110 (617)542-3070	Clovis Pendergast, P.E. Richard D. Larson, P.E. James J. Binder, P.E.	3rd Party Review
Florida Power & Light Co. Distribution Engineering Department Post Office Box 529100 Miami, FL 33152	Robert H. Stevens, P.E.	Electrical Power Transmission Route
Foster Wheeler 110 South Orange Avenue Livingston, NJ 07039 (201) 533-3231	Walter Murray	Operational Characteristics of RDF/Combustion Plant
Resources Recovery (Dade County), Inc. Post Office Box 524056 Miami, FL 33152 (305)593-7000	Brian Rundle James H. Todd	Operational Characteristics of RDF/Combustion Plant — Noise
Southern Bell Engineering Division 715 South Dixie Highway West Palm Beach, FL 33401	Kirt Danielson	Utility Easement
Mock, Roos & Associates, Inc. 5720 Corporate Way West Palm Beach, FL 33407	Mark Williams Alan Wertepny	Drainage Outfall

TABLE 9-2
MEMBERS OF CONSULTING TEAM

Agency	Individual	Responsibility
Barker, Osha & Anderson, Inc. 860 U.S. Highway One Suite 202 North Palm Beach, FL 33408 (305)626-4653	Sumpter(Sam)H. Barker,P.E. Michael Schenk, P.E. Mic Jackson, Ph.D.	Project Director Project Manager Editor
Hayden/Wegman, Inc. 5114 Okeechobee Blvd. Suite 2-B West Palm Beach, FL 33417 (305)471-0444	Gary L. Smith, P.E. Stanley G. Timmerman Lou Terracciano, P.E.	Plant Design Air Quality Analysis

TABLE 9-2 (Continued)
MEMBERS OF CONSULTING TEAM

Agency	Individual	Responsibility
York Services, Inc. 1 Research Drive Stamford, CT 06906 (203) 325-1371	Edward Kaplin, Ph.D.	Air Quality Analysis
Post, Buckley, Schuh & Jernigan, Inc. 889 North Orange Ave. Orlando, FL 33801-1088 (305)423-7275	David Deans, P.E. Albert R. Capellini, P.E. Carolyn Kulwicki	Landfill Design, Surface Water Management Plan Conceptual Plan
Geraghty & Miller, Inc. 2700 PGA Boulevard Suite 104 Palm Beach Gardens, FL 33410 (305)694-0300	Vincent P. Amy Paul Jakob James A. Wheatley	Geohydrological Analysis Injection Well Design
Joyce Environmental Consultants, Inc. 619 Industrial Street Lake Worth, FL 33461 (305)582-4317	Robert D. Blackburn, Ph.D. Marc C. Bruner, Ph.D.	Environmental/Ecological
Kimley-Horn & Associates, Inc. 5800 Corporate Way West Palm Beach, FL 32407 (305)683-5500	James R. Zook, P.E.	Traffic Analysis
Dunn & Associates, Inc. P.O. Box 2408 Boca Raton, FL 33427-2408 (305)487-6898	Stanley E. Dunn, Ph.D. Joseph M. Cuschieri, Ph.D.	Noise Analysis
GBS Architects 1080 E. Indiantown Rd. Suite 205 Jupiter, FL 33458 (305)747-6330	George Gentile, A.S.L.A. Don E. Hearing, A.S.L.A.	Site Plan; Landscaping
Burke & Chappell Engineers, Inc. 2324 S. Congress Avenue West Palm Beach, FL 33406 (305)968-4800	Tom Chappell, P.E.	Transmission Corridor Coordination with FP&L
Gibson & Adams Professional Association Florida National Bank Bldg. 303 First St., Suite 400 West Palm Beach, FL 33402-1629 (305)655-8686	Herbert C. Gibson, Attorney at Law James M. Adams, Attorney at Law	Legal Assistance

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State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To: <u>Tom ROGERS</u>	Locn.: <u>BAQM-TLH</u>	
To: _____	Locn.: _____	
To: _____	Locn.: _____	
From: _____	Date: _____	
Reply Optional ☐	Reply Required ☐	Info. Only ☐
Date Due: _____	Date Due: _____	

TO: Power Plant Siting Review Committee
FROM: Hamilton S. Oven, Jr., P.E. *HSO*
DATE: June 18, 1985
SUBJECT: Palm Beach County Resource Recovery Project
Power Plant Siting Certification Application
PA 84-20

Please review the attached power plant siting application from Palm Beach County for completeness (as opposed to sufficiency) and provide me with your comments by the morning of July 2, 1985. There will be a meeting of the Siting Review Committee to discuss the application at 1:30 on July 2, 1985, in Room 518 (Division of Permitting Director's Conference Room).

HSOjr/sb

Attachment

Distribution:

Tom Rogers, BAQM (+1 extra)
Ed Svec, BAQM
Don Kell, Groundwater
John Reese, Solid Waste
Larry Olsen, Biology
Don White, South Florida District (7 copies)
Julie Cobb, Office of General Counsel
Debbie White, Standard Form Permitting
George Baragona, Engineering Support

APPENDIX 10.1

FEDERAL PERMIT APPLICATIONS OR APPROVAL

DER
JUN 19 1985
BAQM

APPENDIX 10.1.5

PREVENTION OF SIGNIFICANT DETERIORATION

DER
JUN 19 1985
BAQM

PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE-TO-ENERGY FACILITY

REPORT ON AIR QUALITY IMPACTS ANALYSIS

November, 1984

Revised: March, 1985

PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE-TO-ENERGY FACILITY
REPORT ON AIR QUALITY IMPACTS ANALYSIS

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PALM BEACH COUNTY SOLID WASTE AUTHORITY
SOLID WASTE-TO-ENERGY FACILITY
REPORT ON AIR QUALITY IMPACTS ANALYSIS

1.0 INTRODUCTION

The Palm Beach County Solid Waste Authority (PBCSWA) intends to construct a Resource Recovery Facility designed to convert 2000 tons per day (tpd) of municipal solid waste (MSW) into electricity for sale to the Florida Power and Light utility grid. This report describes the technical analyses that have been performed to determine the air quality impact of the proposed facility. Such analyses are required as a condition for obtaining a permit to construct and operate facilities that may emit air pollutants. The analyses reported upon herein have been performed in accordance with the requirements and specifications of the Florida Department of Environmental Regulation (FDER) and the United States Environmental Protection Agency (EPA).

This section of the report contains a brief description of the proposed facility, its location, the study area for air quality impacts produced by the proposed facility, and the current attainment status of the air quality standards in the study area. Section 2.0 provides a discussion of how state and federal laws and regulations regarding prevention of significant Deterioration (PSD) in air quality apply to the proposed facility. Section 3.0 is the analysis of the Best Available Control Tech (BACT). In Section 4.0, the pollutants that will be emitted by the proposed facility are identified and the pollutant emission rates are quantified. Section 5.0 presents a discussion of the dispersion modeling analyses that have been performed to determine the air quality impacts of the proposed facility and provides a detailed review of modeling results. Section 6.0 is a summary and conclusions of this report regarding the air quality impact of the proposed Palm Beach County Solid Waste-to-Energy Facility. Section 7.0 provides references utilized for this report.

1.1 Source Description

The initial Resource Recovery Facility construction involves the installation of 2000 TPD of MSW processing capacity. Within 5 years of initial construction an additional 1000 tpd of MSW processing capacity is planned. Accordingly, the PBCSWA and its consultants considered it prudent to file for permits for the ultimate plant capacity of 3000 tpd of MSW.

The MSW will be processed from 4500 Btu/lb heterogeneous MSW into a more homogenous 6200 Btu/lb Refuse Derived Fuel (RDF) in an RDF Manufacturing Facility located on a common site with the combustion facility. Table 1-1 provides a breakdown of MSW components and heating values. Table 1-2 provides a breakdown of RDF components and heating values. 1800 tpd₇ of RDF will be produced by the RDF Manufacturing Plant from the 3000 tpd₆ of MSW.

1.2 Source Location

The proposed waste-to-energy facility for Palm Beach County will be located on a 1320 acre parcel of land bounded on the north by the Beeline

Highway; on the south by 45th Street; on the east by the Florida Turnpike; and on the west by the West Palm Beach Water Catchment Area. The ground elevation at the proposed site is 17 feet above mean sea level as are the surrounding areas of the county.

1.3 Study Area

The land surface of Palm Beach County slopes gently to the south. Highest general elevations (approximately 25 feet above mean sea level) occur near the north county line. The southern Everglades have the lowest base level elevations at approximately 11 feet above mean sea level.

The proposed combustion facilities stack is located approximately 2600 ft to the west of the Florida Turnpike and 3300 ft to the north of 45th Street. Since the proposed waste-to-energy facility is subject to PSD regulations (see Section 2.0) the area considered as the study area for the air quality analyses included all PSD Class I areas located within a radius of 100 kilometers (62 miles). For PSD Class II, all areas within a radius of 50 kilometers (31 miles) comprise the study area, until a lesser radius of significant impact from the proposed source is determined. No PSD Class I area is located within the study area. Everglades National Park is the closest PSD Class I area and is located about 120 km to the southwest. Therefore the study area has been limited to 50 km radius and visibility analysis is not required pursuant to PSD regulations.

1.4 Air Quality Standard Attainment Status in the Study Area

The study area includes Palm Beach and Martin Counties. Air quality monitoring in Palm Beach County is performed by the Palm Beach County Health Department.

Based on the most recent information available (Palm Beach County Health Department's Annual Report Dated 1983), Palm Beach County is in attainment with all NAAQS standards. However, EPA does not consider the County to be in compliance with regard to ozone in spite of the monitoring data until EPA completes their own ozone monitoring program which is presently ongoing. Martin County has been assumed to be in compliance pending FDER information to the contrary.

HAYDEN-NEWMAN /
BARKER, OSHA & ANDERSON
ENGINEERS - PLANNERS

TABLE 1-1

PALM BEACH COUNTY SOLID WASTE COMPOSITION STUDY

ANALYSIS AND COMPOSITION OF MUNICIPAL SOLID WASTE (MSW)
PERCENT BY WEIGHT

COMPONENT	MOISTURE	INORGANIC	CARBON	HYDROGEN	OXYGEN	NITROGEN	CHLORINE	SULFUR	TOTAL	HHV BTU/LB
CORRUGATED BOARD	1.42	0.11	1.86	0.26	1.79	0.01	0.01	0.01	5.46	315.
NEWSPAPER	4.91	0.25	5.98	0.76	5.19	0.02	0.02	0.03	17.16	1017.
MAGAZINES	0.75	0.42	1.06	0.15	1.05	0.00	0.00	0.01	3.44	178.
OTHER PAPER	5.57	1.64	5.85	0.81	5.40	0.06	0.11	0.03	19.46	989.
PLASTICS	1.09	0.62	4.09	0.56	0.58	0.06	0.22	0.02	7.24	839.
RUBBER, LEATHER	0.19	0.44	0.84	0.10	0.22	0.03	0.10	0.02	1.94	164.
WOOD	0.13	0.02	0.34	0.04	0.29	0.00	0.00	0.00	0.83	58.
TEXTILES	0.40	0.07	1.33	0.18	0.97	0.11	0.01	0.01	3.07	235.
YARD WASTE	0.56	0.10	0.24	0.03	0.18	0.01	0.00	0.00	1.11	40.
FOOD WASTE	1.10	0.33	1.17	0.17	0.84	0.07	0.02	0.00	3.71	213.
MIXED COMBUSTIBLES	8.81	1.31	3.74	0.52	2.96	0.09	0.06	0.03	17.52	653.
FERROUS	0.11	5.15	0.08	0.01	0.08	0.00	0.00	0.00	5.43	14.
ALUMINUM	0.04	1.71	0.03	0.00	0.03	0.00	0.00	0.00	1.80	5.
OTHER NON-FERROUS	0.01	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.32	1.
GLASS	0.23	11.17	0.06	0.01	0.04	0.00	0.00	0.00	11.51	9.
TOTALS	25.30	23.64	26.65	3.61	19.61	0.46	0.55	0.17	100.00	4728.

HEAT VALUE AS RECEIVED (25.3% H₂O) = 4728; HEAT VALUE OF DRY SOLIDS = 6329; HEAT VALUE OF COMBUSTIBLES = 9261.

TABLE 1-2

PALM BEACH COUNTY SOLID WASTE COMPOSITION STUDY

TYPICAL ANALYSIS AND COMPOSITION OF REFUSE DERIVED FUEL (RDF)
PERCENT BY WEIGHT

COMPONENT	RECOVERY RATE (%)	MOISTURE	INORGANIC	CARBON	HYDROGEN	OXYGEN	NITROGEN	CHLORINE	SULFUR	TOTAL	HHV BTU/LB
CORRUGATED BOARD	99.0	1.48	0.17	2.72	0.38	2.62	0.01	0.01	0.02	7.39	461.
NEWSPAPER	99.0	5.10	0.37	8.76	1.11	7.60	0.03	0.03	0.04	23.03	1488.
MAGAZINES	99.0	0.78	0.62	1.55	0.22	1.54	0.01	0.01	0.01	4.72	260.
OTHER PAPER	99.0	5.78	2.39	8.56	1.19	7.90	0.08	0.16	0.05	26.12	1443.
PLASTICS	98.0	1.12	0.90	5.92	0.82	0.84	0.09	0.31	0.03	10.03	1215.
RUBBER, LEATHER	99.0	0.20	0.64	1.22	0.15	0.33	0.04	0.14	0.03	2.76	239.
WOOD	99.0	0.14	0.03	0.50	0.06	0.42	0.00	0.00	0.00	1.16	84.
TEXTILES	98.0	0.41	0.10	1.92	0.26	1.40	0.16	0.01	0.01	4.28	340.
YARD WASTE	85.0	0.50	0.13	0.30	0.04	0.22	0.01	0.00	0.00	1.19	51.
FOOD WASTE	60.0	0.69	0.29	1.04	0.15	0.74	0.07	0.02	0.00	3.01	189.
MIXED COMBUSTIBLES	40.0	3.70	0.77	2.21	0.31	1.75	0.05	0.04	0.02	8.85	386.
FERROUS	7.0	0.01	0.53	0.01	0.00	0.01	0.00	0.00	0.00	0.56	1.
ALUMINUM	35.0	0.01	0.88	0.01	0.00	0.01	0.00	0.00	0.00	0.93	2.
OTHER NON-FERROUS	10.0	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.
GLASS	35.0	0.08	5.78	0.03	0.00	0.02	0.00	0.00	0.00	5.92	5.
TOTALS		20.00	13.66	34.75	4.69	25.40	0.54	0.73	0.22	100.00	6171.

HEAT VALUE AS PRODUCED (20.0% H2O) = 6171.
HEAT VALUE OF DRY SOLIDS = 7714.
HEAT VALUE OF COMBUSTIBLES = 9302.

ASH AS PRODUCED (20.0% H2O) = 13.7%
DENSITY = 2.5 TO 3.5 POUNDS/CUBIC FOOT
SIZE = MINUS 2" X MINUS 2" X MINUS 2"

2.0 REGULATION APPLICABILITY

An air quality impact analysis begins with the determination of which regulations are applicable to the proposed source. The first step in the regulatory analysis is the determination of the applicability of PSD regulations. The issue of applicability involves determining whether the proposed source and its emissions are subject to PSD review and, if so, what analyses must be performed.

PSD regulations are only applicable in areas where National Ambient Air Quality Standards (NAAQS) for a given pollutant are met (or where monitoring is insufficient to determine compliance with NAAQS). In such areas, PSD regulations apply to the construction or modification of major air pollution sources. Although the general concept of an air pollution source is a stack, vent or other emission point, for PSD purposes a source is essentially defined as the aggregate of all such emission points that have the potential to emit a regulated pollutant at a given facility. A source's potential to emit is defined as its design capacity emission rate, after the application of any emission controls or other legally enforceable emission limitations. A proposed new source is considered major if it either falls within one of 28 specific source categories and has the potential to emit 100 tons per year of any regulated pollutant or if it falls in an unspecified source category and has the potential to emit 250 tons per year of any regulated pollutant.

The proposed Palm Beach County waste-to-energy facility falls within one of the 28 categories of sources subject to PSD review. As a municipal incinerator, it will be subject to review because it has the capability of charging more than 250 tons of RDF per day. Because the proposed Palm Beach County waste-to-energy facility will emit more than 100 tons per year of several regulated pollutants (see Section 4.0) it is subject to PSD review and related analyses for those pollutants. For each pollutant emitted at a rate in excess of 100 tons/year, three sets of analyses may be required: one for BACT; one for air quality impacts and one for additional types of impacts.

In some instances, ambient air quality monitoring may be required in support of the air quality impact analyses, but the Florida DER has determined that existing monitoring provides sufficient ambient air quality data for the study area. Air quality impact analyses and additional impacts analyses performed for the Palm Beach County waste-to-energy facility are discussed in subsequent sections of this report.

3.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

The BACT analysis, required by PSD review, addresses energy, economic and environmental impacts for alternative emission control strategies. BACT is defined in the 40 CFR 52.21 as "An emission limitation based on the maximum degree of reduction of each pollutant emitted which the Department, taking into account, energy, environmental and economic impacts and other costs, determines on a case by case basis, is achievable through application of production processes and available methods, systems, and techniques, for control of each pollutant".

Technical feasibility is the important first step in this analysis. A technically feasible control technology is one that has been demonstrated to function on identical or similar processes in the U.S.

Once technically feasible control alternatives have been established, they are ranked by their environmental, economic and energy consumption impacts. The starting point for this process is a "base case" control level which is specified by the standard and regulations that would apply in the absence of PSD. They typically include New Source Performance Standards (NSPS).

Table 3-1 lists the air emissions for which an evaluation for BACT was conducted and control alternatives which are considered for the control of each of the pollutants. The air pollutants and the emission levels for which BACT must be determined are shown in Table 3-2.

TABLE 3-1

BACT POLLUTANTS AND CONTROL ALTERNATIVES

Air Emission Parameter	Control Alternatives
Particulate, Lead, Beryllium & Particulate Mercury	Electrostatic Precipitator (ESP) Fabric Filter Dry Scrubber
Sulfur Dioxide, Hydrogen Fluoride, Hydrogen Chloride & Gaseous Mercury	Dry Scrubber
Nitrogen Oxide	Amonia Injection Catalytic Reduction Design and Operating Procedures
Carbon Monoxide	Design and Operating Procedures

This BACT evaluation of the above described control alternatives considered their technical feasibility, energy usage and certain environmental factors. The proposed units are projected to be on-line approximately 80-85% of the time. Air pollution control equipment must be reliable to minimize contribution to unit downtime. Installation of air pollution control equipment increases the facility cost, but results in benefits to the

surrounding area and pollution. At some point, the cost of air pollution control equipment is not outweighed by the resulting benefits. To this end, the capital, operational and energy costs, were compared to the benefits.

TABLE 3-2
BACT POLLUTANTS AND ANNUAL EMISSIONS

Air Emission Parameter	Tons/Year	Significant
/ Particulate	214	25
/ Sulfur Dioxide	2957.	40
/ Nitrogen Oxide	1314.	~~40~~ 40
/ Carbon Monoxide	3942.	100
/ Lead - <i>No below Significant</i>	0.46 (920 lbs)	1200 lbs
/ Beryllium	0.003 (6 lbs)	0.8 lbs
/ Mercury (particulate & gaseous)	0.98 (1960 lbs)	200 lbs
/ Hydrogen Fluoride	13.2	3
/ Hydrogen Chloride	1150.	—

3.1 BACT for Particulate, Lead, Beryllium and Particulate Mercury

3.1.1 Alternatives Not Considered

A number of technologies have been used to control particulate emissions from incinerators in addition to those listed in Table 3-1. These include venturi scrubbers, cyclone collectors and wet spray chambers. Of these only venturi scrubbers have been remotely capable of controlling particulate emissions to the EPA NSPS mandated level of 0.08 gr/dscf corrected to 12% CO₂. The venturi scrubbers were not considered as a viable control alternative for two reasons:

1. Their performance has been sketchy at best and they have had overall difficulty in satisfying the NSPS control level; and
2. Wet scrubbers produce an aesthetically undesirable water vapor plume. Accordingly, wet scrubbing is considered unacceptable and has been eliminated as a control option.

3.1.2 Fabric Filters (Baghouses)

Baghouses remove particulate by filtering the flue gas stream through a fabric. Actually, most of the effectiveness is attributed to filtering through a mat of particulate which has built-up on the surface of the fabric. Characteristics of baghouses are as follows:

- ° Particulate removal efficiencies as high as 99.8% have been demonstrated on coal fired units.
- ° Variations in flue gas flow rate and particulate composition do not generally effect performance.
- ° Pressure drop through unit is significant resulting in relatively high energy usage by fans.
- ° Available filter materials limit operating temperatures to less than 500°F.
- ° Sparks in flue gas can cause pinhole leaks and even fires within the filter.
- ° Consideration must be given to prevention of corrosion caused by acid gas condensation.
- ° Blinding of filter media.
- ° Experience on resource recovery facilities is very limited.

Although the TSP emission rate would be guaranteed less than 0.01 gr/dscf corrected to 12% CO₂, a baghouse used above is not considered appropriate primarily due to the incidence of fires caused by sparks and the filter media blinding.

3.1.3 Dry Scrubbers

Dry scrubbers are devices which are designed to remove SO₂ and acid gases from the flue gas stream, in addition to particulates. Aqueous solutions of lime are sprayed into the gas stream, which react with the SO₂ and acid gases. Heat from the reaction, and from the flue gas, dry the resultant products, which are then collected in a baghouse. Characteristics of dry scrubbers are the same as those for baghouses, except as follows:

- ° SO₂, acid gases and other flue gas constituents, that may condense with lower exist gas temperatures are controlled.
- ° Sparks in the flue gas are eliminated.
- ° Acid gas corrosion may be less a problem.
- ° Approximately twice as much residue is produced.
- ° Experience on resource recovery facilities is very limited.

Table 3-3 shows estimated costs for a dry scrubber and baghouse system, guaranteed for a TSP emission limit of 0.01 gr/dscf, corrected to 12% CO₂, and guaranteed to remove 70% of the SO₂ and 90% of the HCL in the flue gas stream.

3.1.4 Electrostatic Precipitator

Electrostatic precipitation functions by imparting a negative charge to particulates in the flue gas stream. The particulates are then attracted to positively charged plates, where they are collected. Characteristics of electrostatic precipitators include the following:

- ° Generally capable of particulate removal efficiencies greater than 98% with efficiencies as high as 99.8%.
- ° Can handle high temperature gases of over 600°F in special applications.
- ° Low pressure drop through units resulting in lower energy usage by fans.
- ° Performance is sensitive to actual vs. design flue gas flow rates (actual gas flow must be less than design) and particle resistivity.
- ° Consideration must be given to prevent corrosion caused by acid condensation. Acid mist condensation begins about 250°F.
- ° Recognized as the most reliable and efficient technology on resource recovery systems.

Table 3-4 shows estimated costs for electrostatic precipitators investigated for this project.

TABLE 3-3

DRY SCRUBBER COSTS1. Capital Cost

Capital Cost = Construction Cost x Bonding Factor

= \$5,000,000 x 1.6

= \$8,000,000

Bond Amortized over 20 years @ 11% interest (CRF = 0.12256)

Annual Capital Cost = \$8,000,000 x 0.12256

= \$980,000

2. Operations and Maintenance

a.	Electricity (3.5 million KWH @ 5 cents)	\$175,000
b.	Water (50 gpm @ 0.70/1000 gal)	18,000
c.	Labor (8 men; two per shift @30000)	240,000
d.	O&M (incl. bag replacement) @ 2% of construction cost	100,000
e.	Lime 2000 tpy @ \$150/ton	300,000
f.	Waste Handling & Disposal (5915 TPY TSP; + 2000 TPY Chemicals; + 863 TPY SO ₂ & HCl; @ \$10/ton)	88,000
g.	Reheat Steam (5 MMBTUH @ \$6/MMBTUH)	263,000

Subtotal

\$1,184,000

Total Annual Cost (1. + 2.)

\$2,164,000

TABLE 3-4

ELECTROSTATIC PRECIPITATOR COSTS1. Capital Cost

Capital Cost = \$2,300,000 x 1.6

= \$3,680,000

Annual Capital Cost = \$3,680,000 x 0.12256

(i = 11; n = 20) = \$462,000

2. Operations & Maintenance

a. Electricity (920,000 KWH @ 5¢/KWH) \$46,000

b. O&M (@ 2% of construction cost) 46,000

c. Labor (1/2 man for 4 shifts @ 30,000) 60,000

d. Water - 0 -

e. Chemicals - 0 -

f. Waste Disposal (8366 TPY @ \$10/ton) 84,000

Subtotal \$236,000

Total Annual Cost (1. + 2.). \$698,000

3.1.5 Particulate Lead, Beryllium and Particulate Mercury BACT Selected

An electrostatic precipitator (ESP) with an outlet particulate loading of 0.03 gr/dscf corrected to 12% CO₂ is selected based on analysis of all the control alternatives reviewed.

This selection is based upon the criteria of technical feasibility and the minimization of environmental, economic and energy impacts. Based on the information developed herein the ESP emerges as the alternative which best meets the BACT selection criteria.

3.2 BACT for Sulfur Dioxide (SO₂), Hydrochloric Acid (HCl) and Hydrofluoric Acid (HF)

Because of the low sulfur content of municipal solid waste (approximately 0.2 percent sulfur by weight), there have been no federal standards or regulations (NSPS) promulgated for control of SO₂ emissions from municipal incinerators. Similarly, the State of Florida has not promulgated regulations for control of SO₂ emissions from municipal incinerators.

In regard to control alternatives, control techniques for large sources of SO₂ emissions have been developed for fossil fuel-fired combustion units. These include methods for neutralizing acidic sulfur oxides either in gas-liquid (wet scrubbing) or gas-solid (dry scrubbing) devices. Both techniques produce solid waste by-products: sludge from wet scrubbing and dry ash from dry scrubbing. These technologies, however, have not been applied to large municipal incinerators in the U.S. because of the low sulfur content of municipal solid waste.

In addition to refuse, auxiliary fuel will also contribute to SO₂ emissions. The auxiliary fuel is used during start-up and shut-down. It is expected that auxiliary fuel usage for start-up and shut-down will constitute about 1.25% of heat input to each furnace and that either No. 2 oil (0.25% S) or natural gas (negligible S) will be used as the auxiliary fuel.

3.2.1 Use of Low Sulfur Fuel

SO₂ emissions are a function of the sulfur content in the fuel being burned. Low sulfur fuel is generally considered to have a sulfur content of 2% or less. Historically, fossil fuel burning plants have switched from the firing of high sulfur fuel (3.5 - 7%) to a low sulfur fuel as a means of complying with acid gas source emissions regulations. Since the refuse fuel (and auxiliary fuel) will have a sulfur content of about 0.2%, it is inherently within any current definition for low sulfur fuel. As such, both the federal and state of Florida regulatory authorities have not promulgated air emissions standards for the control of SO₂ from municipal incinerators.

3.2.2 Wet Scrubber Systems

Another technically viable but aesthetically preclusive alternative for SO₂ control is a wet scrubber system for SO₂ and acid gas control. As was mentioned for the particulate BACT analysis, wet scrubbing has been eliminated from consideration due to the dense water vapor plume which is generated (see Section 3.1 A 2. above).

3.2.3 Dry Scrubbers

A control alternative which was previously evaluated for particulate control is the use of a dry scrubber system to control SO₂ and acid gas emissions.

Dry scrubbers operate by injecting droplets of alkali reagent into the flue gas. The resulting reactions remove the sulfur dioxide as sulfites and sulfates in particulate form. The heat generated during the reaction plus flue gas heat evaporates the water carrying the alkali reagent. A bag filter is located downstream to remove the sulfate and sulfite particulates.

Table 3-5 provides comparative costs of controlling particulate and acid gases utilizing an ESP versus a dry scrubber.

3.2.4 SO₂ and Acid Gas BACT Selection

The use of low sulfur auxiliary fuel in conjunction with the inherent low sulfur content of the waste fuel is selected as BACT based on analysis of the viable alternatives.

This choice of alternatives best meets the selection criteria as required by EPA and the State of Florida DER and is consistent with the most recent BACT determinations for resource recovery facilities in other areas of the country.

3.3 BACT for Nitrogen Dioxide

No add-on type controls have been demonstrated for nitrogen oxides (NO_x) emissions from municipal incinerators in the U.S. Good combustion design and practices are the only demonstrated control alternative in the U.S.

The furnace units planned for Palm Beach County will employ advanced combustion systems in which the primary combustion air is added through multiple compartments located underneath the stokers. Uniform mixing of air and burning RDF eliminates high oxygen concentration gradients that favor the formation of NO_x. Secondary combustion air is introduced at high velocity through specially designed nozzles, into the gas stream along the front and rear walls of the combustion chamber. The temperature at the end of combustion chamber can thus be maintained at about 1800-2000°F. Significant NO_x emissions typically occur at temperatures greater than 2000°F.

The environmental impact due to NO_x emissions from the incinerator will not result in a violation of NAAQS.

Good combustion design and practice is proposed as BACT for NO_x.

3.4 BACT for Carbon Monoxide and Volatile Organic Compounds

No add-on type controls have been demonstrated for CO emissions from municipal incinerators. Good boiler design and proper operating conditions are the only effective emission control methodology.

TABLE 3-5

COST COMPARISON OF ELECTROSTATIC PRECIPITATORS VS DRY SCRUBBERS
750 TPD UNIT

	ELECTROSTATIC PRECIPITATOR	DRY SCRUBBER
Emission Limit gr/dscf @ 12% CO ₂	0.03	.01
Removal Efficiency, Percent	99.0	99.9
Capital Cost	\$3,680,000	\$8,000,000
Annual Cost:		
Net Debt Service	\$462,000	\$980,000
Operating and Maintenance Costs	<u>\$236,000</u>	<u>\$1,184,000</u>
Total	\$698,000	\$2,164,000
Unit Cost:		
Per Ton MSW (260,000 TPY)	\$2.69	\$8.32
Per Ton RDF (182,000 TPY)	\$3.84	\$11.89
Per Ton Particulate plus Acid	\$119.00	\$319.00
Incremental:		
Additional Tons Removed	base	917
Additional Annual Cost	base	\$1,508,000
Per Ton Removed		\$1,644
Per Ton MSW (260,000 TPY)		\$5.63
Per Ton RDF (182 000 TPY)		\$8.05

Notes:

- 1 - Particulate Removed annually by each precipitator =
 $21400 \text{ Total Uncontrolled TPY} \times 0.83 \text{ Availability} \times 1 \text{ Unit/3 units} \times .99 \text{ efficiency} = 5861 \text{ TPY removed.}$
- 2 - Particulate removed by dry scrubber =
 $21400 \times 0.83 \times 1/3 \times .999 = 5915 \text{ TPY removed.}$

Table 3-5 (continued)

Notes:

- 3 - Sulfur Dioxide Generated Annually per unit =
2957 Total - Uncontrolled TPY $\times 0.83 \times 1/3 = 818$ TPY
@ 70% control by dry scrubber SO_2 emission = $818 \times 0.3 =$
245 TPY Controlled and 573 TPY removed.
- 4 - HCl and HF Generated Annually per Unit =
 $(1150 + 13.2) \times 0.83 \times 1/3 = 322$ TPY uncontrolled
@ 90% control by dry scrubber = $322 \times 0.1 = 32.2$ TPY controlled
and 290 TPY removed.

The state-of-the-art design of the combustion chamber and the advance temperature control capability inherent in waterwall units will minimize formation of CO and volatile organic compounds (VOC). A continuous CO monitor will assist the plant operators maintain optimum combustion conditions, thereby further reducing CO and VOC formation.

Facility impacts will not cause a violation of NAAQS. Good equipment design and practice plus continuous CO monitors are therefore proposed as BACT for CO and VOC.

4.0 EMISSIONS DATA

The Florida DER requested emission estimates for sixteen pollutants. Six of these are criteria pollutants: 1) particulate; 2) sulfur dioxide (SO_2); 3) carbon monoxide (CO); 4) volatile organic compounds (VOC); 5) nitrogen oxides (NO_x); and 6) lead (Pb). The remaining 10 pollutants included: 7) chlorides (HCl); 8) ozone (O_3); 9) total reduced sulfur (including H_2S); 10) reduced sulfur compounds (including H_2S); 11) sulfuric acid mist; (12) fluorides (HF); 13) vinyl chloride; 14) mercury (Hg); 15) asbestos; and 16) beryllium (Be).

Most of the pollutants are emitted to a certain degree by the proposed Palm Beach County waste-to-energy facility. Ambient concentrations of the criteria pollutants are regulated through the implementation of NAAQS. The NAAQS have been incorporated in their entirety as part of the Florida State Implementation Plan (SIP).

Although no mention was made by the Florida DER of emissions of trace organic compounds, public attention has recently focused on dioxin emissions (2,3,7,8-TCDD) from waste to energy facilities. Therefore the County has voluntarily submitted available data on dioxin emissions.

Emission estimates of the aforementioned pollutants in conjunction with stack and facility operating parameters were then used as input data to an air quality dispersion models to predict facility impacts. These data are described in greater detail in Section 4.1.

Carbon monoxide (CO), as a pollutant, was considered only in terms of emissions potential from the facility itself. Mobile sources associated with the facility activity are negligible since there will be no significant increase in traffic beyond that which already exists in the area.

In order to adequately demonstrate compliance with the NAAQS and PSD increments, it is required that the applicant include in its modeling analysis the pollutant contributions from all existing and PSD sources having a significant impact within the modeling area of the applicant's source. Stack and emissions data for these other sources were developed in conjunction with FDER.

4.1 Emissions Data for the Palm Beach County Waste-to-Energy Facility

Table 4-1 lists the pollutants that will be emitted from the proposed facility. The table shows pollutant emission factors, design capacity emission rates on an annual basis, actual emission rates on an annual basis and design capacity emission rates on an hourly basis.

Emission factors are based on a higher heating value (HHV) of 6,200 Btu/lb for the RDF. Design capacity emission rates are derived from a waste throughput of 2100 tons/day or 766500 tons/year. Actual annual emission rates assume an availability factor of 0.8 and a resulting waste throughput of 613,200 tons/year. These values are totals for three units each rated at 700 tons/day.

Table 4-2 lists stack parameter data, including location coordinates adjacent building dimensions, height, diameter and volumetric flow rate and

temperature for the proposed waste-to-energy facility. For modeling purposes, the three flues in the one proposed stack were treated as a single stack with an inside diameter equal to that of one of the flues. The modeled emission rate for each pollutant was set equal to the sum from the three flues, and the modeled volume flow rates and temperatures were those of an individual flue. These actions ensured that the modeled plume rise was calculated correctly for the proposed stack.

The emission factors contained in Table 4-1 were derived from a detailed investigation of the literature. The criteria used for the emission factor selection included: similarity of the facility design, similarity of the chemical composition of the refuse, reliability of stack tests and availability of data from facilities incorporating state-of-the-art design and air pollution control technology. In the sections which follow, the rationale behind the selection of emission factors for each pollutant listed in Table 4-1 is provided.

4.1.1 Total Suspended Particulate (PM)

The emission factor is based upon the ability of the electrostatic precipitator manufacturer to not exceed a guaranteed grain loading of 0.03 grains/dscf at 12% CO₂. This emission level represents BACT for TSP.

4.1.2 Sulfur Dioxide (SO₂)

The SO₂ emission factor is based upon RDF fuel sulfur content which is assumed to be completely converted to SO₂.

4.1.3 Carbon Monoxide (CO)

Several data bases were investigated to develop an emission factor for CO. The value used was a median value between values cited by California Air Resources Board Report entitled "Air Pollution Control at Resource Recovery Facilities" and vendor information which indicated lower values. The principal reason for the difference is due to excess air design. Most of the spreader stoker furnaces cited by CARB were designed to fire RDF at about 40% excess air. Our investigations have indicated that a prudent operating point for RDF combustion to be at 50% excess air with a design point of 60% to accommodate variations in fuel moisture and heating value.

4.1.4 Volatile Organic Compounds (VOC)

The emission factor for VOC represents the non-methane portion of the total hydrocarbon emissions. Reference literature indicated a wide range of VOC emissions. This wide range is believed to be caused by the low excess air design cited for CO, inability to maintain sufficient temperature (especially those systems which fired pulped RDF which typically had a moisture content of 50% or above) and inadequate combustion controls. The proposed facility will utilize state-of-the-art combustion controls coupled with conservative furnace design in terms of excess air, gas temperature and dwell time to minimize VOC emissions. Accordingly, the VOC emission factor used was selected from mid-range data to provide sufficient conservatism and avoid understating possible facility emissions.

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TABLE 4-1

CONTROLLED EMISSION FACTORS DEVELOPMENT FOR RDF FIRED SPREADER STOKER FURNACES

(ANNUAL AVERAGE BASED ON 1800 TPD RDF FIRED)

POLLUTANT	LBS/TON RDF	LBS/HR	TONS/YEAR	GM/SEC @ 1800 TPD	GM/SEC @ 2100 TPD
CARBON MONOXIDE	12.0	900.	3942.	113.	132
NITROGEN DIOXIDE	4.0	300.	1314.	37.8	44.1
SULFUR DIOXIDE	9.0	675.	2957.	85.1	99.3
CHLORIDES	3.5	263.	1150.	33.1	38.6
VOLATILE ORGANIC COMPOUNDS	.20	15.0	65.6	1.89	2.21
PARTICULATE MATTER	.65	48.8	214.	6.14	7.16
SULFURIC ACID MIST	.0004	.030	.131	.0038	.0044
FLUORIDES	.04	3.00	13.2	.38	.44
LEAD	.0014	.105	.46	.0132	.0154
MERCURY	.003	.225	.98	.0284	.0331
BERYLLIUM	9.0 E-06	6.8 E-04	3.0 E-03	8.5 E-05	9.9E-5
2,3,7,8-TCDD	8.5 E-08	6.4 E-06	2.8 E-05	8.0 E-07	9.3E-7

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TABLE 4-2

STACK PARAMETERS FOR EACH OF THREE SPREADER STOKER FURNACES
(TWO INITIALLY INSTALLED PLUS ONE FUTURE)

	ENGLISH	METRIC
LOCATION		UTM ZONE 17
X-COORDINATE		0585820 METERS EAST
Y-COORDINATE		2960180 METERS NORTH
BASE ELEVATION FOR MODEL INPUT	0.00 FEET	0.00 METERS
STACK DIAMETER	6.69 FEET	2.04 METERS
STACK HEIGHT	250 FEET	76.20 METERS
VOLUMETRIC FLOW		
100% CAPACITY	172377 ACFM	81.4 M3/SEC
75% CAPACITY	124311 ACFM	58.7 M3/SEC
50% CAPACITY	80033 ACFM	37.8 M3/SEC
EXIT VELOCITY		
100% CAPACITY	81.69 FEET/SECOND	24.90 METERS/SECOND
75% CAPACITY	58.91 FEET/SECOND	17.96 METERS/SECOND
50% CAPACITY	37.93 FEET/SECOND	11.56 METERS/SECOND
EXIT TEMPERATURE		
100% CAPACITY	450 FAHRENHEIT	505 KELVIN
75% CAPACITY	415 FAHRENHEIT	486 KELVIN
50% CAPACITY	385 FAHRENHEIT	469 KELVIN

4.1.5 Nitrogen Oxides (NO_x)

The NO_x emission factor was selected from the CARB report and is representative of the upper bound of the median values of the data bases used.

4.1.6 Lead (Pb)

The Pb emission factor was selected based upon detailed analyses conducted during facility permit work by Hayden-Wegman for North Santa Clara County, CA. Data bases provided only sparse information with median values which were either too low or too high to be considered representative of the proposed Palm Beach County project.

4.1.7 Beryllium (Be)

The Be emission factor is based on a weighted average of the values cited by CARB report and Hayden-Wegman for North Santa Clara.

4.1.8 Mercury (Hg)

Hg emission factor is based on the North Santa Clara Report which is higher than other data bases reviewed.

4.1.9 Chlorides (as HCl)

The HCl emission factor is based on North Santa Clara and data reported by Rinaldi, et al.

4.1.10 Fluorides (as HF)

The HF emission factor is based on the median value from the CARB Report.

4.1.11 Sulfuric Acid Mist (H_2SO_4)

H_2SO_4 emission factor is based on data from North Santa Clara, CA. Data bases are very sketchy. The controlled emission is based on 99% removal by the ESP.

4.1.12 Ozone (O_3), Total Reduced Sulfur, Reduced Sulfur Compounds, Vinyl Chloride and Asbestos

No emissions of ozone, total reduced sulfur, reduced sulfur compounds, vinyl chloride and asbestos are expected.

4.1.13 Dioxin (2,3,7,8 Tetra Chloro Dibenzo Dioxin)

The emission factor for 2,3,7,8-TCDD is derived from stack test data taken from Chicago, N.W. facility by the EPA and reported by Cleverly. The reason for using these data are as follows: (a) they represent a direct measurement of flue gas emission, (b) the data have been shown to be comparable to similar measurements made by the Swiss Environmental Agency and to measurements derived from independent analyses from fly ash collected from

U.S. and European waste-to-energy facilities; and (c) the data are conservative in that they show the highest emission rate (of the seven large scale waste to energy facilities for which data are available) for the tetra homologue which contains the isomer of greatest toxicity and concern. The emission factor was calculated from a conservative emission rate of 0.085 ug/sec for the 3000 tons/day Brooklyn Navy Yard facility. It is expected that this emission level will not be encountered at the proposed facility due to excellent combustion controls and auxiliary fuel systems that are designed to maintain exit gas temperatures at a level above the critical threshold where dioxin could be formed.

5.0 AIR QUALITY MODELING ANALYSES

5.1 Model Requirements

5.1.1 Determination of Worst-Case Load Conditions

A pollutant source does not generally operate or emit pollutants at a constant rate. Most facilities, particularly waste-to-energy facilities, operate at variable rates depending on supply and demand, weekday versus weekend or day versus night work schedules or other factors. Changes in source operating rates produce different pollutant emission rates and exhaust gas flow rates and temperatures. When flow rates and temperatures vary, so does pollutant dispersion (plume rise) such that different points of maximum pollutant impact are produced. As a result, screening modeling was performed to determine the source operating load that produces the worst-case impacts. Such screening modeling was performed for 100, 75 and 50 percent load. Model results indicated that 100% load produced worst case conditions.

5.1.2 Determination of the Modeling Area

The next required modeling analysis determined the territorial extent of significant impact of the proposed source. Significant impact levels have been defined for various averaging periods for specific pollutants as shown in Table 5-1. Significant monitored concentrations (De Minimus Values) have also been defined for other pollutants as shown in Table 5-2.

As screening analysis was performed first, using a screening-type model and a limited set of hypothetical meteorological data to define appropriate receptor locations (i.e., points where impacts are calculated). Once receptors were selected, other refined models and historical meteorological data could then be used to calculate source impacts for all averaging periods of concern.

TABLE 5-1
SIGNIFICANCE LEVELS FOR AIR QUALITY IMPACTS

<u>POLLUTANT</u>	<u>AVERAGING TIME</u>	<u>SIGN. LEVEL CONC. (ug/m³)</u>	<u>DISTANCE (KM) FROM SOURCE TO SIGNIFICANCE LEVEL</u>	
			<u>HIGHEST</u>	<u>HIGH SECOND HIGH</u>
Sulfur Dioxide	3 Hour	25	24.5	9.0
	24 Hour	5	25.0	20.0
	Annual	1	15.0	NA
Total Suspended Particulate	24 Hour	5	#	#
	Annual	1	#	NA
Nitrogen Dioxide	Annual	1	5.0	NA
Carbon Monoxide	8 Hour	2000	#	#
	Annual	500	#	NA

NA Not applicable

Less than significant levels at all distances. Minimum boundary line distance from RDF Source: 0.73 km.

TABLE 5-2
COMPARISON OF IMPACT OF PALM BEACH COUNTY RDF FIRED
SPREADER STOKER FURNACES TO DE-MINIMUS LEVELS (ISC MODEL)

SIGNIFICANT MONITORING CONCENTRATIONS

POLLUTANT	AVERAGING TIME	DE-MINIMUS GUIDELINES ug/m ³	HIGHEST 2ND HIGHEST# CONCENTRATION ug/m ³	DISTANCE (KM) FROM SOURCE TO DE-MINIMUS LEVEL	
				HIGH	H2NDH
TSP	24 Hour	10	2.0	##	##
SO ₂	24 Hour	13	27.9	9.0	9.0
CO	8 Hour	575	81.1	##	##
NO _x	24 Hour	14	12.3	1.5	##
Ozone (VOC)	1 Hour	*	3.0**	##	##
Mercury	24 Hour	0.25	9.3E-3	##	##
Fluorides	24 Hour	0.25	0.12	##	##
Lead	24 Hour	0.1	4.3E-3	##	##
Beryllium	24 Hour	5.0E-4	9.9E-5	##	##

* No value established. Ambient air standard: 235 ug/m³ not to be exceeded on more than an average of one day per year over a three year period.

Model analyses for SO₂ based on 2100 TPD and 9% S. Concentrations for other pollutants based on their emissions ratio to SO₂.

** Assumes all VOC becomes ozone.

Less than de-minimus values at all distances greater than 0.6 km from the source. Minimum distance from RDF source to site boundary: 0.73 km.

The circle enclosing the furthest radial distance to which significant impacts are found defines the "modeling area" for the applicant's source. Subsequent modeling analyses included all sources located within this area that have significant emissions of the criteria pollutants emitted (in significant amounts) by the applicant's source. Model results indicated that only SO₂ produced significant impacts in both short-term and long-term averaging periods.

5.1.3 Determination of the Screening Area

An additional "screening area" was defined for additional sources to be considered for inclusion in subsequent modeling analyses. This screening area was contained in the annular ring that extends 50 kilometers (31 miles) beyond the applicant's source's modeling area. Sources located in the screening area were included in subsequent modeling along with the applicant's source, if their impact within the applicant's source modeling area was as much as 1 ug/m³ on an annual basis of 5 ug/m³ on a 24-hour basis.

5.1.4 PSD Increment Consumption and NAAQS Analysis

The PSD regulations have established limits for increases in concentrations of two pollutants, PM on a 24-hour and annual basis, and SO₂ on a 3-hour, 24-hour and annual basis. These limits of concentration increases have been defined as increments which are shown in Table 5-3. The starting point for PSD increment consumption is January 6, 1975. In a given area, the starting point for tracking PSD increment consumption is the date thereafter on which the first PSD source permit application is submitted for regulatory review. The first PSD permit application date is defined as the baseline date for the given area. No major PSD increment consuming source has triggered the baseline date in the study area.

TABLE 5-3

ALLOWABLE PSD INCREMENTS
(ug/m³)

	Class I Area	Class II Area	Class III Area
Sulfur Dioxide			
. Annual	2	20	40
. 24-hour	5*	91*	182*
. 3-hour	25*	512*	700*
Total Suspended Particulate Matter			
. Annual	5	19	37
. 24-hour	10*	37*	75*

* Not to be exceeded more than once a year.

No multisource modeling for PSD increment consumption is required since no major source has been constructed since January 6, 1975 within the modeling area.

The sum of the impacts of the proposed PSD source emissions and all existing source emissions must also not produce concentrations that violate NAAQS. The NAAQS concentrations are shown in Table 5-4. Modeling for compliance with NAAQS must include: 1) all source emissions from the proposed PSD source, 2) actual emissions from all operating sources and all allowable emissions from permitted (but not operating) sources within the modeling area, and 3) actual emissions from all operating sources and all allowable emissions from permitted (but not operating) sources within the screening area, if such sources have significant impacts ($>1 \text{ ug/m}^3$, annual and $>5 \text{ ug/m}^3$, 24-hour) within the modeling area. Modeling impacts must be added to appropriate background levels to determine compliance with NAAQS.

5.1.5 Soils and Vegetation Impacts

The emission of pollutants listed in Table 5-1 are not expected to cause any harm to the vegetation or soils within the study area. For these pollutants, either all applicable NAAQS and state standards will be met, emissions will be less than de minimus values, or ambient impacts will be insignificant.

The potential impact to soil and vegetation resulting from emission from the proposed facility are discussed for the following specific compounds and materials: total suspended particulates (TSP); carbon monoxide (CO); sulfuric acid (H_2SO_4); sulfur dioxide (SO_2); nitrogen dioxide (NO_2).

Total Suspended Particulates. Particulate matter can interfere with plant metabolism when large enough quantities coat leaf surfaces causing the blockage of gas and light exchange mechanisms. The specific sensitivity of plants to particulate matter produced by resource recovery facilities is not known, nor have levels which produce plant injuries from other sources been documented.

The proposed facility will contribute a maximum annual average of 0.26 ug/m^3 of TSP. The maximum observed level in 1983 was 134 ug/m^3 , to which the facilities emissions will add an insignificant amount of 0.2 ug/m^3 .

Carbon Monoxide. Plants appear to be resistant to high levels of CO. In most species tested, exposure to 115 mg/m^3 for up to three weeks did not produce visible injury (Zimmerman, et al., 1983). More recently, exposure to less than 27 ug/m^3 (Chakrabarti, 1976) also produce no visible injury.

The proposed facility will contribute a maximum annual concentration of 4.8 ug/m^3 . Total concentrations, as a result of the operation of the proposed facility, will thus be considerably below concentrations causing visible injury to vegetation.

Sulfuric Acid. H_2SO_4 is formed when gaseous SO_3 produced by the facility reacts with water droplets. the acidified water vapor can

result in acidic precipitation. It is difficult to predict the extent that H_2SO_4 produced by the facility will impact vegetation because (1) H_2SO_4 aerosols are neutralized by the presence of ammonia in the atmosphere (Huntzicher, et al., 1980); (2) when effects of acid precipitation on plants are observed they may be positive due to fertilization impacts of sulfur or negative due to the leaching of leaf surfaces; and (3) the impact of emissions of H_2SO_4 from a single facility on vegetation may be difficult to differentiate from the overall impacts of acid rain on vegetation.

Although evaluation of data relative to acidic precipitation impacts on vegetation is complex, the majority of crop species studied to date indicates the exposure to simulated acid rain has little or no adverse impact on vegetative growth and yield.

The proposed facility will add an annual average of $1.6\text{E}-4 \text{ ug/m}^3$ of H_2SO_4 . It is not anticipated that this concentration will contribute significantly to acidic precipitation when compared to existing concentrations and other major producers, such as fossil fuel power plants.

Sulfur Dioxide. Sensitivity of plant species to SO_2 appears to vary not only with climate of an area, but with the duration of exposure. Garsed and Rutter (1982) reported that various species of conifer (Pinus sp.) had markedly differing sensitivities to levels of SO_2 ranging from 200 ug/m^3 for 11 months to 8000 ug/m^3 for 6 hours. A 14% reduction in relative growth rate was seen in one pine species at the 200 ug/m^3 dosage level. A number of oak and pine species (black and red oak, white pine) have been reported to develop visible injury when exposed to concentrations of SO_2 between 786 and $1,572 \text{ ug/m}^3$ for three hours (Jones, et al. 1979), have reported a threshold value for foliar injury to certain species (blackberry winged sumac, other herbaceous species) at 340 ug/m^3 for 3 hours under environmental conditions which maximized plant sensitivity.

A maximum annual ground level concentration for SO_2 of 3.6 ug/m^3 is predicted for the authority facility. This value, when added to a background level of 10 ug/m^3 is considerably below the concentration causing a reduction in relative growth rate of a pine species. The maximum background level of SO_2 over a three hour averaging period, is 140 ug/m^3 to which the facility will add a maximum of 82 ug/m^3 . This maximum level does not exceed threshold value for certain sensitive species under worst-case conditions.

Nitrogen Dioxide. Nitrogen dioxide can be beneficial to vegetation in specific amounts. Uptake of NO_2 varies with a number of factors such as nutrient supply in the soil, fertilization, and rainfall. NO_2 can also be converted to nitric acid and contribute to acid precipitation. Natural biological cycling of nitrogen compounds produces greater acidity than does atmospheric decomposition (Frink, et al., 1976).

Short-term injury threshold for NO_2 -tolerant species, such as corn and sorghum, has been found to be $24,400 \text{ ug/m}^3 \text{ NO}_2$ for a one-hour exposure when grown in a controlled environment (Heck and Tingey, 1970). Continuous exposure throughout the growth period to 470 ug/m^3 reduced size and productivity and increased senescence in tomatoes and navel oranges (Taylor, et al., 1975; Spierings, 1971). The concentration of NO_2 has been found to be a greater influence on the extent of injury than the length of exposure.

The greater-than-additive effect of NO_2 and SO_2 in combination on crops species and varieties. In a recent study of yield reduction in soybeans, no adverse effect was observed at atmospheric concentrations of 481 ug/m^3 SO_2 in combination with 155 ug/m^3 of NO_2 (Amundson, 1983). The results of these investigations indicate that the presence of elevated levels of NO_2 in the atmosphere in combination with SO_2 above a threshold level can lead to adverse crop response. NO_2 concentrations below 120 ug/m^3 have not been reported to produce injury in the absence of other pollutants (Thompson, et al., 1974).

The proposed facility will produce a maximum annual NO_2 concentration of 1.06 ug/m^3 . The maximum annual ambient NO_2 concentration recorded in the county was 20 ug/m^3 . Total concentrations will thus be well below the estimated threshold level (120 ug/m^3) of injury to certain plants.

Hydrogen Chloride. Gaseous HCl will be emitted from the proposed facility as a result of the combustion of certain materials contained in the refuse (especially plastics). HCl fallout onto soil does not pose a serious risk to vegetation. HCl disassociates in soil, and the Cl which occurs in a dissolved form is generally leached from the soil with precipitation. Since it is therefore unavailable for uptake through plant roots, indirect injury to vegetation through the soil is unlikely.

Studies of plant growth in an environment containing gaseous HCl have reported that exposure on the order of $10,000 \text{ ug/m}^3$ for 1 to 2 hours will produced plant injury. Intermittent exposure to concentrations of approximately 50 ug/m^3 were found to pose minimal risk to sensitive vegetation. Concentrations ranging from approximately $6,000 \text{ ug/m}^3$ for 120 hours or below would provide for adequate protection from HCl injury.

The proposed facility will increase HCl concentrations by a 1-hour maximum of 57 ug/m^3 and an annual average of 1.4 ug/m^3 . Peak and long term concentrations are well below levels specifically documented to cause injury and those proposed as adequate for vegetation protection. Therefore, HCl emissions are not expected to adversely impact local vegetation.

5.2 Model Selection Criteria

5.2.1 Number of Emission Points

A number of models are available for the screening modeling analyses needed for selecting receptor locations and determining worst-case load impacts. PTMAX and PTPLU are applicable to individual sources and PTMTP and Valley are applicable to individual multiple sources. A number of models are also available for the more comprehensive modeling analyses needed to define the modeling area, compute PSD increment consumption, and assess compliance with NAAQS. The CRSTER model is only applicable to single or collocated sources. The MPTER, RAM, ISCST, ISCLT, Complex I, SHORTZ, LONGZ, and CDMQC models are applicable to multiple sources.

Since it was anticipated that the modeling and screening areas would contain sources that emit the same pollutants (in significant

amounts*) as will be emitted by the proposed facility (in significant amounts*) Hayden-Wegman planned, at the outset of this study, to use multiple source models for the refined modeling analyses. Upon consideration of the topography and demography of the study area and the type and number of sources to be modeled, the following dispersion models are utilized: PTPLU, PTDIS, ISCST and ISCLT.

These models are used with downwash option and in rural mode pursuant to FDER instructions.

* As defined in Table 5-1

TABLE 5-4

AMBIENT AIR QUALITY STANDARDS

POLLUTANT	FEDERAL PRIMARY	FEDERAL SECONDARY	STATE	MAXIMUM CONCENTRATION MEASURED IN 1983 (SITE #)	MAXIMUM 2ND MAX CONCENTRATION (3) MEASURED IN 1983 (SITE #)
SULFUR DIOXIDE					
MAX 3-HOUR CONCENTRATION (2)	NO STANDARD	1300 UG/M3 (0.5 PPM)	1300 UG/M3 (0.5 PPM)	65 UG/M3 (11) (0.025 PPM)	63 UG/M3 (11) (0.024 PPM)
MAX 24-HOUR CONCENTRATION	365 UG/M3 (0.14 PPM)	NO STANDARD	260 UG/M3 (0.1 PPM)	39 UG/M3 (11) (0.015 PPM)	29 UG/M3 (11) (0.011 PPM)
ANNUAL ARITHMETIC MEAN	80 UG/M3 (0.03 PPM)	NO STANDARD	60 UG/M3 (0.02 PPM)	7 UG/M3 (11) (0.0027 PPM)	
PARTICULATE MATTER					
MAX 24-HOUR CONCENTRATION (2)	260 UG/M3	150 UG/M3	150 UG/M3	134 UG/M3 (5)	107 UG/M3 (4)
ANNUAL GEOMETRIC MEAN	75 UG/M3	60 UG/M3	60 UG/M3	43 UG/M3 (12)	
NITROGEN DIOXIDE					
ANNUAL ARITHMETIC MEAN	100 UG/M3 (.05 PPM)	100 UG/M3 (.05 PPM)	100 UG/M3 (.05 PPM)	20 UG/M3 (1) (0.01 PPM)	
OZONE					
DAILY MAX 1-HOUR CONCENTRATION (1)	235 UG/M3 (0.12 PPM)	235 UG/M3 (0.12 PPM)	235 UG/M3 (0.12 PPM)	180 UG/M3 (10) (0.092 PPM)	172 UG/M3 (10) (0.088 PPM)
LEAD					
QUARTERLY ARITHMETIC MEAN	NO STANDARD	NO STANDARD	1.5 UG/M3	NOT MONITORED	
CARBON MONOXIDE					
MAX 1-HOUR CONCENTRATION	40000 UG/M3 (35 PPM)	40000 UG/M3 (35 PPM)	40000 UG/M3 (35 PPM)	10171 UG/M3 (1) (8.9 PPM)	9943 UG/M3 (1) (8.7 PPM)
MAX 8-HOUR CONCENTRATION (2)	10000 UG/M3 (10 PPM)	10000 UG/M3 (10 PPM)	10000 UG/M3 (10 PPM)	6600 UG/M3 (1) (6.6 PPM)	4500 UG/M3 (1) (4.5 PPM)

1. THE STANDARD IS ATTAINED WHEN THE EXPECTED NUMBER OF DAYS PER CALENDAR YEAR WITH MAXIMUM HOURLY AVERAGE AVERAGE CONCENTRATIONS ABOVE 0.12 PPM IS EQUAL TO OR LESS THAN 1.
2. CONCENTRATION LIMITS NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.
3. SINCE SHORT TERM CONCENTRATION LIMITS ARE NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR, THE VALUES PRESENTED IN COLUMN (5) FOR SHORT TERM CONCENTRATIONS REFLECT THE HIGHEST VALUES OF THE SECOND HIGHEST CONCENTRATION MEASURED AT THE MONITORING STATION.

5.2.2 Pollutant Averaging Periods

As discussed earlier, pollutant concentrations must be predicted on the basis of several averaging periods for PM (24-hour and annual) and SO₂ (3-hour, 24-hour and annual). Pollutant impacts must also be predicted on the basis of 1-hour and 8-hour averaging periods for CO and on a calendar quarter basis for lead.

The PTPLU, and PTDIS screening models can be used with hypothetical meteorological data to predict worst-case 1-hour impacts which can be converted to worst-case 3-hour, 8-hour and 24-hour impacts using scaling factors provided in EPA's Volume 10.

5.2.3 GEP Determination and Potential for Downwash

The relationship between a source's stack height and the dimensions of adjacent structures and terrain determine whether plume downwash will occur. EPA has developed criteria for constructing stacks with heights defined according to good engineering practice (GEP) criteria in order to minimize plume downwash. The ISC models are the only ones capable of calculating impacts caused by plume downwash. Modeling for downwash is required only if the applicant's stack is not constructed according to GEP criteria.

Hayden-Wegman performed a GEP analysis for the proposed source's stack. The analysis was performed in accordance with EPA regulations. Building dimensions are 233 ft long by 110 ft wide by 120 ft high. GEP stack height was determined to be 300 ft. Accordingly, the results of this analysis indicated that the proposed source stack was below GEP height so downwash modeling was performed.

5.3 Modeling Considerations

5.3.1 Highest, Second-Highest Concentrations

For the short term averaging periods, compliance with PSD increments and NAAQS is based on the highest, second-highest modeled (modeled plus background for NAAQS) concentrations. Such concentrations are determined by first obtaining the highest and second-highest concentrations at all the receptors within the study area. The highest, second highest concentration is defined as being the highest value from among the set of second highest concentrations for all the receptors. In this report, highest, second-highest concentrations are presented for all short-term averaging periods for the pollutants for which short-term NAAQS or PSD increments have been established.

5.3.2 Block Averaging Times

Compliance with short-term PSD increments and NAAQS is based on block averages. Block averages are those that start at midnight for all non-overlapping averaging periods until the following midnight. Thus, each day produces a single 24-hour block average, three 8-hour block averages, and eight 3-hour block averages. In this report all modeled short-term concentrations are presented as block averages.

5.3.3 Dispersion Coefficients

Dispersion coefficients are constants that are built into dispersion models for use in calculating the amount of horizontal and vertical plume spread depending on downwind atmospheric stability and distance. All of the models used contain Pasquill/Gifford coefficients. The Pasquill/Gifford coefficients are applicable to rural areas. In long term-models, the Pasquill/Gifford coefficients are applicable to rural areas. In long-term models, the Pasquill/Gifford coefficients are used to calculate pollutant dispersion in the vertical, but pollutant dispersion is calculated to be evenly distributed within a wind direction sector in the horizontal.

5.3.4 Stability Categories

There are several models available for determining stability categories. All the models discussed herein use stability classifications developed by the Pasquill/Turner method. The Pasquill/Turner method is based on measurements of cloud cover, isolation (solar heat) and wind speed. The stability classifications used for this study were developed using the CRSTER preprocessor which converts standard National Weather Service observations into the format required for model input.

5.3.5 Plume Rise

The standard algorithms for determining plume rise are those of Briggs and these algorithms are used in all the models that were used in this study. The Briggs algorithms calculate plume rise based on thermal buoyancy (exhaust gas temperature) and momentum (exhaust gas volume flow).

a. Buoyancy Induced Dispersion

If a large source has a thermally buoyant plume, dispersion will begin immediately upon its exit from the stack. This phenomenon is accounted for in algorithms for buoyancy induced dispersion, which are available as an option in several of the models discussed herein. This option was employed in this study because the proposed source has a hot plume.

b. Stack Tip Downwash

Downwash of a plume can be induced by a stack if it is poorly constructed, or if the exhaust gas velocity is low. This option was employed for this study as a measure of conservatism although the proposed stack will be properly constructed and have adequate exhaust gas velocity.

c. Final Versus Transitional Plume Rise

Upon entering the atmosphere, a plume will rise as a function of its thermal buoyancy and momentum, as discussed above. The plume will rise until it loses its buoyancy and momentum. As the plume rises, it travels downwind until it reaches its equilibrium, or final height. Algorithms have been developed to account for this period of transitional plume rise and were utilized for model runs.

5.3.6 Chemical Transformation

Some pollutants undergo chemical transformations after their release into the atmosphere. Various methods can be used to account for these transformations, the most common of which makes use of an exponential decay or "half-life" term, that is dependent on travel time. Of the pollutants that will be emitted by the proposed facility, those most subject to chemical transformations in the atmosphere are sulfur oxides (SO_x), and NO_x . After entering the atmosphere, the amount of SO_2 in the SO_x emissions is slowly depleted. During the short travel times involved in the study area, this depletion is of minimal significance and was not considered. The conversion of NO_x to NO_2 is rapid so all NO_x emissions were treated as NO_2 . Therefore, although several of the models selected for this study contain "half-life" equations for calculating pollutant decay, this option was not used.

5.3.7 Particle Deposition

Large particles settle out of the atmosphere while smaller particles remain suspended. Modeled concentrations will be underpredictions if particle deposition is not calculated and source emissions do include particles that settle out before reaching the receptor. In air permitting analyses, the latter situation is allowed to occur, especially if particulate size distributions are not available, to ensure that ambient air quality standards are met. For this study, all particulate emissions were considered to be non-settleable.

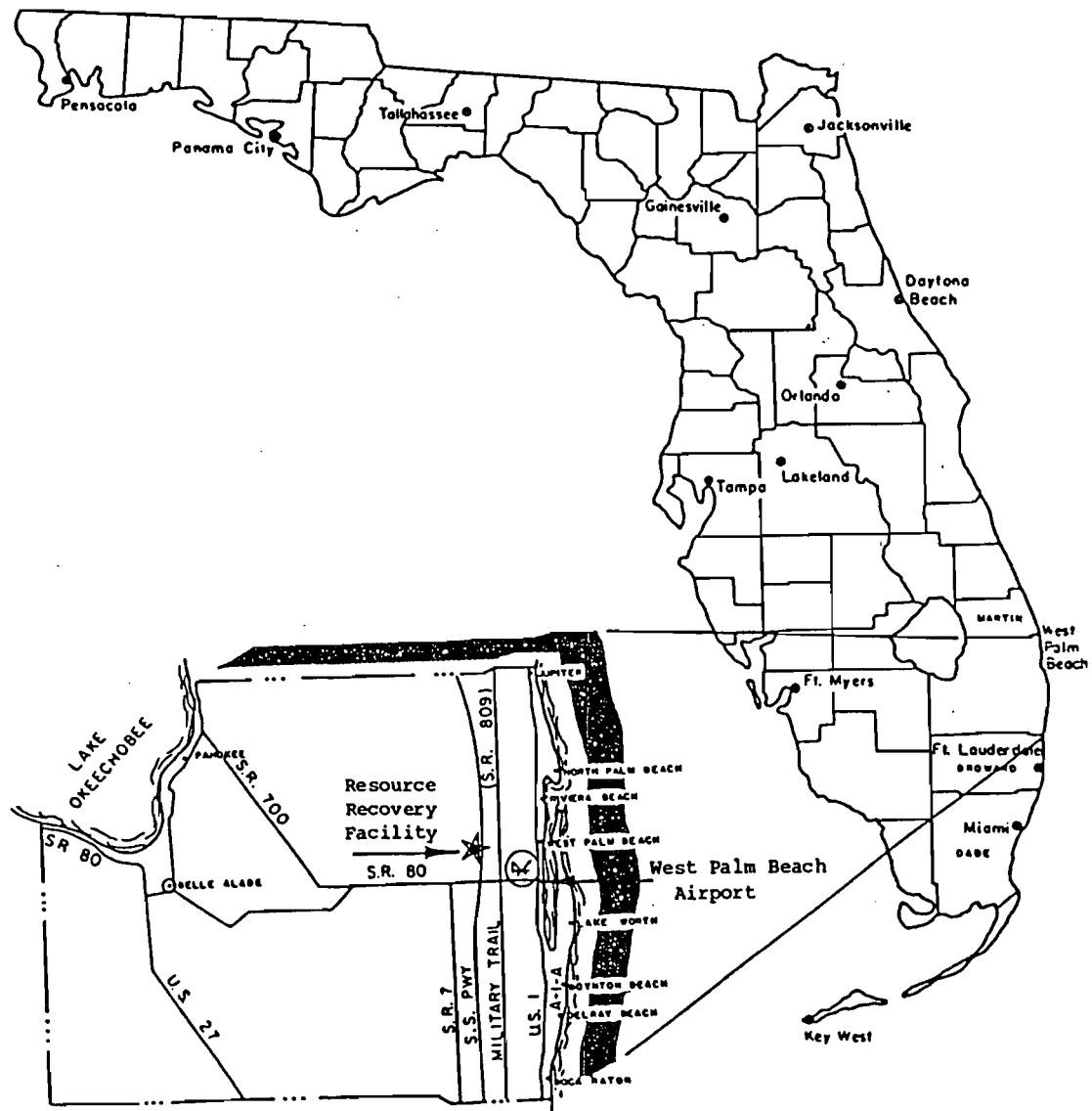
5.4 Meteorological and Climatology

5.4.1 Climatology

The proposed waste-to-energy facility is to be located in Palm Beach County in the lower east coast climatological regime of Florida (Figure 5.1). The site is approximately 10 kilometers west of the Intercoastal Waterway and 11.5 kilometers from the Atlantic Ocean shoreline. There is no significant terrain in the vicinity (Figure 5.2). Summer temperatures are warm and humid while the winter temperatures are moderated slightly by an occasional influx of cool air from the north. The region is dominated by the effect of the Gulf Stream which flows northward following the contours of the lower east coast and a dominant trade wind that blows from east to west. This water trajectory is a moderating influence that cools the region in the summer and gives warmth in the winter. Average mean winter (January) and summer (July) maximum temperatures for Florida are shown in Figure 5.3 and 5.4. The primary rainy season occurs during the six month period from May through October. Most of the precipitation is associated with thunderstorms. The maximum average rainfalls are during the months of September and October. These rains may be associated with tropical storms. The frequency of tropical storms, by year, for Florida is shown in Exhibit Table 5.1. The chances of hurricane force winds at West Palm Beach are 1 in 7. Meteorological conditions that aggravate air pollution are least likely to occur in the lower east coast region due to the prevailing easterly trade winds and the overall prevailing instability of the air. The trade winds are sufficiently pervasive so as to minimize any true sea breeze effect.

LOCATION MAP

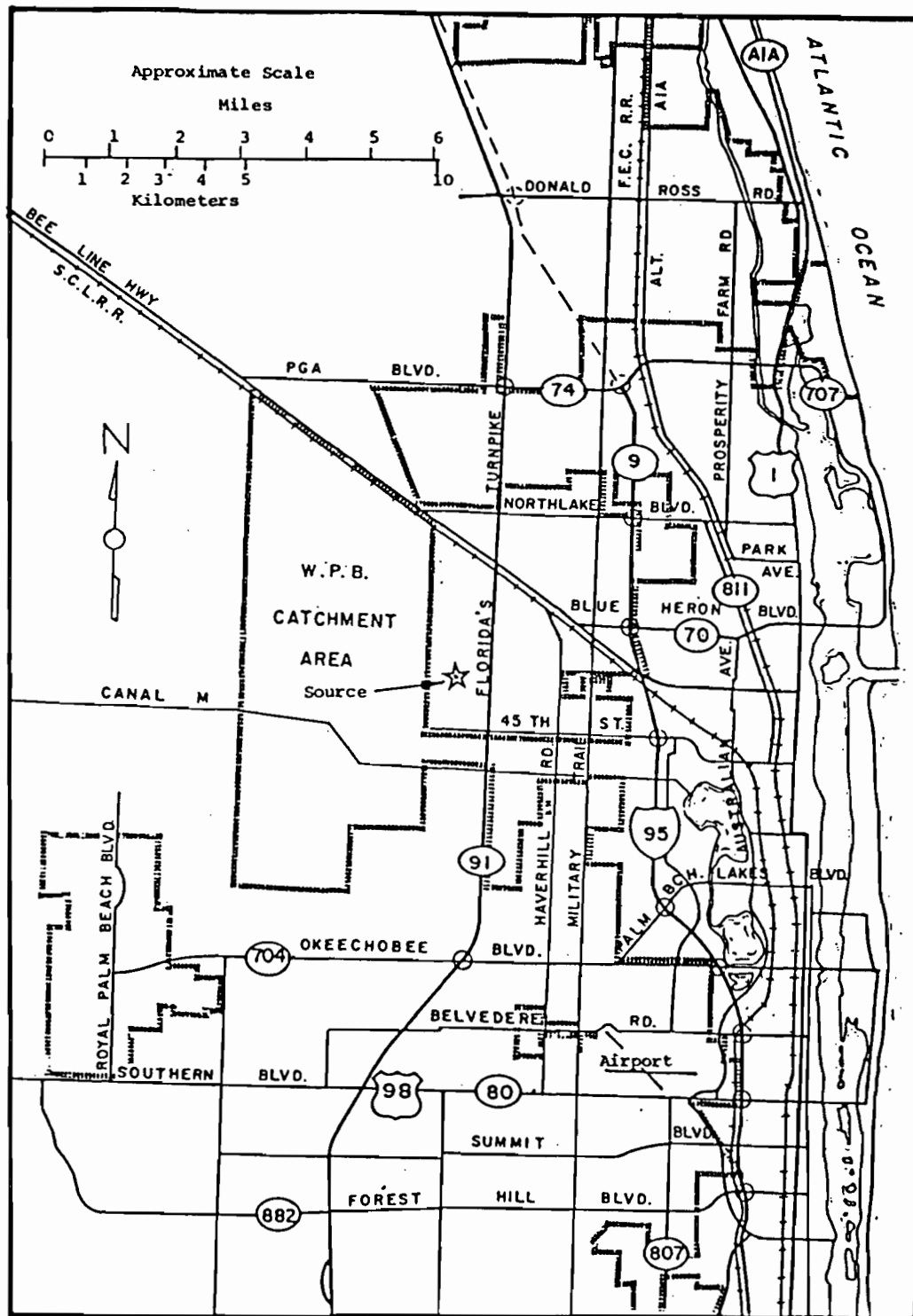
PALM BEACH COUNTY, FLORIDA



**PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY**



FIGURE 5.1



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



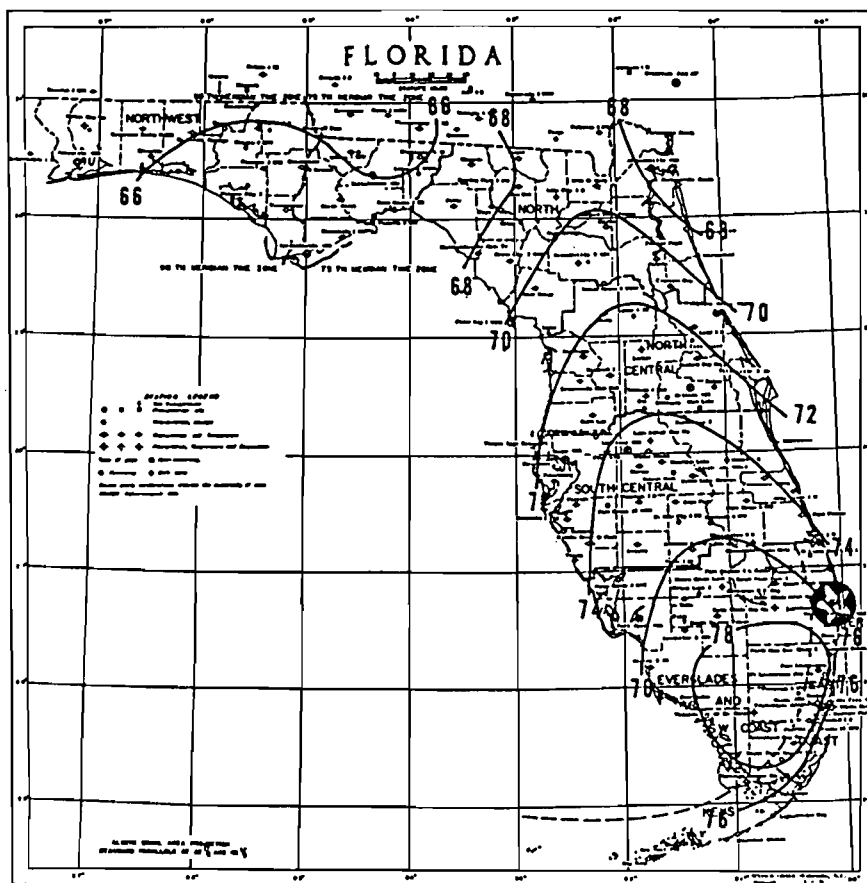
FIGURE 5.2



FIGURE 5.3

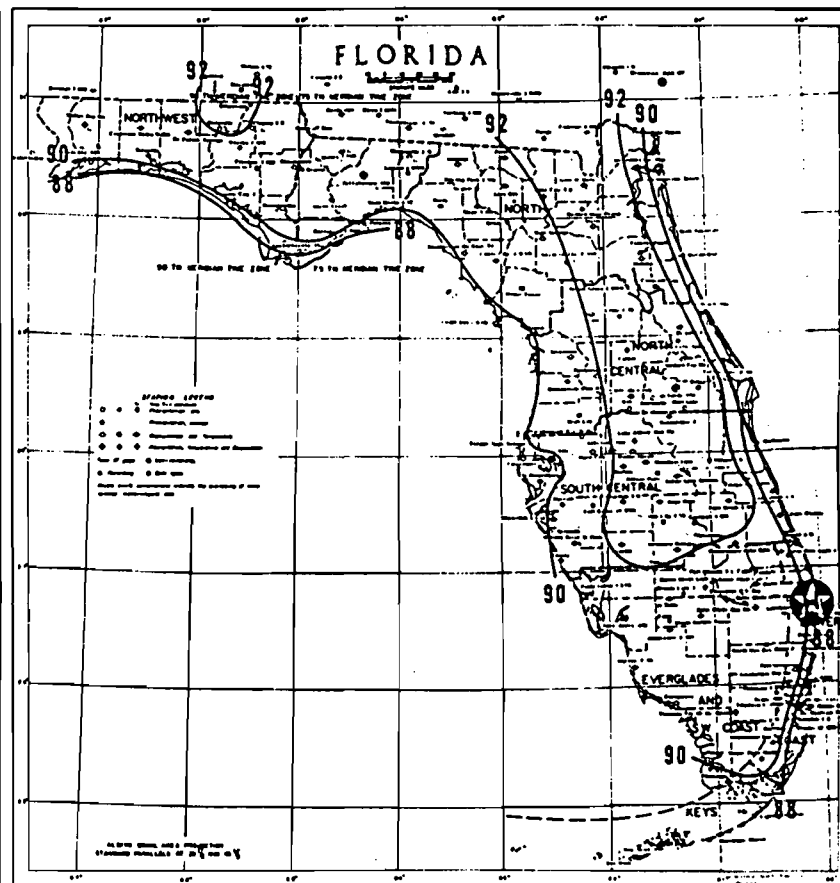
Data Source: CLIMATE OF THE STATES, Vol. 1, Water Information Center, Inc., 1974

MEAN MAXIMUM TEMPERATURE (°F.), JANUARY



Data are based on the period 1931-52. Isolines are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

MEAN MAXIMUM TEMPERATURE (°F.), JULY



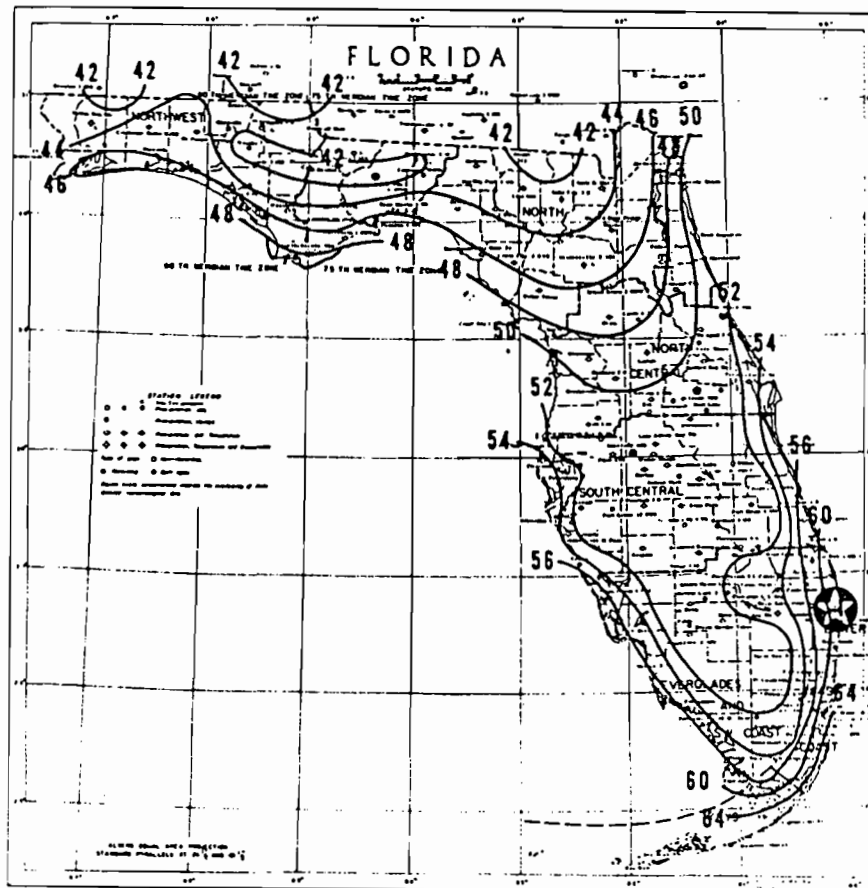
Data are based on the period 1931-52. Isolines are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.



FIGURE 5.4

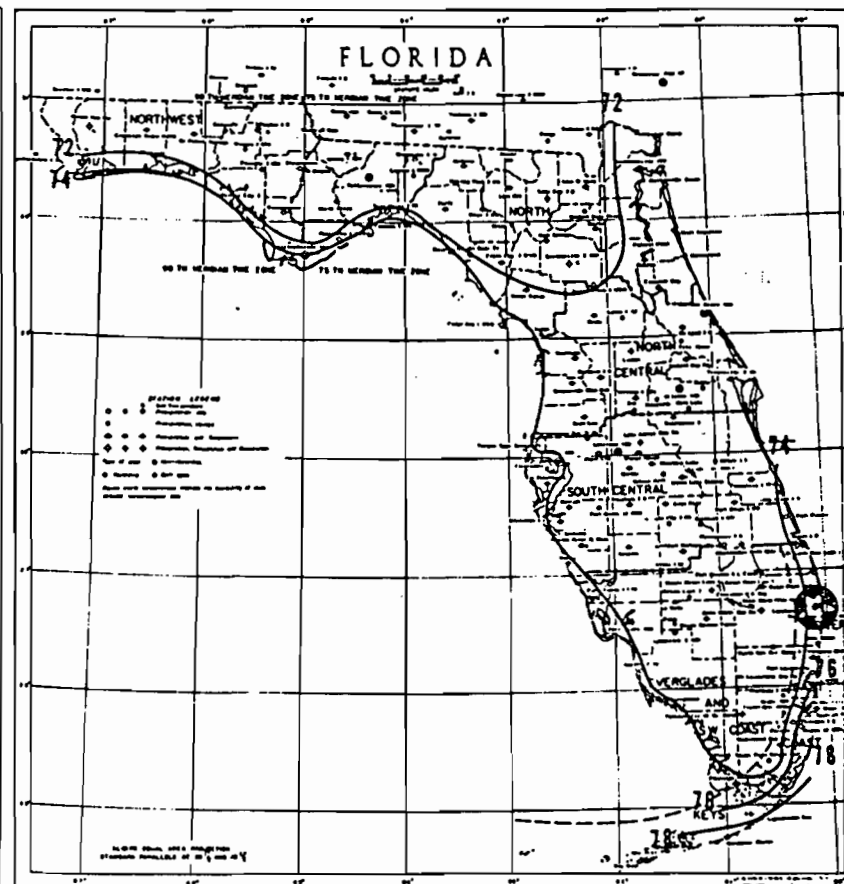
Data Source: CLIMATE OF THE STATES, Vol. 1, Water Information Center, Inc., 1974

MEAN MINIMUM TEMPERATURE [°F.], JANUARY



Data are based on the period 1931-52. Isolines are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

MEAN MINIMUM TEMPERATURE [°F.], JULY



Data are based on the period 1931-52. Isolines are drawn through points of approximately equal value. Caution should be used in interpolating on these maps.

FREQUENCY OF TROPICAL STORMS BY YEARS IN FLORIDA

Year	Of Known Hurricane Intensity	Not or Of Doubtful Hurricane Intensity	Total	Year	Of Known Hurricane Intensity	Not or Of Doubtful Hurricane Intensity	Total
1885	3	1	4	1930	0	1	1
1886	3	1	4	1931	0	0	0
1887	1	1	2	1932	1	1	2
1888	2	1	3	1933	2	2	4
1889	1	2	3	1934	0	0	0
1890	0	0	0	1935	3	0	3
1891	1	1	2	1936	1	2	3
1892	0	2	2	1937	0	3	3
1893	3	2	5	1938	0	1	1
1894	2	1	3	1939	1	1	2
1895	1	3	4	1940	0	0	0
1896	3	0	3	1941	1	1	2
1897	0	1	1	1942	0	0	0
1898	2	0	2	1943	0	0	0
1899	1	2	3	1944	1	0	1
1900	0	1	1	1945	2	1	3
1901	0	2	2	1946	1	1	2
1902	0	1	1	1947	2	1	3
1903	1	0	1	1948	2	0	2
1904	1	0	1	1949	1	0	1
1905	0	0	0	1950	2	2	4
1906	3	1	4	1951	0	1	1
1907	0	1	1	1952	0	1	1
1908	0	0	0	1953	1	2	3
1909	1	1	2	1954	0	0	0
1910	1	0	1	1955	0	0	0
1911	1	1	2	1956	1	0	1
1912	1	0	1	1957	0	3	3
1913	0	0	0	1958	0	1	1
1914	0	0	0	1959	0	2	2
1915	1	1	2	1960	1	2	3
1916	3	0	3	1961	0	0	0
1917	1	0	1	1962	0	0	0
1918	0	0	0	1963	0	1	1
1919	1	1	2	1964	3	2	5
1920	0	1	1	1965	1	1	2
1921	1	0	1	1966	2	0	2
1922	0	0	0	1967	0	0	0
1923	0	1	1	1968	4	0	4
1924	2	1	3	1969	1	1	2
1925	1	0	1	1970	1	1	2
1926	3	0	3	1971	0	0	0
1927	0	0	0				
1928	3	0	3				
1929	1	0	1	Total	84	66	150

CHANCES OF HURRICANE FORCE WINDS IN ANY GIVEN YEAR

City	Chances	City	Chances
Jacksonville	1 in 100	Key West	1 in 8
Daytona Beach	1 in 50	Fort Myers	1 in 11
Melbourne-Vero Beach	1 in 20	Tampa-St. Petersburg	1 in 25
Palm Beach	1 in 7	Apalachicola-St. Marks	1 in 17
Miami	1 in 6	Pensacola	1 in 8

Data Source: CLIMATE OF THE STATES, Vol. 1, Water Information Center, Inc., 1974

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



EXHIBIT TABLE 5.1

Regional Climatology

There are two full time, full service weather stations within 100 km of the proposed facility:

- ° Palm Beach International Airport
- ° Miami International Airport

The Palm Beach International Airport is approximately 9.5 kilometer (5.9 miles) southeast of the proposed facility. The Miami International Airport is approximately 100 kilometers (62 miles) south of the proposed facility. Both stations lie within the Florida lower east coast climatological regime.

Meteorological normals for these two stations are shown in Exhibit Tables 5.2 and 5.3. The meteorological data from the Palm Beach International Airport can be considered representative of the site location for the purpose for air quality modeling analyses. While surface weather data are available from the Palm Beach International Airport, Miami International Airport is the closest available station with recorded upper air data that can be considered as representative for modeling purposes.

A wind frequency distribution summarized for the data collection period from 1970-1974 is available for the Palm Beach International. The joint distribution of these data as a function of wind speed and direction are shown in Figure 5.5. A directional summary of these data in wind rose format is shown in Figure 5.6, along with the average speed for each direction.

The annual average wind speed derived from the 1970-1974 summary wind frequency distribution is approximately 4.27 m/s (9.6 mph). The highest average speed as a function of wind direction is approximately 5.83 m/s (13.0 mph) for winds from the ENE. The winds with the highest frequency of occurrence are from the E (17.2%). Winds from the E and ESE account for 27.3% of all occurrences and winds from an expanded sector ENE through SE account for 44.2% of all occurrences. The summary joint distributions of the wind directions and stability classes are shown in Figure 5.7 and 5.8. The proportion stable stability classes: 5 & 6 per total frequency for each wind direction exceeds 50% for the directions SSW through NW. These two classes are 62% of all the winds from the west (W). These two classes represent less than 20% of the observations for winds from the NNE through E.

The wind distribution, average speeds and stability category data are based on USDEP, COMM. NOAA, EDS, NCC STAR Program results. These data were used to generate annual impact concentrations.

The Summary by Hour analyses given in the monthly Local Climatological Data (LCD) for West Palm Beach for the period 1970 -1974 were used to generate seasonal diurnal distributions for the resultant wind directions and average wind speeds. Winter consists of all available data for the months of December, January and February. Spring consisted of all available data for the months of March, April and May, etc. The derived seasonal diurnal variations for wind direction are shown in Figure 5.9.

The diurnal variations of the wind directions for the spring and summer seasons are almost identical and uniquely different from the diurnal curve for

1973

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows:
 Airport locations: Highest temperature 100 in July 1942; lowest temperature 26 in December 1934 (28 in January 1940); maximum precipitation in 24 hours 12.56 in April 1942. City locations: Lowest temperature 27 in February 1917; maximum precipitation in 24 hours 15.10 in November 1935; fastest mile of wind 122 from the South in October 1950. Miami Beach (Allison Hospital): Fastest mile of wind 132 from the East, September 18, 1926.

1973

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows:
Highest temperature 101° in July 1942.

CLIMATOGRAPHY OF THE UNITED STATES NO. 60

Climate of Florida

NOAA, EDS, NCC, October, 1976

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half.
- Trace.

NORMALS - Based on record for the 1961-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

* NORMALS BY CLIMATOLOGICAL DIVISIONS

Taken from "Climatology of the United States No. 81-4, Decennial Census of U. S. Climate"

STATIONS (By Divisions)	TEMPERATURE (°F)												PRECIPITATION (In.)													
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANN	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANN
LOWER EAST COAST																										
FORT LAUDERDALE	67.8	68.4	70.7	74.3	77.5	80.4	81.8	82.6	81.5	77.9	72.8	69.0	75.4	2.20	2.06	2.84	4.19	5.29	7.42	5.96	6.88	8.98	8.39	3.18	2.90	60.29
FORESTAD EXP STA	65.6	66.5	69.2	72.8	75.9	79.2	80.2	80.7	80.0	76.3	70.7	66.9	73.7	1.75	1.71	2.38	3.69	6.46	8.77	8.81	8.29	6.61	8.72	2.28	1.22	64.49
MIAMI BEACH	69.1	69.6	71.6	74.9	78.2	81.1	82.3	82.9	81.7	78.4	73.8	70.3	76.2	1.68	1.65	1.95	2.92	4.34	5.65	4.45	5.06	7.56	6.71	2.53	1.78	46.26
MIAMI VSO	66.9	67.9	70.5	74.2	77.6	80.8	81.8	82.3	81.3	77.8	72.4	68.1	75.1	2.03	1.87	2.27	3.88	6.44	7.37	6.75	6.97	9.47	8.21	2.83	1.67	59.76
MIAMI 12 SW	66.5	67.4	70.4	74.2	77.5	80.4	81.6	82.0	81.0	77.2	71.6	67.7	74.8	2.05	1.80	2.44	3.75	6.13	7.00	6.58	6.25	9.03	8.23	2.59	1.63	57.48
WEST PALM BEACH VSO	66.9	67.6	69.9	73.9	77.6	81.0	82.6	83.0	82.1	78.2	72.5	68.2	75.2	2.48	2.35	3.44	4.34	5.11	7.53	6.66	6.74	9.66	7.96	2.86	2.57	61.70
DIVISION	66.9	67.6	70.0	73.6	77.0	80.2	81.5	82.0	81.0	77.4	72.0	68.2	74.8	2.16	2.02	2.82	3.90	5.49	7.44	6.65	6.82	9.47	8.15	2.84	2.17	60.00
KEYS																										
KEY WEST VSO	69.8	70.4	72.5	75.8	79.0	81.8	83.3	83.6	82.3	79.0	74.1	70.6	76.6	1.53	1.98	1.77	2.48	2.73	3.97	4.16	4.33	6.73	5.82	2.80	1.69	39.99
KEY WEST	70.4	71.3	73.6	77.1	80.2	82.8	84.0	84.3	83.0	79.6	74.9	71.4	77.7	1.49	2.00	1.73	2.51	2.77	4.01	4.16	4.25	6.53	5.87	2.81	1.71	39.84
DIVISION	70.2	71.0	73.3	76.6	79.8	82.4	83.5	83.8	82.5	79.2	74.5	71.2	77.2	1.71	1.88	1.92	2.29	3.10	4.33	4.54	4.68	7.05	6.73	2.43	1.88	42.55

* Normals for the period 1931-1960. Divisional normals may not be the arithmetical average of individual stations published, since additional data for shorter period stations are used to obtain better areal representation.

CONFIDENCE - LIMITS

In absence of trend or record changes, the chances are 9 out of 10 that the true mean will lie in the interval formed by adding and subtracting the values in the following table from the means for any station in the State. Because of the wider variation in mean precipitation, the corresponding monthly means and annual mean must be substituted for "p" in the precipitation table below to obtain mean precipitation confidence limits.

1.3 | 1.3 | 1.1 | .5 | .5 | .4 | .4 | .3 | .4 | .3 | .4 | 1.2 | .4 | 39/p | 37/p | 44/p | 48/p | 47/p | 48/p | 38/p | 43/p | 53/p | 59/p | 44/p | 35/p | 44/p

COMPARATIVE DATA

Data in the following table are the mean temperature and average precipitation for St. Leo's Abbey, Florida, for the period 1901-1930 and are included in this publication for comparative purposes.

60.3 | 61.7 | 66.3 | 70.6 | 75.8 | 79.2 | 80.5 | 80.7 | 79.2 | 73.2 | 65.4 | 60.3 | 71.1 | 2.87 | 2.54 | 2.90 | 2.20 | 4.44 | 8.18 | 8.22 | 9.48 | 6.91 | 3.70 | 2.20 | 2.51 | 55.16

Data Source: CLIMATE OF THE STATES, Vol. 1, Water Information Center, Inc., 1974

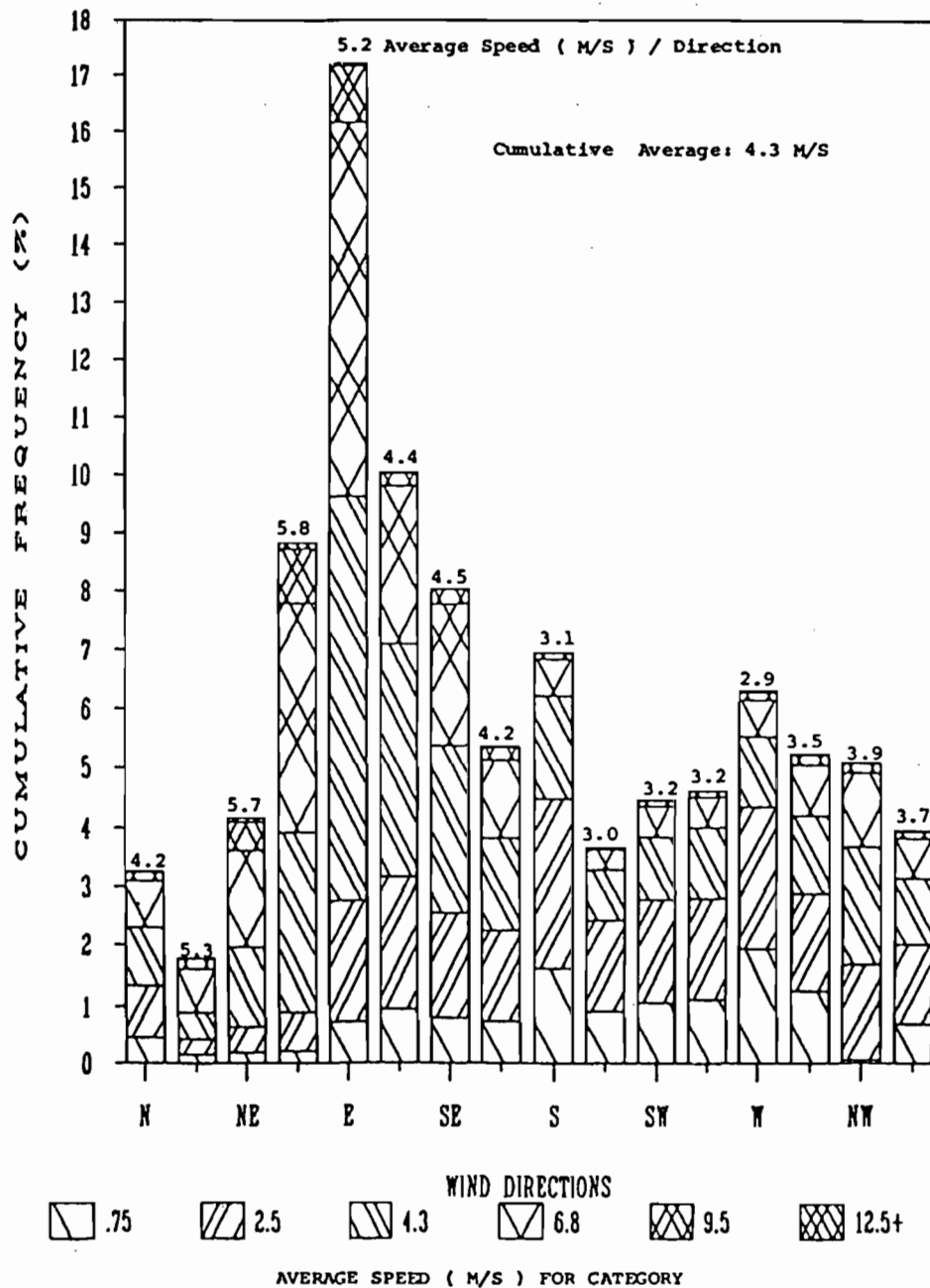
PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



EXHIBIT TABLE 5.3

WIND SPEED FREQUENCY DISTRIBUTIONS

WEST PALM BEACH, FL. (1970-1974)



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY

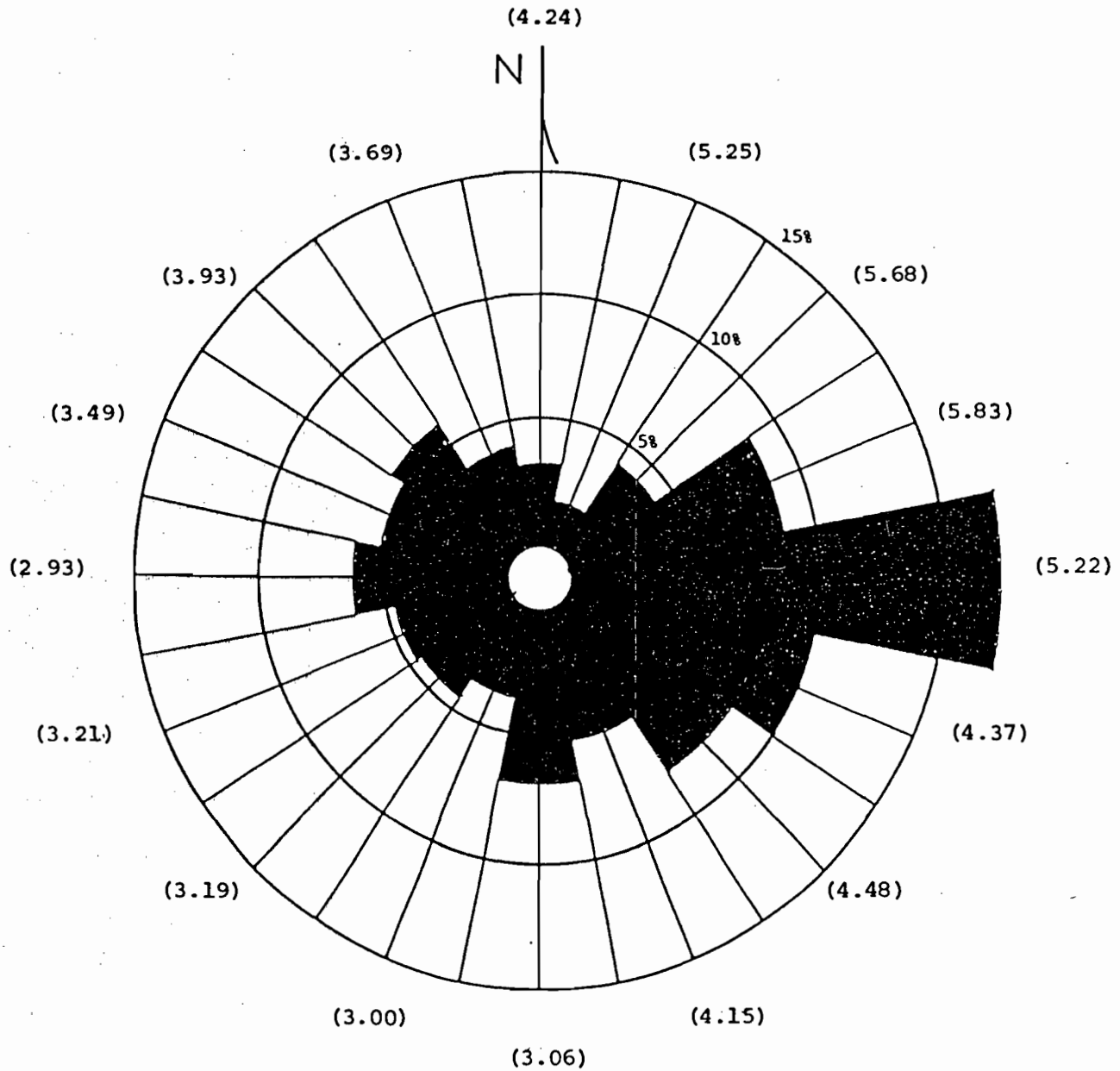


FIGURE 5.5

WIND DIRECTION FREQUENCY DISTRIBUTION

WEST PALM BEACH: 1970-1974

(Annual Average Wind Speed: 4.3 M/S)



Average Wind Speed: (m/s)

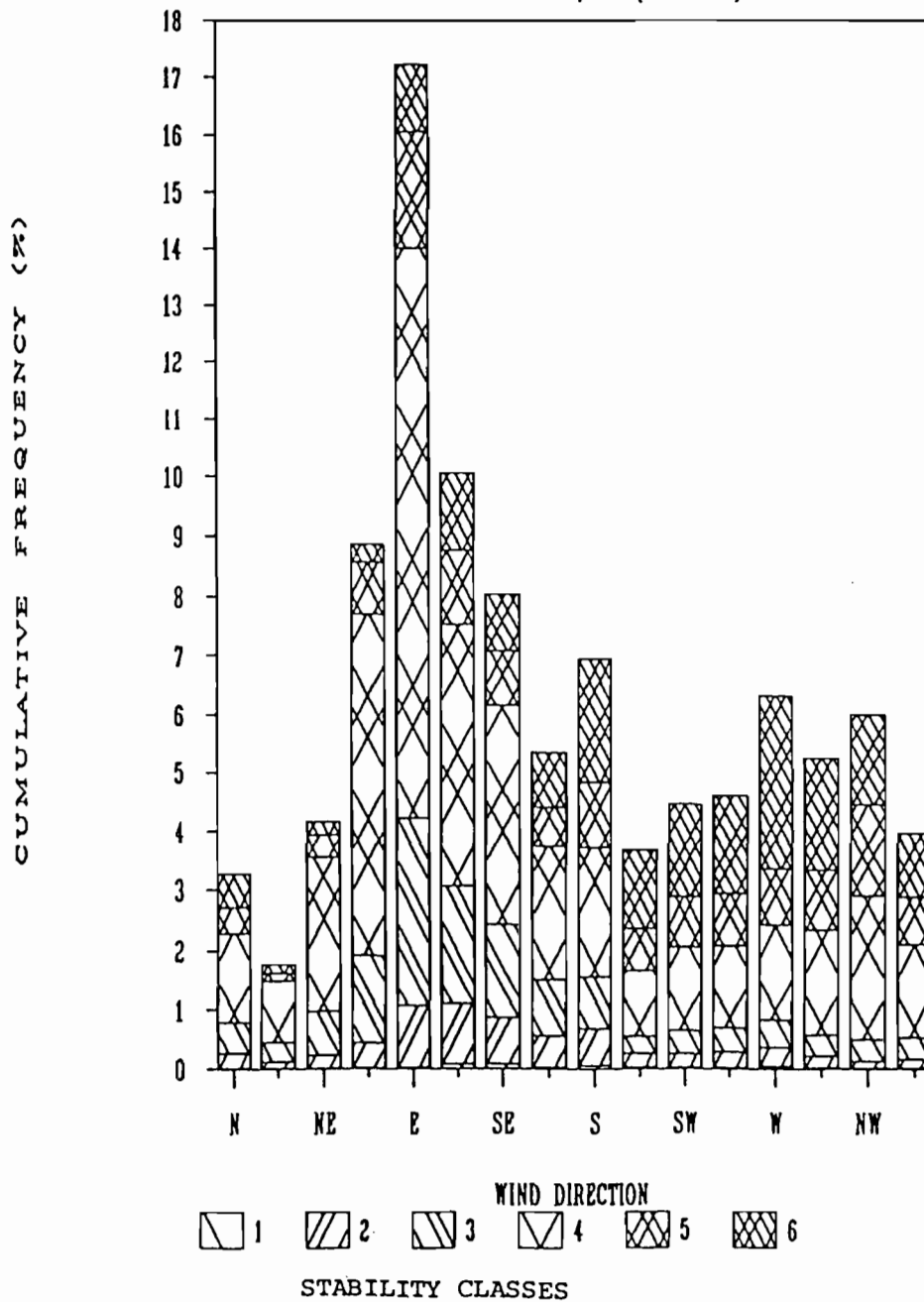
PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



FIGURE 5.6

STABILITY CLASS FREQUENCY DISTRIBUTIONS

WEST PALM BEACH, FL. (1970-1974)



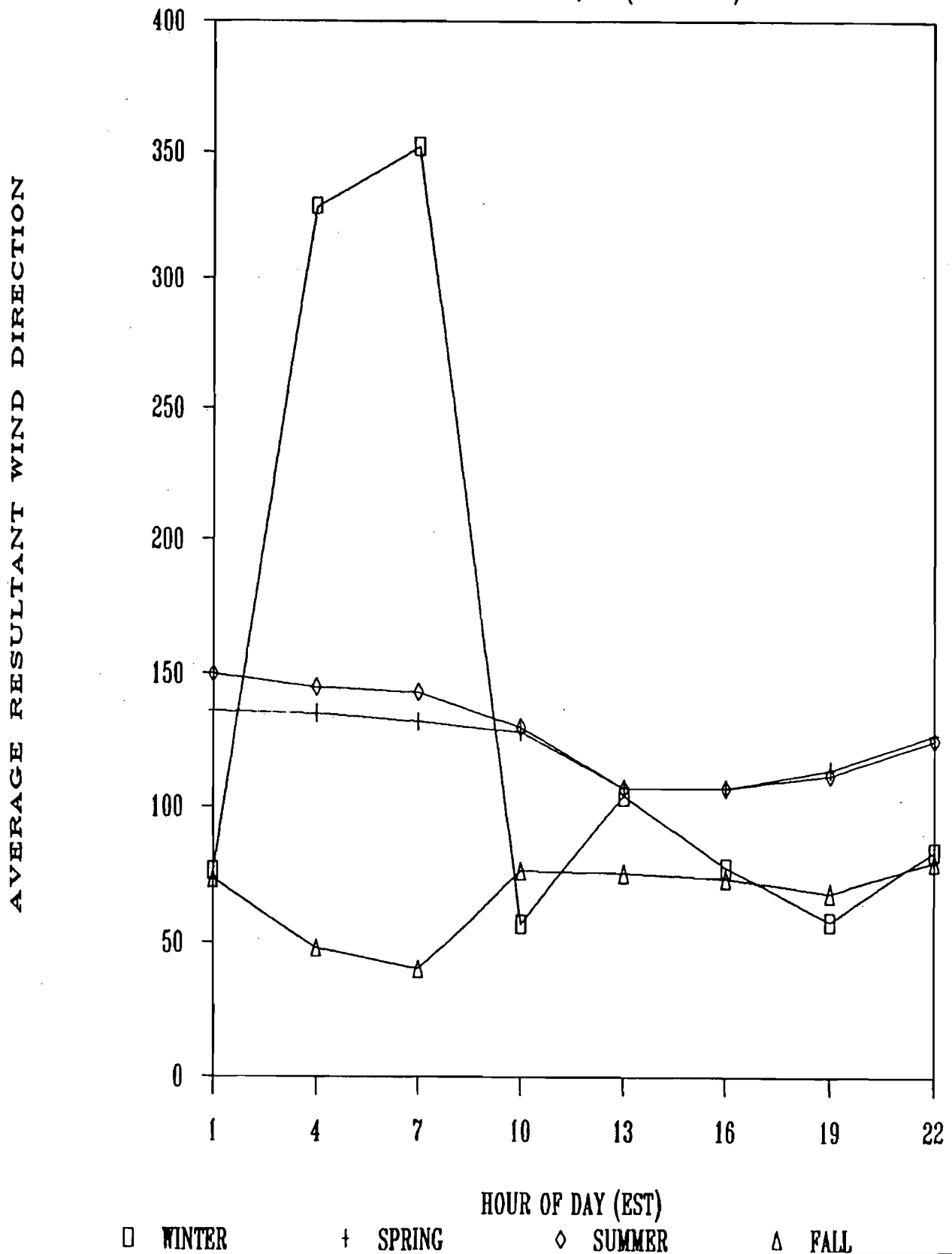
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FIGURE 5.7

SEASONAL DIURNAL WIND DIRECTIONS

WEST PALM BEACH, FL. (1970-1974)



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



FIGURE 5.8

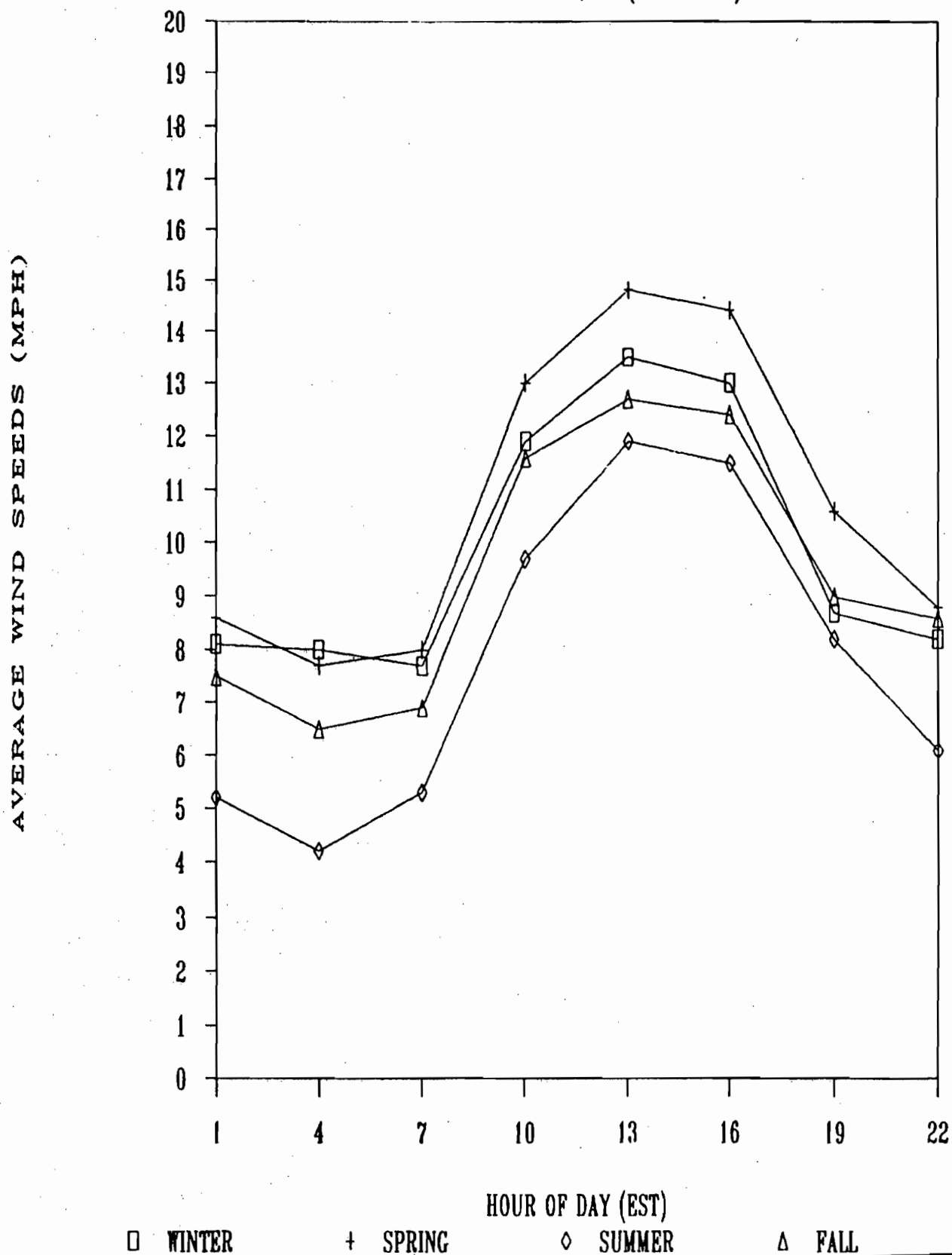
the fall season. The winter season curve is erratic particularly during the early morning hours, but tends to correspond with that of the fall season during the daylight and early evening hours.

The diurnal wind direction patterns give no indication of a diurnal shift that would be consistent with an ocean sea breeze. They, instead confirm the dominant easterly trade winds that were observed in the annual wind direction frequency roses. The seasonal diurnal wind speed distributions shown in Figure 5.9 all have the same general form. The minimum wind speeds occurred at or between 0400-0700. The minimum average speed was 1.9 m/s (4.3 mph) at 0400 during the summer season. The maximum wind speeds occurred at 1300. The highest average speed was 6.6 m/s (14.8 mph) during the spring season. The spring season (except at 0400) has the highest diurnal average wind speeds and the summer season (without exception) has the lowest diurnal average wind speed.

Seasonal mixing heights for the West Palm Beach, based on G.C. Holtzworth, differ slightly from those of Miami when they are extracted from Holtzworth's isopheth maps. These values are given in Exhibit Table 5.4.

SEASONAL DIURNAL WIND SPEEDS

WEST PALM BEACH, FL (1970-1974)



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



FIGURE 5,9

EXHIBIT TABLE 5.4

HOLTZWORTH* MIXING HEIGHTS FOR WEST PALM BEACH AND MIAMI

<u>PERIOD</u>	<u>MORNING</u>		<u>AFTERNOON</u>	
	<u>WEST PALM</u>	<u>MIAMI#</u>	<u>WEST PALM</u>	<u>MIAMI#</u>
ANNUAL	800	923	1375	1351
SPRING	800	980	1400	1457
SUMMER	900	1071	1400	1383
FALL	800	933	1350	1341
WINTER	700	707	1175	1221

*G.C. Holtzworth, Mixing Heights, Winds Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States: USEPA AP-101, January, 1972.

#APPENDIX B, Table B-1; all cases, Holtzworth, 1972.

5.4.2 Available Sources of Meteorological Data

When refined dispersion modeling analyses are performed, a full year (or more) of meteorological data is required. The short-term dispersion models require hour-by-hour meteorological data and the long-term models require seasonal or annual average data. The meteorological parameters needed include wind direction, wind speed, temperature, cloud cover, solar insolation, and mixing height. Mixing height is calculated using the CRSTER preprocessor program from surface temperature and upper air soundings of the rate of temperature change with height, the latter of which are usually obtained by balloon measurements.

The nearest NWS station to the proposed waste-to-energy facility is West Palm Beach Airport which is located 9.5 kilometers (5.9 miles) to the southeast. The nearest NWS station for upper air data is Miami Airport located 100 kilometers (62 miles) to the south. The Florida DER provided the most recent five-year surface and upper air meteorological data for the years 1970 thru 1974 inclusive and these data were used for the ISCST model runs.

5.4.3 Procedures for Using the Meteorological Data

Each of the five years of hourly meteorological data are used in separate refined modeling analyses to determine the maximum impacts of the proposed source by itself. The meteorological days which produced the 50 maximum 1, 3, 8 and 24-hour impacts for each of the 5 years were used in subsequent refined multisource modeling analyses to determine compliance with NAAQS consumption. Tables 5-5A thru E list these days for each of the years 1970 thru 1974.

5.5 Receptor Selection

5.5.1 Procedures for Receptor Selection

Receptor selection is an important part of the modeling analysis. Receptors must be selected in such a manner as to ensure that all possible locations of maximum impact are included in the analysis. This can be accomplished by developing receptor grids, supplemented by discrete receptors at critical locations, if necessary. Two types of receptor grids can be used, rectangular or polar.

With a rectangular grid, receptors are placed at the intersections of a selected set of equally spaced map coordinate lines, where the lines are oriented north/south and east/west. The selected set of receptors is usually centered on the proposed source and extends outward a prescribed distance. Available map coordinate systems include latitude/longitude, Universal Transverse Mercator (UTM) meters, and State grid feet. With a polar grid, receptors are placed at the intersections of radials that extend out from the proposed source. In order to develop a polar receptor grid, the PTPLU and PTDIS models were first used to predict maximum hourly impacts of the proposed source, based on PTPLU's built-in set of hypothetical meteorological data. For this analysis, the receptor elevation in PTPLU is set equal to the highest terrain elevation found within 1 kilometer of the proposed source's stack. The proposed source is modeled using PTPLU to determine the distances (without regard to direction) at which

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TABLE 5-5A

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1970

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
49	20	60	33	20	215
155	32	61	60	32	216
161	33	73	61	33	218
164	60	76	121	49	224
175	73	121	129	60	226
176	121	152	242	61	228
180	139	194	269	73	231
187	218	211	270	76	239
190	224	215	279	121	241
216	226	226	280	129	242
306	228	231	292	139	269
318	231	241	328	152	270
	239	270	342	161	274
	241	291		164	279
	270	342		175	280
	274			176	291
	342			180	292
				187	306
				190	318
				194	328
				211	342

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TABLE 5-5B

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1971

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
104	19	33	19	19	196
148	34	58	33	33	207
157	58	114	34	34	211
162	85	186	58	58	214
166	111	214	101	85	215
168	114	268	268	101	220
171	168	309	310	104	256
172	172	319	319	111	268
176	191	320	320	114	309
195	193	321	321	148	319
196	207	327	327	157	320
211	220	336	335	162	321
215	309	353	357	166	327
220	319	357		168	335
256	320	358		171	336
319	353	359		172	353
	356			176	356
	357			186	357
	359			191	358
				193	359
				195	

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TABLE 5-5C

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1972

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
40	16	71	71	16	183
75	17	81	101	17	193
88	62	95	119	40	195
103	71	100	120	62	206
170	94	101	127	71	209
172	95	126	168	75	212
183	100	127	170	81	215
193	101	170	174	88	218
195	119	209	285	94	225
206	126	280	295	95	228
215	127	285	296	100	232
218	133	286	306	101	233
225	169	287		103	280
228	170	294		119	285
232	171	295		120	286
233	193			126	287
	209			127	294
	212			133	295
	233			168	296
	280			169	306
	294			170	351
	295			171	353
	296			172	356
	351			174	
	353				
	356				

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TABLE 5-5D

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1973

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
119	17	17	17	17	177
132	29	29	32	29	179
142	33	32	74	32	182
143	64	33	84	33	186
167	94	74	105	64	189
177	97	84	106	74	191
182	104	97	107	84	209
186	105	104	108	94	217
187	107	106	110	97	221
189	108	107	111	104	234
191	110	108	284	105	258
209	111	111	285	106	259
217	112	121	294	107	261
221	132	122	295	108	262
234	179	123		110	266
258	186	179		111	267
262	259	287		112	284
266	261	294		119	285
267	266	314		121	287
	284	315		122	294
	285			123	295
	296			132	296
	314			142	314
	315			143	315
	355			167	355

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TABLE 5-5E

METEOROLOGICAL DAYS OF OCCURRENCE FOR THE 50 MAXIMUM IMPACTS FOR THE INDICATED TIME PERIOD
BASED ON INITIAL ISCST MODEL RUN FOR THE YEAR 1974

1-HOUR MAXIMUM DAY	3-HOUR MAXIMUM DAY	8-HOUR MAXIMUM DAY	24-HOUR MAXIMUM DAY	CUMULATIVE DAY	
80	39	65	74	39	197
90	47	73	101	47	201
127	73	74	110	65	204
133	74	101	111	73	205
155	83	102	277	74	208
158	92	103	278	80	211
173	101	110	285	83	222
197	102	111	294	90	229
201	111	115	295	92	231
204	115	137	357	101	234
205	130	184		102	247
208	161	278		103	256
211	170	279		110	265
222	184	294		111	267
229	265	295		115	277
231	277	296		127	278
234	278	330		130	279
247	284	357		133	284
256	295			137	285
267	306			155	294
				158	295
				161	296
				170	306
				173	330
				184	357

maximum impacts occur. All maximum impact distances (for each stability category) were input as rings to ISCST and additional rings were placed at prudent locations (three within and others between and beyond the PTPLU maximum impact distances). A total of 27 rings and 70 radials were input yielding 1890 receptors to determine the maximum impacts of the source alone.

Maximum impacts can be found using either a polar or rectangular receptor grid. The polar grid is preferable for single source analysis because it provides better impact resolution near the proposed source. The rectangular grid system is usually preferable for multisource analyses because the impact resolution is the same throughout the grid. However, in this study, because a polar grid was used in the screening modeling analyses performed to determine the size of the modeling area, the same type of grid was used for the refined multisource modeling analyses. Additional discrete receptors were also placed at all monitoring sites within the study area. Table 5-6 lists monitoring station sites together with their locations and pollutants monitored. No other additional discrete receptors were needed for this study.

5.6 Modeling Procedures and Preliminary Analysis Results

5.6.1 PTPLU and PTDIS Screening Modeling Analyses

The initial screening modeling analyses were performed to determine the critical downwind distances using PTPLU and PTDIS models. All receptors and the proposed facility were assumed to be at zero elevations. Maximum impacts depending on stability class were identified at 571, 926, 1046 and 1615 meters. 571 meters is within the Facility boundaries.

5.6.2 ISCST Modeling Analyses

Modeled impacts were calculated at 27 concentric rings of receptors centered on the proposed waste to energy facility stack and spaced at every 6° azimuth. The ring distances from the stack were selected based on the results of the earlier screening modeling analyses performed using the PTPLU model. The ring distances modeled were located 100, 250, 500, 571, 730, 926, 1046, 1500, 1615, 2000, 4000, 5000, 7005, 8956, 9026, 9796, 10000, 11414, 15000, 18045, 20000, 24563, 33308, 41853, 44750, 53136 and 53671 meters from the stack of the proposed waste-to-energy facility. SO₂ impacts were calculated on a 1-hour, 3-hour, 8-hour, 24-hour and annual average basis using ISCST. SO₂ impacts were calculated for each of the five years (1970 through 1974) of available meteorological data. The impacts of each of the other pollutants emitted by the facility were determined based on the ratio of the emission rate of the other pollutant versus the appropriate SO₂ emission rate. (Emission rates based on 2100 TPD except for all sources 1970: 1800 TPD.)

Refined multisource runs were performed for the existing sources in Table 5-7 to determine the maximum combined SO₂ impacts of all sources. Also included in Table 5-7 are the stack parameters and UTM coordinates for each source. Since single source ISCST modeling had determined that the proposed source did not produce significant short-term SO₂ impacts upon the existing sources (see Table 5-8) only the impacts of the existing sources in combination with the proposed source downwind of the proposed source were evaluated by ISCST and ISCLT. Downwind radials were located at the angle

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TABLE 5-6

MONITORING STATION LOCAL ADDRESSES, UTM COORDINATES AND LOCATION (DISTANCE & ANGLE)
RELATIVE TO THE PROPOSED PALM BEACH COUNTY RDF FIRED WATERWALL FURNACE FACILITY

(FACILITY UTM COORDINATES 2960180N; 585820E; UTM ZONE 17)

SITE NO.	ADDRESS (MONITORING CAPABILITY)	UTM COORDINATES ZONE 17	DISTANCE FROM PROPOSED FACILITY (METERS)	DIRECTION RELATIVE TO PROPOSED FACILITY (NORTH = 0 (360) DEGREES) (DEGREES)
1	WEST PALM BEACH WATER TREATMENT PLANT FIRST STREET & TAMARIND AVENUE WEST PALM BEACH, FLORIDA (CO, NO2, METEOROLOGY)	2955030N 0593232E	9026	125
1 A	PALM BEACH COUNTY HEALTH DEPARTMENT 901 EVERNIA STREET WEST PALM BEACH, FLORIDA (SUSPENDED PARTICULATE)	2955030N 0593232E	9026	125
2	NORTH PALM BEACH WATER TREATMENT PLANT 603 ANCHORAGE DRIVE NORTH PALM BEACH, FLORIDA (SUSPENDED PARTICULATE)	2965817N 0592780E	8956	51
3	LAKE WORTH WATER TREATMENT PLANT 301-303 COLLEGE STREET LAKE WORTH, FLORIDA (SUSPENDED PARTICULATE)	2943537N 0592793E	18045	157
4	DELRAY BEACH WATER TREATMENT PLANT 202 NW FIRST STREET DELRAY BEACH, FLORIDA (SUSPENDED PARTICULATE)	2927488N 0592195E	33308	169
5	BOCA RATON FIRE STATION #1 1151 NORTH FEDERAL HIGHWAY BOCA RATON, FLORIDA (SUSPENDED PARTICULATE)	2915768N 05913137E	44750	173

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TABLE 5.6 Cont'd

MONITORING STATION LOCAL ADDRESSES, UTM COORDINATES AND LOCATION (DISTANCE & ANGLE)
RELATIVE TO THE PROPOSED PALM BEACH COUNTY RDF FIRED WATERWALL FURNACE FACILITY

(FACILITY UTM COORDINATES 2960180N; 585820E; UTM ZONE 17)

SITE NO.	ADDRESS (MONITORING CAPABILITY)	UTM COORDINATES ZONE 17	DISTANCE FROM PROPOSED FACILITY (METERS)	DIRECTION RELATIVE TO PROPOSED FACILITY (NORTH = 0 (360) DEGREES) (DEGREES)
6	SOUTHWEST FIRE DEPARTMENT 1180 SOUTH MILITARY TRAIL WEST PALM BEACH, FLORIDA (SUSPENDED PARTICULATE)	2949018N 0588207E	11414	168
7	COLLEGE OF BOCA RATON 1151 NORTH FEDERAL HIGHWAY BOCA RATON, FLORIDA (SUSPENDED PARTICULATE)	2918354N 0587320E	41853	178
8	SOUTH FLORIDA WATER MANAGEMENT PUMP STATION TWENTY MILE BEND STATE ROAD 80 (SUSPENDED PARTICULATE, OZONE, METEOROLOGY)	2951402N 0562879E	24563	249
9	PAHOKEE SEWAGE TREATMENT PLANT 1050 McCLURE ROAD PAHOKEE, FLORIDA (SUSPENDED PARTICULATE)	2964200N 0532300E	53671	274
10	ROYAL PALM BEACH R.V. AREA 10999 OKEECHOBEE BOULEVARD ROYAL PALM BEACH, FLORIDA (OZONE, METEOROLOGY)	2954150N 0578100E	9796	232
11	PALM BEACH COUNTY HEALTH DEPARTMENT WAREHOUSE 2030 AVENUE "L" RIVIERA BEACH, FLORIDA (SULFUR DIOXIDE)	2962350N 0592490E	7005	72
12	BELLE GLADE HEALTH DEPARTMENT 1024 NW AVENUE "D" BELLE GLADE, FLORIDA (SUSPENDED PARTICULATE)	2953082N 0533160E	53136	262

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TABLE 5-7

STACK PARAMETERS OF MAJOR SOURCES WITHIN 50 KM OF THE PROPOSED PALM BEACH COUNTY
RDF FIRED SPREADER STOKER FURNACE FACILITY

(FACILITY UTM COORDINATES 2960180N; 585820E; UTM ZONE 17)

SOURCE	EMISSION POINT NO.	VOLUMETRIC FLOW (M3/SEC)	STACK DIAMETER (METERS)	STACK HEIGHT (METERS)	EXIT VELOCITY (MPS)	EXIT TEMPERATURE (DEG K)	SO2 EMISSION (GPS)
PRATT & WHITNEY	UNIT 1	42.83	2.29	19.96	10.40	533.	67.95
	UNIT 2	42.83	2.29	19.96	10.40	533.	67.95
LAKE WORTH UTILITIES	UNIT S-1	12.34	1.52	18.29	6.80	433.	36.3
	UNIT S-2	11.25	1.52	18.29	6.20	434.	36.3
	UNIT S-3	27.44	2.13	38.10	7.70	408.	103.9
	UNIT S-4	39.95	2.29	38.10	9.70	408.	133.9
	UNIT S-5	133.70	3.05	22.86	18.30	450.	11.6
FLORIDA POWER AND LIGHT	UNIT 2	103.34	4.57	45.72	6.30	430.	54.2
	UNIT 3	353.50	4.88	90.83	18.90	408.	349.3
	UNIT 4	353.50	4.88	90.83	18.90	408.	349.3

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TABLE 5-8

SO2 IMPACT OF THE PROPOSED FACILITY ON EXISTING MAJOR SO2 SOURCES
WITHIN THE MODELING AND SCREENING AREA

(FACILITY UTM COORDINATES 2960180N; 585820E; UTM ZONE 17)

SOURCE NO.	NAME & ADDRESS	DISTANCE (METERS)/ DIRECTION (DEGREES) (NORTH = 0 (360) DEGREES) RELATIVE TO PROPOSED FACILITY	MET YEAR	MAXIMUM IMPACT OF PROPOSED FACILITY ON THE EXISTING SOURCE (UG/M3)		
				3-HOUR	24-HOUR	ANNUAL MEAN
1	PRATT & WHITNEY 301-303 COLLEGE STREET LAKE WORTH, FLORIDA UTM ZONE 17; 2974400N; 0565500E	24801/305	1970	11.6	2.2	0.24
			1971	12.7	2.9	0.30
			1972	11.7	3.5	0.30
			1973	13.0	4.3	0.38
			1974	12.3	3.3	0.32
2	FLORIDA POWER & LIGHT RIVIERA BEACH, FLORIDA UTM ZONE 17; 2960600N; 0594200E	8391/ 87	1970	23.0	4.3	0.26
			1971	16.6	4.1	0.25
			1972	17.4	4.4	0.21
			1973	17.9	3.9	0.21
			1974	16.7	3.3	0.22
3	LAKE WORTH UTILITIES AUTHORITY TOM G. SMITH MUNICIPAL POWER PLANT 127 COLLEGE STREET LAKE WORTH, FLORIDA 33460 UTM ZONE 17; 2943700N; 0592800E	17897/157	1970	9.4	2.5	0.18
			1971	15.2	2.9	0.17
			1972	15.0	2.1	0.18
			1973	13.7	3.6	0.21
			1974	12.7	2.4	0.17

from each existing source to the proposed source and at 1° increments and decrements to $\pm 5^\circ$ or an 11° sector downwind of the proposed source. Rings were selected from the minimum fence line distance of 730 meters and for every 100 meters starting at 800 meters thru 1700 meters inclusive. This procedure yielded a total of 33 radials and 11 rings which were used for all the refined multisource ISCST and ISCLT model runs.

5.6.3 Modeling Results

The results of the five years of single source ISCST modeling analysis are summarized by year in Tables 5-9A thru E. Cumulative 5-year results are presented in Table 5-9F. The data in Table 5-9F show that the proposed facility will not produce any impacts that exceed ambient air quality standards or PSD requirements.

The results of five years of ISCST and ISCLT multisource modeling analysis are summarized in Table 5-10.

Table 5-11 provides an overall summary of both single and multisource impacts as well as background levels and the Air Quality and PSD standards and demonstrates that the proposed facility's air quality impact together with other sources will not exceed ambient air quality or PSD requirements. These results are portrayed in Figures 5-10 and 5-11.

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TABLE 5-9A

IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1970

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES

	1-HOUR (1046M; 108D) (D175; P12)	3-HOUR (1500M; 264D) (D239; P05)	8-HOUR (1500M; 262D) (D231; P02)	24-HOUR (1500M; 252D) (D121)	ANNUAL ARITHMETIC MEAN (1) (1500M; 264D)
CARBON MONOXIDE	143.	96.0	81.1	34.2	4.80
NITROGEN DIOXIDE	47.7	32.0	27.0	11.4	1.60
SULFUR DIOXIDE	107.	72.0	60.9	25.6	3.60
CHLORIDES	41.7	28.0	23.7	10.0	1.40
VOLATILE ORGANIC COMPOUNDS	2.4	1.6	1.4	5.7E-01	8.0E-02
PARTICULATE MATTER	7.8	5.2	4.4	1.9	0.26
SULFURIC ACID MIST	4.8E-03	3.2E-03	2.7E-03	1.1E-03	1.6E-04
FLUORIDES	4.8E-01	3.2E-01	2.7E-01	1.1E-01	1.6E-02
LEAD	1.7E-02	1.1E-02	9.5E-03	4.0E-03	5.6E-04
MERCURY	4.8E-02	3.2E-02	2.7E-02	1.1E-02	1.6E-03
BERYLLIUM	1.1E-04	7.2E-05	6.1E-05	2.6E-05	3.6E-06
2,3,7,8-TCDD	1.0E-06	6.8E-07	5.7E-07	2.4E-07	3.4E-08

NOTES

1. THE ABOVE DATA WAS DEVELOPED BY MODELING THE IMPACTS OF THE SO2 EMISSION THEN MULTIPLYING THE RATIO OF THE COMPONENT EMISSION TO THE SO2 EMISSION BY THE MAXIMUM SO2 IMPACT TO DETERMINE THE COMPONENT'S IMPACT.

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TABLE 5-9B

IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1971

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES

	1-HOUR (730M; 300D) (D215; P11)	3-HOUR (1500M; 276D) (D186; P04)	8-HOUR (1500M; 270D) (D214; P02)	24-HOUR (1500M; 258D) (D320)	ANNUAL ARITHMETIC MEAN (1) (1615M; 270D)
CARBON MONOXIDE	173.	88.8	54.7	34.6	3.10
NITROGEN DIOXIDE	57.9	29.6	18.3	11.5	1.03
SULFUR DIOXIDE	130.	66.6	41.1	26.0	2.33
CHLORIDES	50.6	25.9	16.0	10.1	0.90
VOLATILE ORGANIC COMPOUNDS	2.9	1.5	9.1E-01	5.8E-01	5.2E-02
PARTICULATE MATTER	9.4	4.8	3.0	1.9	1.7E-01
SULFURIC ACID MIST	5.8E-03	3.0E-03	1.8E-03	1.2E-03	1.0E-04
FLUORIDES	5.8E-01	3.0E-01	1.8E-01	1.2E-01	1.0E-02
LEAD	2.0E-02	1.0E-02	6.4E-03	4.0E-03	3.6E-04
MERCURY	5.8E-02	3.0E-02	1.8E-02	1.2E-02	1.0E-03
BERYLLIUM	1.3E-04	6.7E-05	4.1E-05	2.6E-05	2.3E-06
2,3,7,8-TCDD	1.2E-06	6.3E-07	3.9E-08	2.5E-07	2.2E-08

NOTES

1. THE ABOVE DATA WAS DEVELOPED BY MODELING THE IMPACTS OF THE SO2 EMISSION THEN MULTIPLYING THE RATIO OF THE COMPONENT EMISSION TO THE SO2 EMISSION BY THE MAXIMUM SO2 IMPACT TO DETERMINE THE COMPONENT'S IMPACT.

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TABLE 5-9C

IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1972

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES					
	1-HOUR (730M; 70D) (D236; P12)	3-HOUR (1500M; 282D) (D170; P04)	8-HOUR (1046M; 249D) (D127; P02)	24-HOUR (730M; 240D) (D295)	ANNUAL ARITHMETIC MEAN (1) (1615M; 270D)
CARBON MONOXIDE	178.	85.3	55.7	27.6	3.20
NITROGEN DIOXIDE	59.4	28.4	18.6	9.2	1.07
SULFUR DIOXIDE	134.	64.0	41.8	20.7	2.40
CHLORIDES	52.0	24.9	14.2	8.1	0.93
VOLATILE ORGANIC COMPOUNDS	3.0	1.4	9.3E-01	4.6E-01	5.3E-02
PARTICULATE MATTER	9.7	4.6	3.0	1.5	0.17
SULFURIC ACID MIST	5.9E-03	2.8E-03	1.9E-03	9.2E-04	1.1E-04
FLUORIDES	5.9E-01	2.8E-01	1.9E-01	9.2E-02	1.1E-02
LEAD	2.1E-02	1.0E-02	6.5E-02	3.2E-03	3.7E-04
MERCURY	5.9E-02	2.8E-02	1.9E-02	9.2E-03	1.1E-03
BERYLLIUM	1.3E-04	6.4E-05	4.2E-05	2.1E-05	2.4E-06
2,3,7,8-TCDD	1.3E-06	6.0E-07	3.9E-07	2.0E-07	2.3E-08

NOTES

1. THE ABOVE DATA WAS DEVELOPED BY MODELING THE IMPACTS OF THE SO2 EMISSION THEN MULTIPLYING THE RATIO OF THE COMPONENT EMISSION TO THE SO2 EMISSION BY THE MAXIMUM SO2 IMPACT TO DETERMINE THE COMPONENT'S IMPACT.

HAYDEN-WEGMAN /
BARKER, OSHA & ANDERSON
ENGINEERS - PLANNERS

TABLE 5-9D

IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1973

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES

	1-HOUR (730M; 120D) (D258; P13)	3-HOUR (730M; 110D) (D267; P04)	8-HOUR (1500M; 300D) (D163; P02)	24-HOUR (730M; 270D) (D107)	ANNUAL ARITHMETIC MEAN (1) (1615M; 270D)
CARBON MONOXIDE	182.	86.5	55.5	31.7	3.40
NITROGEN DIOXIDE	60.6	28.8	18.5	10.6	1.13
SULFUR DIOXIDE	136.	64.9	41.6	23.8	2.55
CHLORIDES	53.0	25.2	16.2	9.2	0.99
VOLATILE ORGANIC COMPOUNDS	3.0	1.4	9.3E-01	5.3E-01	5.7E-02
PARTICULATE MATTER	9.9	4.7	3.0	1.7	0.18
SULFURIC ACID MIST	6.1E-03	2.9E-03	1.9E-03	1.1E-03	1.1E-04
FLOURIDES	6.1E-01	2.9E-01	1.9E-01	1.1E-01	1.1E-02
LEAD	2.1E-02	1.0E-02	6.5E-03	3.7E-03	4.0E-04
MERCURY	6.1E-02	2.9E-02	1.9E-02	1.1E-02	1.1E-03
BERYLLIUM	1.4E-04	6.5E-05	4.2E-05	2.4E-05	2.6E-06
2,3,7,8-TCDD	1.3E-06	6.1E-07	3.9E-07	2.2E-07	2.4E-08

NOTES

1. THE ABOVE DATA WAS DEVELOPED BY MODELING THE IMPACTS OF THE SO2 EMISSION THEN MULTIPLYING THE RATIO OF THE COMPONENT EMISSION TO THE SO2 EMISSION BY THE MAXIMUM SO2 IMPACT TO DETERMINE THE COMPONENT'S IMPACT.

HAYDEN-WEGMAN /
BARKER, OSHA & ANDERSON
ENGINEERS - PLANNERS

TABLE 5-9E

IMPACT OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEAR 1974

HIGHEST 2ND HIGH MODELED CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES					
	1-HOUR (730M; 80D) (D127; P11)	3-HOUR (1500M; 276D) (D184; P05)	8-HOUR (926M; 258D) (D101; P02)	24-HOUR (730M; 260D) (D111)	ANNUAL ARITHMETIC MEAN (1) (1615M; 270D)
CARBON MONOXIDE	175.	91.9	59.3	37.2	3.53
NITROGEN DIOXIDE	58.2	30.7	19.8	12.4	1.18
SULFUR DIOXIDE	131.	69.0	44.5	27.9	2.64
CHLORIDES	50.1	26.8	17.3	10.9	1.03
VOLATILE ORGANIC COMPOUNDS	2.9	1.5	1.0	6.2E-01	5.9E-02
PARTICULATE MATTER	9.5	5.0	3.2	2.0	0.19
SULFURIC ACID MIST	5.8E-03	3.1E-03	2.0E-03	1.2E-03	1.2E-04
FLUORIDES	5.8E-01	3.1E-01	2.0E-01	1.2E-01	1.2E-02
LEAD	2.0E-02	1.1E-02	6.9E-03	4.3E-03	4.1E-04
MERCURY	5.8E-02	3.1E-02	2.0E-02	1.2E-02	1.2E-03
BERYLLIUM	1.3E-04	6.9E-05	4.4E-05	2.8E-05	2.6E-06
2,3,7,8-TCDD	1.2E-06	6.5E-07	4.2E-07	2.6E-07	2.5E-08

NOTES

1. THE ABOVE DATA WAS DEVELOPED BY MODELING THE IMPACTS OF THE SO2 EMISSION THEN MULTIPLYING THE RATIO OF THE COMPONENT EMISSION TO THE SO2 EMISSION BY THE MAXIMUM SO2 IMPACT TO DETERMINE THE COMPONENT'S IMPACT.

HAYDEN-WEGMAN /
BARKER, OSHA & ANDERSON
ENGINEERS - PLANNERS

TABLE 5-9F

PEAK SECOND-HIGH IMPACTS OF PALM BEACH COUNTY RDF FIRED SPREADER STOKER FURNACES ON AIR QUALITY
BASED ON ISCST MODEL FOR METEOROLOGICAL YEARS 1970-1974

PEAK MODELED SECOND-HIGH CONCENTRATION (UG/M3) FOR THE INDICATED AVERAGING TIMES AND (YEAR)					
	1-HOUR (1973) (730M; 120D) (D258; P13)	3-HOUR (1970) (1500M; 264D) (D239; P05)	8-HOUR (1970) (1500M; 262D) (D231; P02)	24-HOUR (1974) (730M; 260D) (D111)	ANNUAL ARITHMETIC MEAN (1) (1970) (1500M; 264D)
CARBON MONOXIDE	182.	96.0	81.1	37.2	4.80
NITROGEN DIOXIDE	60.6	32.0	27.0	12.4	1.60
SULFUR DIOXIDE	136.	72.0	60.9	27.9	3.60
CHLORIDES	53.0	28.0	23.7	10.9	1.40
VOLATILE ORGANIC COMPOUNDS	3.0	1.6	1.4	6.2E-01	8.0E-02
PARTICULATE MATTER	9.9	5.2	4.4	2.0	0.26
SULFURIC ACID MIST	6.1E-03	3.2E-03	2.7E-03	1.2E-03	1.6E-04
FLUORIDES	6.1E-01	3.2E-01	2.7E-01	1.2E-01	1.6E-02
LEAD	2.1E-02	1.1E-02	9.5E-03	4.3E-03	5.6E-04
MERCURY	6.1E-02	3.2E-02	2.7E-02	1.2E-02	1.6E-03
BERYLLIUM	1.4E-04	7.2E-05	6.1E-05	2.8E-05	3.6E-06
2,3,7,8-TCDD	1.3E-06	6.8E-07	5.7E-07	2.6E-07	3.4E-08

NOTES

1. THE ABOVE DATA WAS DEVELOPED BY MODELING THE IMPACTS OF THE SO2 EMISSION THEN MULTIPLYING THE RATIO OF THE COMPONENT EMISSION TO THE SO2 EMISSION BY THE MAXIMUM SO2 IMPACT TO DETERMINE THE COMPONENT'S IMPACT.

TABLE 5-10

CUMULATIVE IMPACTS OF PALM BEACH COUNTY RDF-FIRED
SPREADER STOKER FURNACES AND OTHER MAJOR
SOURCES OF SO₂ ON AIR QUALITY
(BASIS: RDF @ 2100 TPD, 9 LB S/TON RDF)

YEAR	AVERAGING TIME	ALL SOURCES PEAK CONCENTRATION		RDF SOURCE CONTRIBUTION		LOCATION	
		ug/m ³	MET. DAY	ug/m ³	MET. DAY	METERS	DEGREE
1970##	3 HR*	157	318/8	31	328/8#	1700	130
	24 HR*	63	269/1	21	269/1	730	269
	ANNUAL	14		5		1300	270
1971	3 HR*	118	168/5	53	220/4#	1300	269
	24 HR*	40	336/1	16	319/1#	730	262
	ANNUAL	11		3		1300	270
1972	3 HR*	110	218/4	56	60/5#	730	272
	24 HR*	52	168/1	17	211/1#	730	265
	ANNUAL	12		4		1400	270
1973	3 HR*	150	104/7	51	104/7	730	269
	24 HR*	63	17/1	22	17/1	1600	265
	ANNUAL	12		4		1400	270
1974	3 HR*	277	204/8	53	133/5#	1700	263
	24 HR*	68	357/1	21	74/1#	1200	269
	ANNUAL	12		4		1300	270

5 YEAR MAXIMUMS

1974	3 HR*	277	204/8	53	133/5#	1700	263
1974	24 HR*	68	357/1	21	74/1#	1200	269
1970	ANNUAL	14		5		1300	270

* Maximum 2nd high impact

Concentration for same location as all sources (NOT CONCURRENT OCCURENCES)

Based on 1800 TPD, 9 lb s/ton RDF

**HAYDEN-WEGMAN /
BARKER, OSHA & ANDERSON
ENGINEERS - PLANNERS**

TABLE 5-11

SUMMARY OF MAXIMUM AIR QUALITY IMPACTS OF THE PROPOSED PALM BEACH COUNTY WASTE TO ENERGY FACILITY

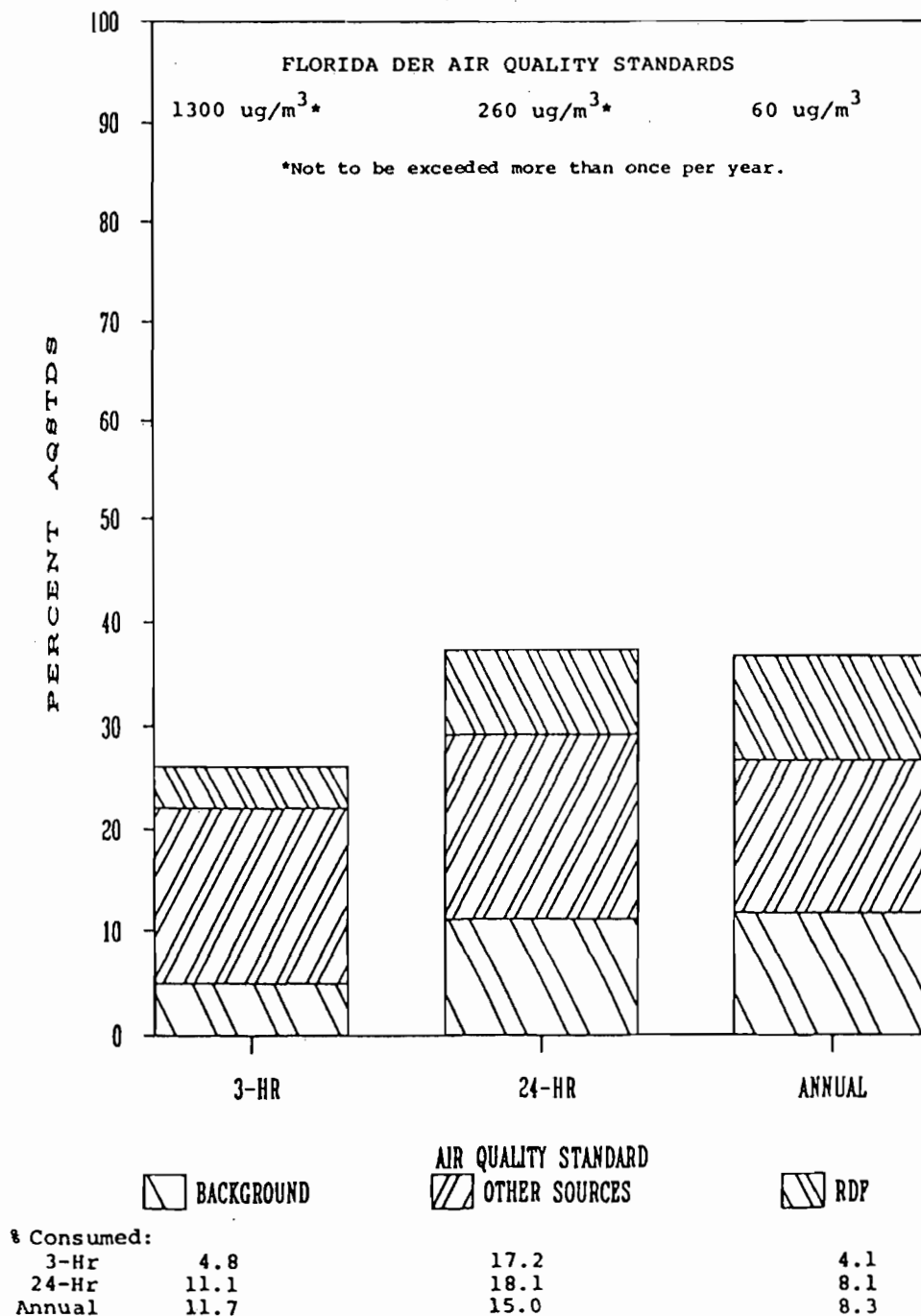
POLLUTANT	AMBIENT AIR QUALITY STANDARD (UG/M3)	PREVENTION OF SIGNIFICANT DETERIORATION (PSD) INCREMENT (UG/M3)	BACKGROUND CONCENTRATION (UG/M3) (2)	PALM BEACH COUNTY WASTE TO ENERGY FACILITY IMPACT (UG/M3) (3)	TOTAL POINT SOURCE IMPACT (UG/M3) (5)
SULFUR DIOXIDE					
MAX 3-HOUR CONCENTRATION	1300 (1)	512	63	72	277
MAX 24-HOUR CONCENTRATION	260 (1)	91	29	28	68
ANNUAL ARITHMETIC MEAN	60	20	7	4	15
PARTICULATE MATTER					
MAX 24-HOUR CONCENTRATION	150 (1)	37	107	2	NC
ANNUAL GEOMETRIC MEAN	60	19	43	0.3	NC
NITROGEN DIOXIDE					
ANNUAL ARITHMETIC MEAN	100	NO STANDARD	20	2	22 (6)
OZONE					
DAILY MAX 1-HOUR CONCENTRATION	235 (1)	NO STANDARD	172	NE	NA
LEAD					
QUARTERLY ARITHMETIC MEAN	1.5	NO STANDARD	NM	4.3E-03 (4)	1.1E-02 (4)
CARBON MONOXIDE					
MAX 1-HOUR CONCENTRATION	40000 (1)	NO STANDARD	9943	182	NC
MAX 8-HOUR CONCENTRATION	10000 (1)	NO STANDARD	4500	81	NC

NA = NOT APPLICABLE; NC = NOT CALCULATED SINCE PROPOSED FACILITY'S IMPACT IS BELOW SIGNIFICANCE LEVEL;
NE = NOT EMITTED; NM = NOT MONITORED.

1. CONCENTRATION LIMITS NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.
2. BACKGROUND INFORMATION IS BASED UPON DATA COMPILED BY THE PALM BEACH COUNTY ANNUAL REPORT DATED 1983.
3. DETAILED MODELING RESULTS FOR THE PROPOSED SOURCE COVERING 5 YEARS OF HOURLY METEOROLOGICAL DATA IS INCLUDED IN TABLES 5-9A THRU 9F. (EXIT VELOCITY = 24.9 M/S)
4. QUARTERLY MEAN NOT GENERATED. VALUE CITED IS 24-HOUR MAXIMUM 2ND-HIGH.
5. TOTAL IMPACTS ARE INCLUSIVE OF THE PROPOSED SOURCE. DETAILED INFORMATION IS INCLUDED IN TABLE 5-10. (VS = 21.34 M/S)
6. TOTAL IMPACTS WERE ASSUMED TO BE EQUAL TO BACKGROUND LEVELS SINCE NO2 EMISSION LEVELS OF OTHER SOURCES WERE NOT READILY AVAILABLE AND THE PROPOSED SOURCE'S IMPACT WAS VIRTUALLY AT THE SIGNIFICANCE LEVEL (1.6 UG/M3 VS 1.0 UG/M3).

CONTRIBUTIONS TO AQSTD

SULFUR DIOXIDE IMPACT



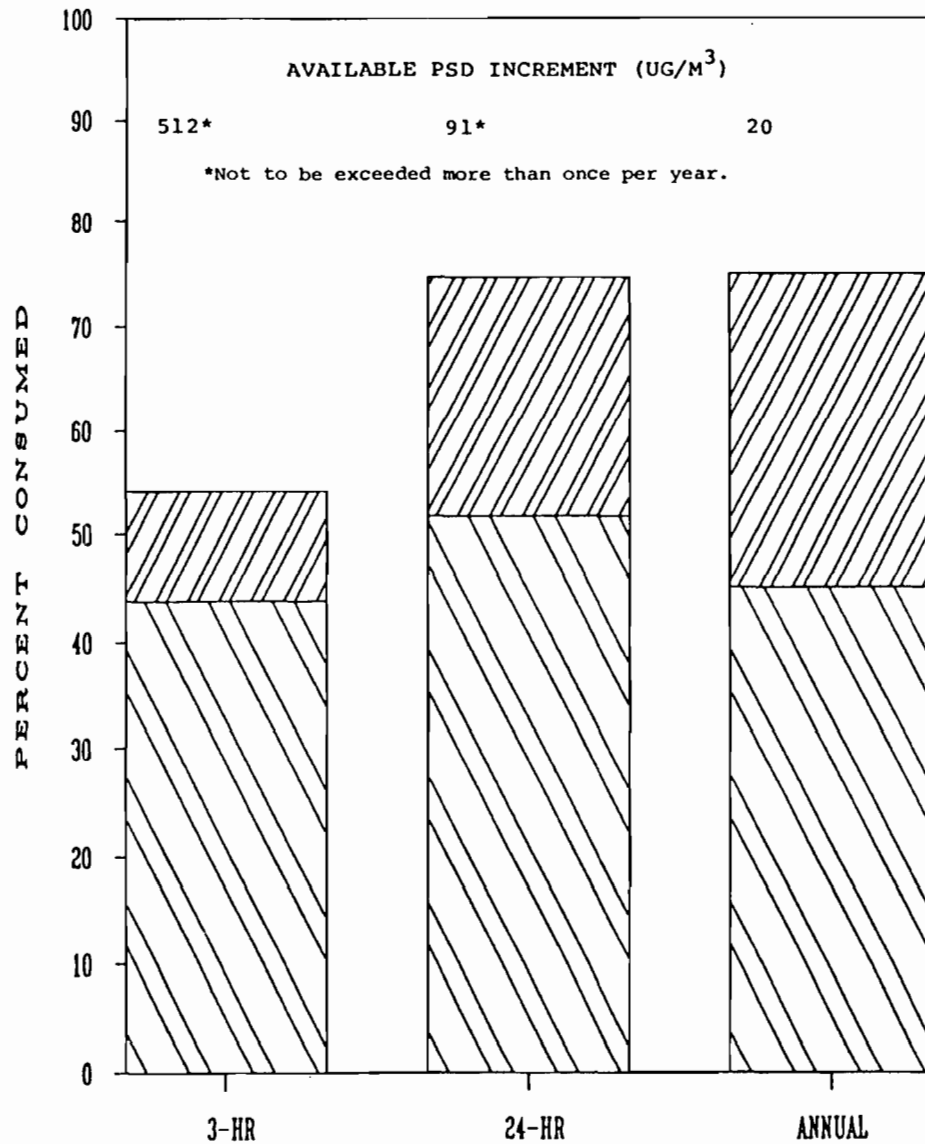
PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



FIGURE 5.10

PSD INCREMENT

SULFUR DIOXIDE IMPACT



% Consumed:	3-Hr	43.8	10.4
	24-Hr	51.6	23.1
	Annual	45.0	25.0

PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



FIGURE 5.11

6.0 SUMMARY AND CONCLUSIONS

An analysis of best available control technology and an evaluation of ambient impacts have been presented herein for the proposed Palm Beach County waste-to-energy facility. It has been determined that the proposed facility is subject to PSD review.

The results of the BACT analysis indicate that the only recommended add-on control device is an electrostatic precipitator for the control of particulate matter. Sulfur dioxide emissions will be minimized through the use of refuse derived fuel which inherently has a low sulfur content and by utilizing No. 2 fuel oil or natural gas as available as an auxiliary fuel. Good combustion design and practice is proposed as BACT for nitrogen oxides, carbon monoxide and volatile organic compounds.

Predicted concentrations of the acid gas pollutants are calculated to be well below state standards. Trace metal emissions will be controlled as particulate matter in the electrostatic precipitator.

An extensive air quality impact analyses has been performed. This analysis demonstrates that all applicable PSD increments, federal and state air quality standards will not be exceeded as a result of the proposed Palm Beach County waste-to-energy facility acting alone or in concert with other existing sources.

Assuming that all VOC emissions are converted to ozone, the maximum 1 hour source impact in any year would be .002 ppm. Based on local 1982-83 ambient air quality data as background, this maximum impact would not exceed the ozone standard.

There are no existing legal ambient air quality standards for the compound 2,3,7,8-TCDD. The New York State Department of Environmental Conservation in its Air Guide No. 1 (revised 12/15/83) has recommended an acceptable ambient air level (AAL) on an annual average basis of 9.2×10^{-8} ug/m³. The maximum annual impact generated by the conservative assumptions of this report is 3.4×10^{-8} .

On an annual basis, all impacts in the West Palm Beach Water Catchment Area will be less than any established de-minus levels. In making this determination, a variety of conservative assumptions were employed in the analysis. For example, maximum design capacity operations were assumed for all 8,760 hours of the year; other major sources were assumed to fire oil continuously when in fact natural gas which contain virtually no sulfur is predominantly used; and the other source category includes Florida Power and Light whose operations will be offset by the electrical output of the proposed facility. Because of these and other conservative assumptions, it can be stated with confidence that public health will be protected with an adequate margin of safety.

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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
APPLICATION TO CONSTRUCT/OPERATE AIR POLLUTANT EMISSION SOURCE

APIS
☐

1. Type of Application Construction ☒ Operation ☐ Site ☒ Amend- Init. Modif. Init. Renewal Cert. ment ☒ ☐ ☒ ☐ ☒ ☐					2. Source Identification/Jurisdiction District Office County Facility Source 				
3. Facility Owner (Company Name) PALM BEACH COUNTY SOLID WASTE AUTH.			4. Facility Owner-ship Code U		5. Facility Name/Location 2900 FT. WEST FLORIDA TURNPIKE 2600 FT. NORTH 45th STREET				
6. City N/A		7. County PALM BEACH	8. Facility Zip 33412		9. Facility Type CDS VOC				
10. Facility Zone East North UTM Coordi- 17 585.8 2960.2 nates (km)			11. Facility Latitude Longitude Lat./Long. 26° 46' 05" 80° 08' 30" (°, '")						
12. Authorized Agent (Address and Telephone) Name S. G. TIMMERMAN Title ASSOCIATE Organization/Firm HAYDEN-WEGMAN, INC.									
Street or P.O. Box 5114 OKEECHOBEE BLVD. 2-B			City W. PALM BEACH		St. Zip Telephone FL 33409 305-471-0444				
13. STATEMENT BY OWNER OR AUTHORIZED AGENT I, the undersigned, am the owner or authorized representative* of the facility described above. I certify that the statements made in this application for a permit are true, correct, and complete to the best of my knowledge and belief. Further, I agree to operate and maintain the air pollution source and pollution control equipment described in this application so as to comply with all provisions of Chapter 403, Florida Statutes, and all applicable rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable, and I will promptly notify the department upon sale or legal transfer of the permitted source. *Attach letter of authorization *Signed: <u>George E. Cranston</u> Date: <u>April 25, 1985</u>									
14. Prof. Engineer (Address and Telephone) Name GEORGE E. CRANSTON Fla. Regis. No. 21733 Organization/Firm HAYDEN-WEGMAN, INC.									
Street or P.O. Box 330 W. 42nd STREET			City NEW YORK		St. Zip Telephone NY 10036 212-563-6900				
15. STATEMENT BY PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.) I, the undersigned, certify that the engineering features of this project have been designed or examined by me and found to be in conformity with modern engineering principles applicable to the control of emissions of the air pollutants characterized in this permit application. There is reasonable assurance, in my professional judgment, that the air pollution source and the pollution control equipment, when properly operated and maintained, will comply with all applicable statutes of the State of Florida and all applicable rules and regulations of the department. Signed: <u>George E. Cranston</u> Date: <u>4-24-85</u> (Affix Seal)									
16. Facility Comment 									

17. Permit Application Processing Information	Fee Paid	Permit/PPS Number Assigned This App.	Date Comp. YY/MM/DD	Data Issued YY/MM/DD	Date Exp. YY/MM/DD	AOR Req.				
18. Description of Source Addressed in This Application 250 FT. HIGH STACK FOR 2-350 MILLION BTU/HR REFUSE DERIVED FUEL FIRED BOILERS				19. Current DER Permit No. No. N/A						
20. Init. Const. Date - YY/MM/DD 87/00/00										
21. Date(s) and Description(s) of Any Previous Modification(s) to Source N/A										
22. Nature and Extent of Proposed Project PROJECT IS A SOLID WASTE RESOURCE RECOVERY FACILITY WHICH SHALL GENERATE ELECTRIC POWER FROM COMBUSTION OF REFUSE DERIVED FUEL AND RECOVER RECYCLABLE MATERIALS. THE POLLUTION CONTROL SHALL BE A FOUR FIELD ELECTROSTATIC PRECIPITATOR AND SHALL MEET BACT FOR ALL APPLICABLE POLLUTANTS.										
23. Projected Dates of Initiation and Completion of Construction 87/00/00 - 89/00/00										
24. Source Codes	SIC	Type	25. Source Regs.	NSPS	NESHAP	111(d)	PSD	NAA	NSR	RACT
26. Boiler Data	Type	SPREADER STOKER	Design Heat Input Rate (10 ⁶ Btu/hr)	2 UNITS	350 EACH	27. Generator Design Output (gross MW)	50	28. Pct. fuel for space heat		
29. Incinerator Data	Type	Design Capacity (tpd)	Type of Waste	Dwell Time (sec.)	After-burner	Temp. °F				
30. Liq. Storage Tank Data	Type	Capac-ity (10 ³ bbl)	Product	Condition						
31. Normal Operating Schedule	hr/dy	dy/wk	wk/yr	32. Normal % Operation By Season	DJF	MAM	JJA	SON		
	24	7	50		25	25	25	25		
33. Re-quested Limit(s)	hr/dy	dy/wk	wk/yr	hr/yr	34. Allow-able Oper. Limit(s)	hr/dy	dy/wk	wk/yr	hr/yr	
	24	7	52	8760						
35. Emission Point	36. Stack Ht. (ft.)	37. Exit Diam. (ft.)	38. Exit Temp. (°F)	39. Water Vapor (%)	40. Actual Volumetric Flow Rate (acfm)	41. Dry Standard Flow Rate (dscfm)	42. Plume Ht. (ft.)			
Type ID on Diagram										
3	250	6.69 EACH	450	8% BY WEIGHT	172,377 EACH	88,650	0			
43. Bldg. Dimensions (ft.)	Ht. 120	Width 110	44. Point UTM Coordinates	East	North	45. Source Numbers with Common Stack				
46. Source Comment										

47. Description of Process

SPREADER STOKER FURNACES (2) FIRED WITH REFUSE DERIVED FUEL
MANUFACTURED FROM MUNICIPAL SOLID WASTE.

48a. Component 'a'
Process or Fuel
Type Employed

49a. Source Classification Code for Process/Fuel Type 'a'	50a. Process/Fuel Usage Rates					51a. Fuel Characteristics		
	Max. Hourly	Est. Annual	Requested Ann. Limit	Annual Limit	Unit Code	S (%)	Ash (%)	10 ⁶ Btu/Unit (As Fired)
	58.3 TONS	438,000 TONS	-		99 (RDF)	0.22	13.62	12.328 x 10 ⁶ TON RDF

52a. SCC Comment for Process/Fuel 'a'

48b. Component 'b'
Process or Fuel
Type Employed

49b. Source Classification Code for Process/Fuel Type 'b'	50b. Process/Fuel Usage Rates					51b. Fuel Characteristics		
	Max. Hourly	Est. Annual	Requested Ann. Limit	Annual Limit	Unit Code	S (%)	Ash (%)	10 ⁶ Btu/Unit (As Fired)

52b. SCC Comment for Process/Fuel 'b'

48c. Component 'c'
Process or Fuel
Type Employed

49c. Source Classification Code for Process/Fuel Type 'c'	50c. Process/Fuel Usage Rates					51c. Fuel Characteristics		
	Max. Hourly	Est. Annual	Requested Ann. Limit	Annual Limit	Unit Code	S (%)	Ash (%)	10 ⁶ Btu/Unit (As Fired)

52c. SCC Comment for Process/Fuel 'c'

48d. Component 'd'
Process or Fuel
Type Employed

49d. Source Classification Code for Process/Fuel Type 'd'	50d. Process/Fuel Usage Rates					51d. Fuel Characteristics		
	Max. Hourly	Est. Annual	Requested Ann. Limit	Annual Limit	Unit Code	S (%)	Ash (%)	10 ⁶ Btu/Unit (As Fired)

52d. SCC Comment for Process/Fuel 'd'

53. Description of Control Equipment										
FOUR FIELD ELECTROSTATIC PRECIPITATOR (SUPPLIER NOT SELECTED)										
54. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal										
FLY ASH WILL BE QUENCHED WITH BOTTOM ASH; DEWATERED AND DISPOSED IN CLASS 1 LANDFILL										
55a. Pol- lutant 'a' Emitted	56a. Type Control Equipment		57a. Effi- ciency	58a. Maximum Emissions - Normal Cond.		59a. Emission Meth.	60a. Re- quested Emission Limit	61a. Allowable Emission	62a. Po- tential Emission	63a. Comp. Test Freq.
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	
PM	010		99	38	166	2				
64a. Requested Limit in Units Other Than lb/hr				0.03 GRAINS/DSCF @ 12% CO ₂				65a. Allowable Emission in Units Other Than lb/hr		66a. Reg. Code
55b. Pol- lutant 'b' Emitted	56b. Type Control Equipment		57b. Effi- ciency	58b. Maximum Emissions - Normal Cond.		59b. Emission Meth.	60b. Re- quested Emission Limit	61b. Allowable Emission	62b. Po- tential Emission	63b. Comp. Test Freq.
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	
SO ₂	0	0	0	525	2300	2				
64b. Requested Limit in Units Other Than lb/hr				65b. Allowable Emission in Units Other Than lb/hr				66b. Reg. Code		
55c. Pol- lutant 'c' Emitted	56c. Type Control Equipment		57c. Effi- ciency	58c. Maximum Emissions - Normal Cond.		59c. Emission Meth.	60c. Re- quested Emission Limit	61c. Allowable Emission	62c. Po- tential Emission	63c. Comp. Test Freq.
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	
CO	0	0	0	700	3066	2				
64c. Requested Limit in Units Other Than lb/hr				65c. Allowable Emission in Units Other Than lb/hr				66c. Reg. Code		
55d. Pol- lutant 'd' Emitted	56d. Type Control Equipment		57d. Effi- ciency	58d. Maximum Emissions - Normal Cond.		59d. Emission Meth.	60d. Re- quested Emission Limit	61d. Allowable Emission	62d. Po- tential Emission	63d. Comp. Test Freq.
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	
VOC	0	0	0	11.7	51	2				
64d. Requested Limit in Units Other Than lb/hr				65d. Allowable Emission in Units Other Than lb/hr				66d. Reg. Code		
55e. Pol- lutant 'e' Emitted	56e. Type Control Equipment		57e. Effi- ciency	58e. Maximum Emissions - Normal Cond.		59e. Emission Meth.	60e. Re- quested Emission Limit	61e. Allowable Emission	62e. Po- tential Emission	63e. Comp. Test Freq.
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	
NOX	0	0	0	233	1022					
64e. Requested Limit in Units Other Than lb/hr				65e. Allowable Emission in Units Other Than lb/hr				66e. Reg. Code		
67. Visible Emissions	68. Requested % Opacity limit				69. Allowable % Opacity				70. Test Freq.	71. Req.
	Normal Cond. Exceptional Cond.				Normal Cond. Exceptional Cond.					
VE #1 RINGELMAN	10				40 % 2 min					
72. Fugitive Pollutant ID	73. Fugitive Emission Sources and Control Measures CYCLONES & BAG FILTERS ARE PROVIDED FOR EACH OF THE THREE (3) RDF MFG. TRAINS, OBW & FERROUS RECOVERY LINE. SEE ATTACHMENT 5								74. Quantifi- able Fugitive Emissions tpy	
PM									19.34	

53. Description of Control Equipment

54. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal

55f. Pollutant 'a' Emitted	56f. Type Control Equipment		57f. Efficiency (%)	58f. Maximum Emissions - Normal Cond.		59f. Emission Method	60f. Requested Emission Limit	61a. Allowable Emission	62a. Potential Emission	63a. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	Freq.
PB	0	0	0	0.082	0.36	2				
64f. Requested Limit in Units Other Than lb/hr				65a. Allowable Emission in Units Other Than lb/hr				66a. Reg. Code		
55g. Pollutant 'b' Emitted	56g. Type Control Equipment		57g. Efficiency (%)	58g. Maximum Emissions - Normal Cond.		59g. Emission Method	60g. Requested Emission Limit	61b. Allowable Emission	62b. Potential Emission	63b. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	Freq.
BE	0	0	0	5.3E-4	2.34E-3	2				
64g. Requested Limit in Units Other Than lb/hr				65b. Allowable Emission in Units Other Than lb/hr				66b. Reg. Code		
55h. Pollutant 'c' Emitted	56h. Type Control Equipment		57h. Efficiency (%)	58h. Maximum Emissions - Normal Cond.		59h. Emission Method	60h. Requested Emission Limit	61c. Allowable Emission	62c. Potential Emission	63c. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	Freq.
HG	0	0	0	0.18	0.76	2				
64h. Requested Limit in Units Other Than lb/hr				65c. Allowable Emission in Units Other Than lb/hr				66c. Reg. Code		
55i. Pollutant 'd' Emitted	56i. Type Control Equipment		57i. Efficiency (%)	58i. Maximum Emissions - Normal Cond.		59i. Emission Method	60i. Requested Emission Limit	61d. Allowable Emission	62d. Potential Emission	63d. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	Freq.
HCL	0	0	0	205	894					
64i. Requested Limit in Units Other Than lb/hr				65d. Allowable Emission in Units Other Than lb/hr				66d. Reg. Code		
55j. Pollutant 'e' Emitted	56j. Type Control Equipment		57j. Efficiency (%)	58j. Maximum Emissions - Normal Cond.		59j. Emission Method	60j. Requested Emission Limit	61e. Allowable Emission	62e. Potential Emission	63e. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy	Code	lb/hr	lb/hr	tpy	Freq.
FL	0	0	0	2.33	10.3	2				
64j. Requested Limit in Units Other Than lb/hr				65e. Allowable Emission in Units Other Than lb/hr				66e. Reg. Code		
67. Visible Emissions	68. Requested % Opacity limit				69. Allowable % Opacity				70. Test Freq.	71. Req.
VE										
72. Fugitive Pollutant	73. Fugitive Emission Sources and Control Measures								74. Quantifiable Fugitive Emissions	
ID									tpy	

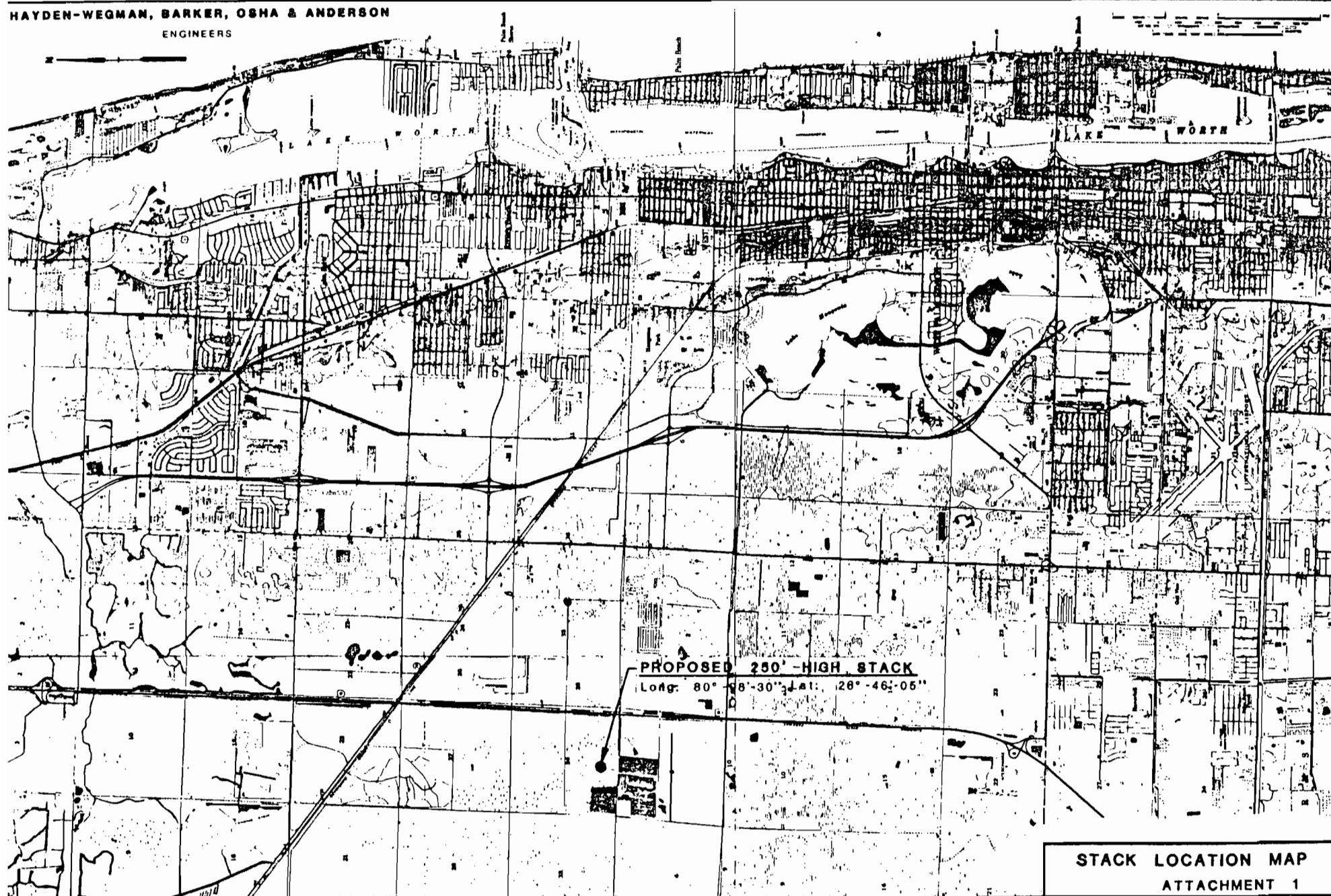
53. Description of Control Equipment										
54. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal										
55k. Pollutant 'a' Emitted	56k. Type Control Equipment		57k. Efficiency (%)	58k. Maximum Emissions - Normal Cond.		5k. Meth. Code	60a. Requested Emission Limit	61a. Allowable Emission	62a. Potential Emission	63a. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy		lb/hr	lb/hr	tpy	Freq.
SAM	0	0	0	0.0233	0.102	2				
64a. Requested Limit in Units Other Than lb/hr					65a. Allowable Emission in Units Other Than lb/hr			66a. Reg. Code		
55b. Pollutant 'b' Emitted	56b. Type Control Equipment		57b. Efficiency (%)	58b. Maximum Emissions - Normal Cond.		59b. Meth. Code	60b. Requested Emission Limit	61b. Allowable Emission	62b. Potential Emission	63b. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy		lb/hr	lb/hr	tpy	Freq.
64b. Requested Limit in Units Other Than lb/hr					65b. Allowable Emission in Units Other Than lb/hr			66b. Reg. Code		
55c. Pollutant 'c' Emitted	56c. Type Control Equipment		57c. Efficiency (%)	58c. Maximum Emissions - Normal Cond.		59c. Meth. Code	60c. Requested Emission Limit	61c. Allowable Emission	62c. Potential Emission	63c. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy		lb/hr	lb/hr	tpy	Freq.
64c. Requested Limit in Units Other Than lb/hr					65c. Allowable Emission in Units Other Than lb/hr			66c. Reg. Code		
55d. Pollutant 'd' Emitted	56d. Type Control Equipment		57d. Efficiency (%)	58d. Maximum Emissions - Normal Cond.		59d. Meth. Code	60d. Requested Emission Limit	61d. Allowable Emission	62d. Potential Emission	63d. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy		lb/hr	lb/hr	tpy	Freq.
64d. Requested Limit in Units Other Than lb/hr					65d. Allowable Emission in Units Other Than lb/hr			66d. Reg. Code		
54e. Pollutant 'e' Emitted	55e. Type Control Equipment		56e. Efficiency (%)	57e. Maximum Emissions - Normal Cond.		59e. Meth. Code	60e. Requested Emission Limit	61e. Allowable Emission	62e. Potential Emission	63e. Comp. Test
ID	Pri.	Sec.	(%)	lb/hr	tpy		lb/hr	lb/hr	tpy	Freq.
64e. Requested Limit in Units Other Than lb/hr					65e. Allowable Emission in Units Other Than lb/hr			66e. Reg. Code		
67. Visible Emissions	68. Requested % Opacity limit				69. Allowable % Opacity			70. Test Freq.	71. Req.	
VE	Normal Cond. Exceptional Cond.				Normal Cond. Exceptional Cond.					
	%				%					
72. Fugitive Pollutant	73. Fugitive Emission Sources and Control Measures								74. Quantifiable Fugitive Emissions	
ID									tpy	

SUPPLEMENTAL REQUIREMENTS

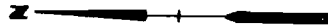
1. Provide an 8 1/2" x 11" map (e.g., the relevant portion of a USGS topographic map) showing the location of the facility and points of air pollutant emissions in relation to residences, roads, and other features of the surrounding area.
2. Provide an 8 1/2" x 11" plot plan of the facility showing the location of manufacturing processes, stacks, vents, and sources of fugitive emissions.
3. Provide an 8 1/2" x 11" flow diagram which will identify, the individual operations and processes. Indicate where raw materials enter, where solid and liquid wastes exit, where gaseous and/or particulate emissions are evolved, and where finished products are obtained.
4. For each pollutant emitted by the source addressed in this application, provide an estimate of the maximum uncontrolled emission rate (in lb/hr) and show the derivation of each such estimate (e.g., AP-42 emission factor). For a construction permit application involving the combustion of any fuel other than distillate oil, liquefied petroleum gas, or natural gas, provide an ultimate analysis of the fuel to be used. The ultimate analysis should give the percent content by weight of carbon, hydrogen, oxygen, sulfur, nitrogen, ash, and moisture.
5. For a construction permit application, show the bases of the normal maximum (after controls) emission estimates (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and describe the proposed methods for showing proof of compliance with any applicable emission limiting standards. For an operation permit application, provide test results or methods used to show proof of compliance.
6. For a construction permit application, provide design details for all air pollution control systems (e.g., for baghouse, include cloth to air ratio; for scrubber, include cross-section sketch, design pressure drop, etc.) and show the derivation of the efficiency of each control device. Items 4, 5, and 6 should be consistent; i.e., $\text{Uncontrolled Emissions} = (\text{Normal Maximum Emissions}) / (1 - \text{Control Efficiency})$.
7. For a construction permit application subject to review under Rule 17-2.500, "Prevention of Significant Deterioration," or Rule 17-2.510, "New Source Review for Nonattainment Areas," provide all additional information required by the department under such rule (e.g., BACT or LAER evaluation, monitoring data, summary of modeling results, one copy of all pertinent model output, etc.).
8. For a permit application subject to the "Reasonably Available Control Technology" provisions of Rule 17-2.650, provide all additional information required by the department under that rule.
9. For a permit application involving the incineration of hazardous wastes, provide all additional information required by the department under Rule 17-30 and Chapter 403, Florida Statutes.
10. Submit the appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

BEST AVAILABLE COPY

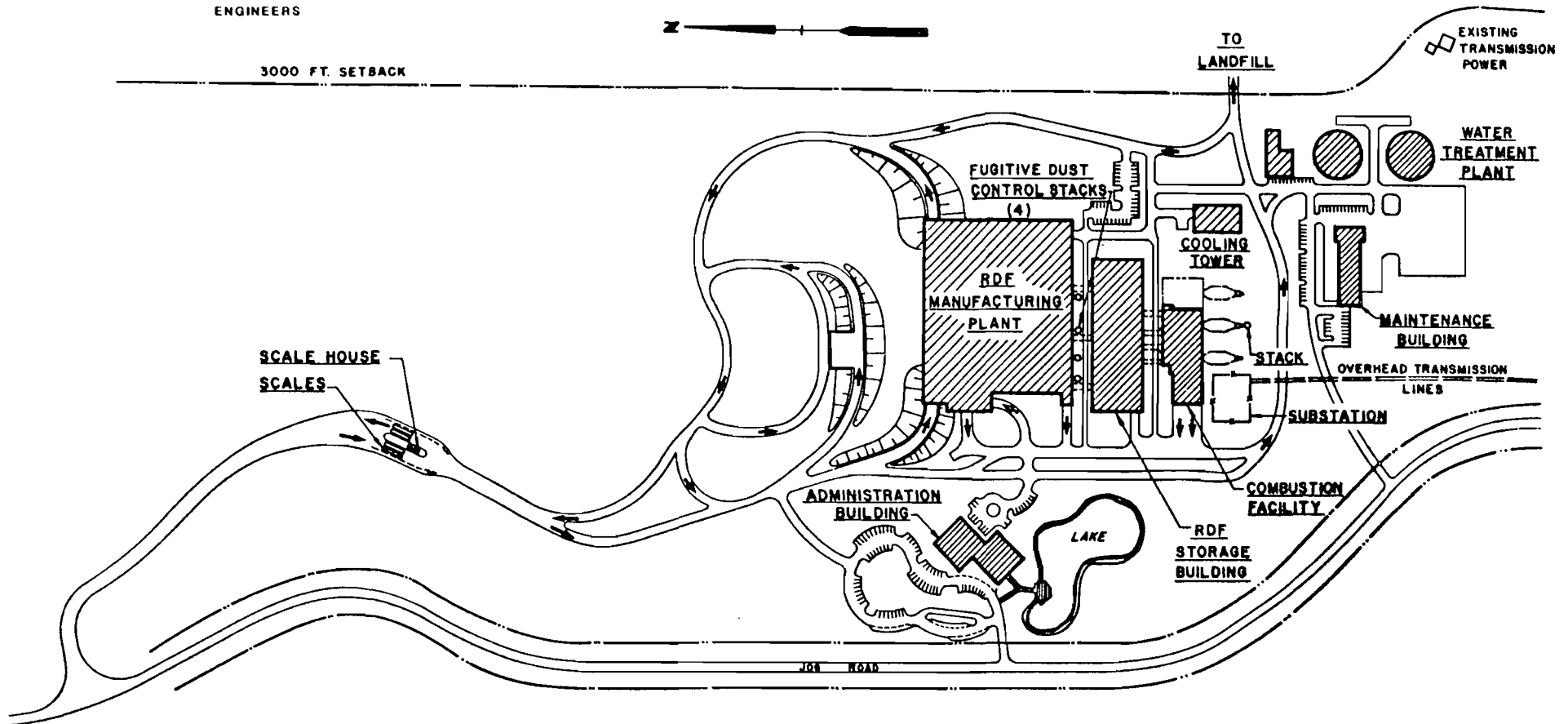
HAYDEN-WEGMAN, BARKER, OSHA & ANDERSON
ENGINEERS



HAYDEN-WEGMAN, BARKER, OSHA & ANDERSON
ENGINEERS



3000 FT. SETBACK

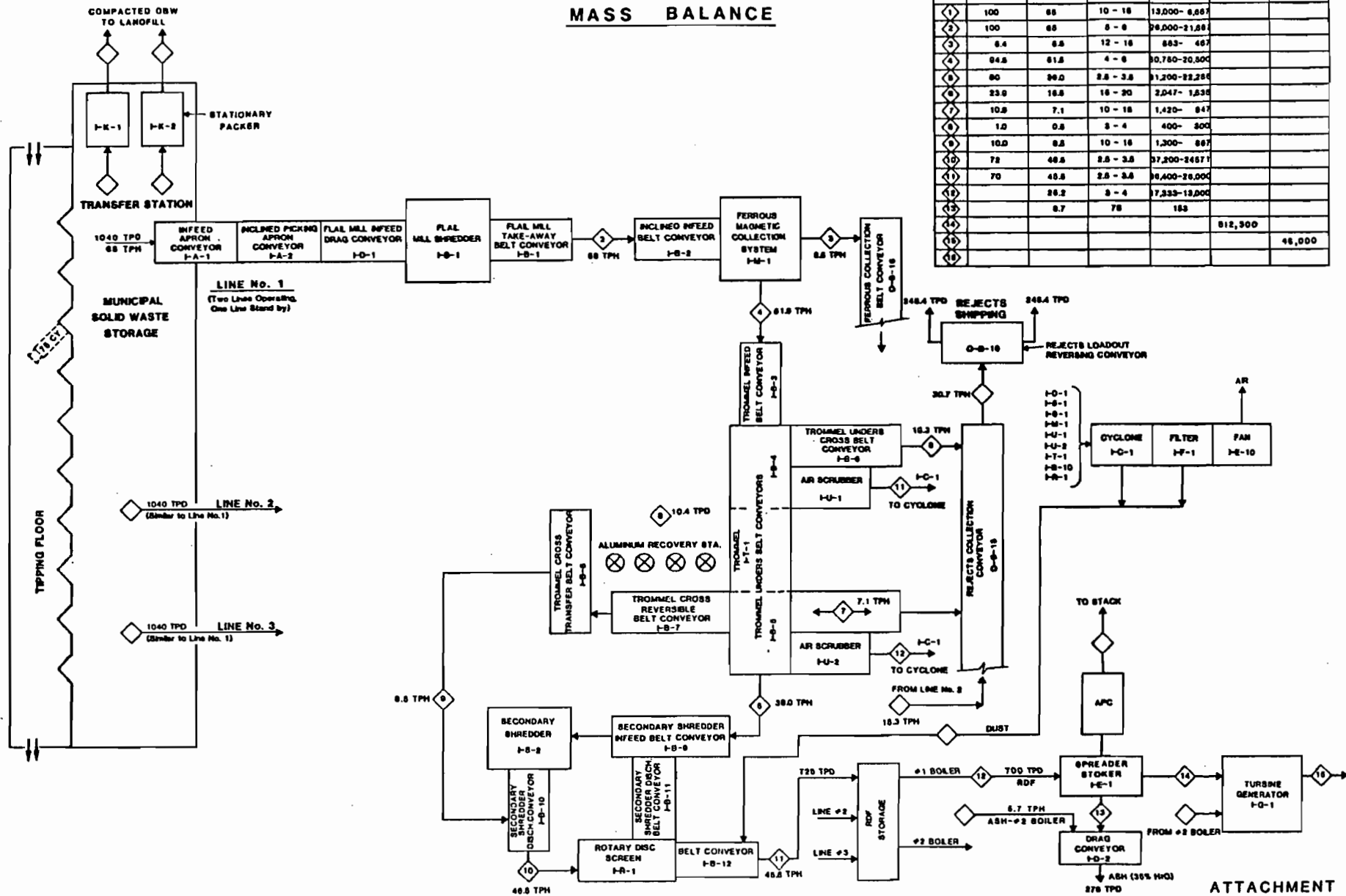


200 100 0 200
SCALE IN FEET
1" = 200'

ATTACHMENT 2

HAYDEN/WEGMAN-BARKER OSHA & ANDERSON
ENGINEERS

MASS BALANCE

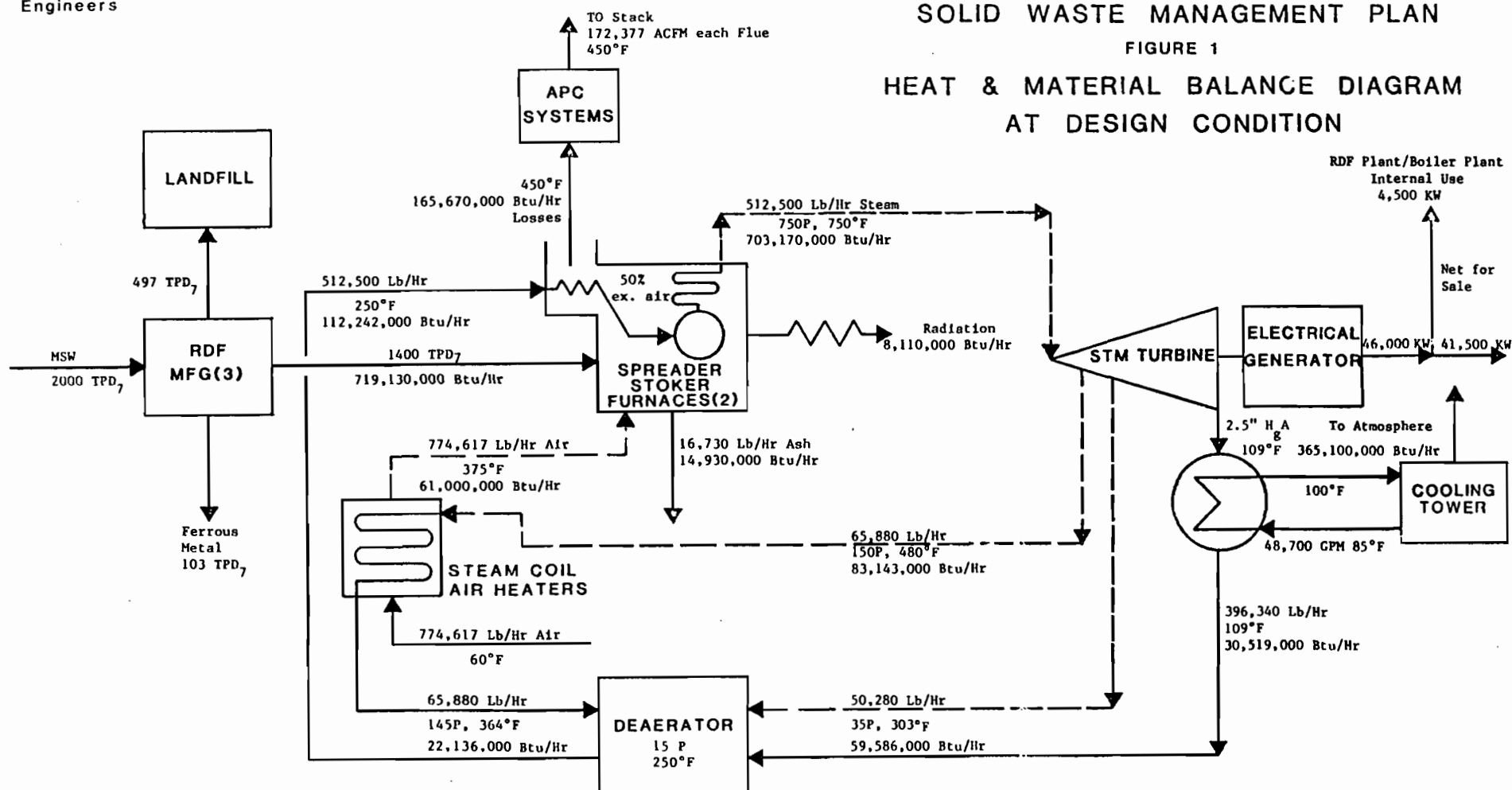


HAYDEN/WEGMAN-BARKER OSHA & ANDERSON
Engineers

PALM BEACH SOLID WASTE AUTHORITY
SOLID WASTE MANAGEMENT PLAN

FIGURE 1

HEAT & MATERIAL BALANCE DIAGRAM
AT DESIGN CONDITION

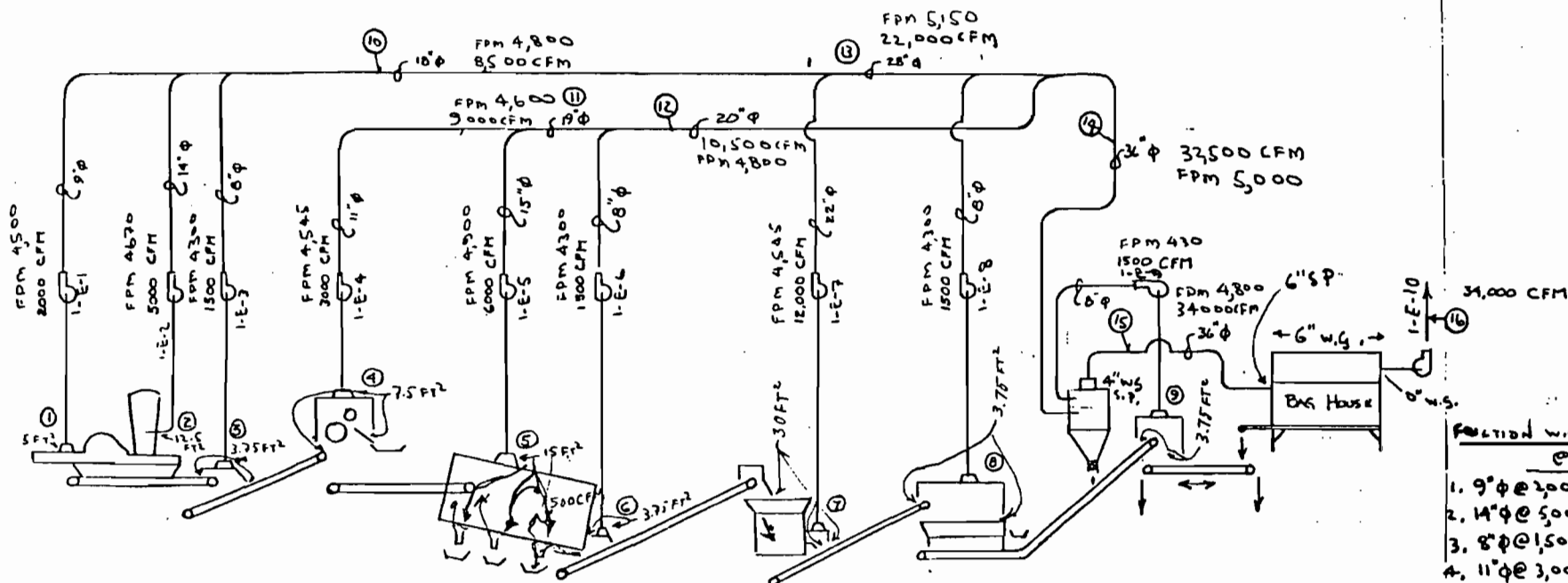


PROJECT PALM BEACH
 OWNER SWA
 FEATURE RDF PAUL DUST CONTROL

Wegman
 ENGINEERS

SHEET NO. 11 OF 11
 DATE 8-18-92 BY SGT
 CHKD. BY NO.

DUST CONTROL SYSTEM PER RDF MANUFACTURING LINE



1. FLAIL MILL INFEED
2. EXPLOSION VENT
3. FLAIL MILL DISCHARGE CONVEYOR
4. MAGNETIC SEPARATION HOOD
5. TROMMEL
6. TROMMEL DISCHARGE
7. SHREDDER DISCHARGE
8. DISC SCREEN
9. PACKER INFEED CONVEYOR

NOTES:

1. ALL EXHAUST FANS TO BE MATERIAL HANDLING (RD WHEELS)
2. ALL EXHAUST FANS TO BE VARIABLE SPEED
3. DUCT THRU 18" ϕ - 14 GAGE FITTINGS - 12 GAGE
 THRU 36" ϕ - 12 GAGE " - 10 GAGE
4. BAG HOUSE CLOTH AREA 8 to 1 (RANGE 6 to 1 / 10 to 1)
- 5 CYCLONE

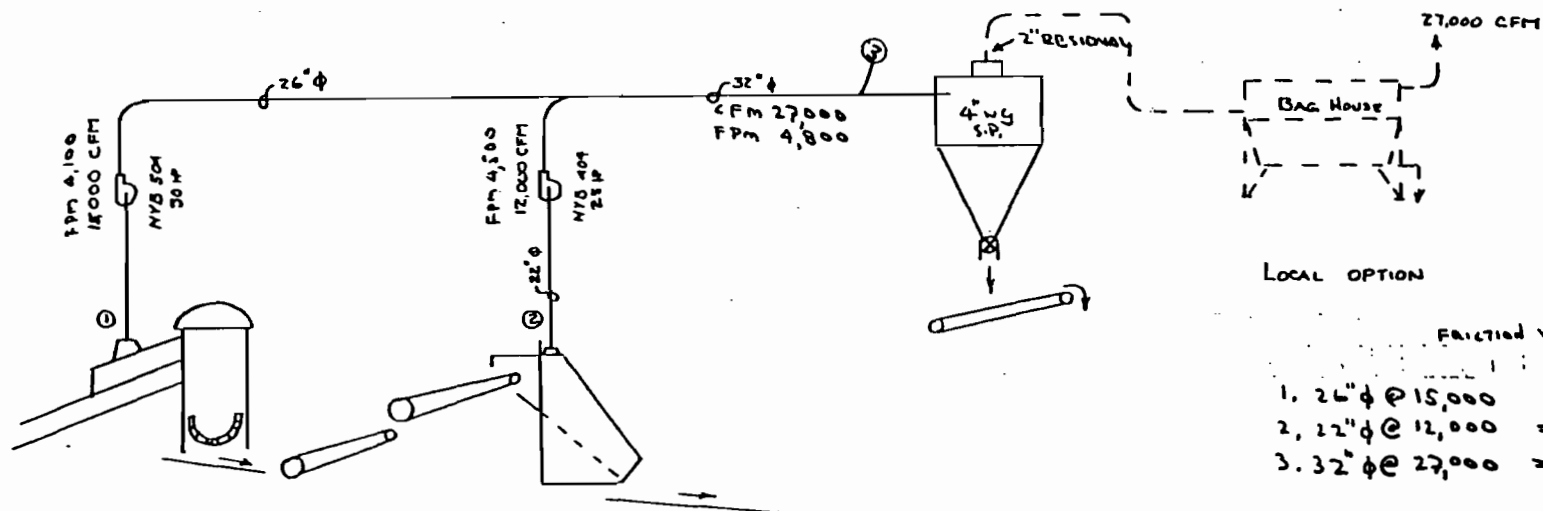
FUNCTION	W.G. INCHES	100 FT DUCT
@ STATED CFM		
1. 9" ϕ @ 2,000		3.3
2. 14" ϕ @ 5,000		2.1
3. 8" ϕ @ 1,500		3.6
4. 11" ϕ @ 3,000		2.7
5. 15" ϕ @ 6,000		2.1
6. 8" ϕ @ 1,500		3.6
7. 22" ϕ @ 12,000		1.15
8. 8" ϕ @ 1,500		2.6
9. 8" ϕ @ 1,500		3.6
10. 18" ϕ @ 8,500		1.6
11. 15" ϕ @ 9,000		1.4
12. 20" ϕ @ 10,500		1.35
13. 28" ϕ @ 22,000		1.1
14. 36" ϕ @ 32,500		0.55
15. 36" ϕ @ 34,000		0.55
16. @ 34,000		

PROJECT PALM BEACH
 OWNER SWA
 FEATURE RDF PLANT - DUST CONTROL

Wegman
ENGINEERS

SHEET NO. 12 OF
 DATE 8-18-82 BY SGT
 CHKD. BY NO.

DUST CONTROL SYSTEM OBW & FERROUS PROCESSING LINE



LOCAL OPTION

FRICTION W.G. INCHES/100 FT DUCT
 @ STATES C.F.M.

1. 26" ϕ @ 15,000 = 0.56
2. 12" ϕ @ 12,000 = 1.15
3. 32" ϕ @ 27,000 = 0.56

1. SHREDDER INFEEED
2. METAL AIR SCRUBBER

NOTES:

1. EXHAUST FANS TO BE MATERIAL HANDLING DESIGN (RD WHEELS)
2. METAL AIR SCRUBBER FAN TO BE VARIABLE SPEED
3. DUCT TO BE 12 GAGE - FITTINGS 10 GAGE
4. BAG HOUSE AIR TO CLOTH RATIO 8-1

HAYDEN/WEGBMAN-BARKER, OSHA & ANDERSON
ENGINEERS
22-APR-1985

PALM BEACH SOLID WASTE AUTHORITY
SOLID WASTE MANGEMENT PLAN

ATTACHMENT 5 (SHEET 3 OF 3)
FIELD 73. FUGITIVE EMISSION SOURCES AND CONTROL MEASURES
TECHNICAL CALCULATIONS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EMISSION SOURCES	OPERATING HOURS PER DAY (HOUR)	OPERATING DAYS PER WEEK (DAYS)	UNCONTROLLED EMISSION FACTOR (GRAINS/SCF)	CYCLONE & BAGHOUSE DESIGN RATING (SCFM)	COLLECTION EFFICIENCY OF CYCLONE & BAGHOUSE (%)	MAXIMUM EMISSION (LB/HR)	ANNUAL EMISSION (TON/YEAR)
RDF MANUFACTURING TRAIN #1	16	6	5	34,000	99.8	2.91	6.18
RDF MANUFACTURING TRAIN #2	16	6	5	34,000	99.8	2.91	6.18
RDF MANUFACTURING TRAIN #3	16	2	5	34,000	99.8	2.91	2.06
OBW & FERROUS RECOVERY LINE	16	6	5	27,000	99.8	2.31	4.91
TOTAL						11.06	19.34

NOTES (REFER TO COLUMN NO. ABOVE):

(4) THE EMISSION FACTOR IS BASED ON HEAVY DUST CONCENTRATION OF THE ROCK
CRUSHING AND SCREENING OPERATION (WORST CASE).

(7) $= (4) * (5) * (1.00 - (6) / 100.00) * (60 \text{ MIN/HR}) / (7000 \text{ GRAINS/LB})$

(8) $= (7) * (2) * (3) * (52 \text{ WK/YR}) * (0.85 \text{ AVAILABILITY FACTOR}) / (2000 \text{ LB/TON})$

PALM BEACH COUNTY

SOLID WASTE AUTHORITY



January 13, 1985

Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Attn: Mr. Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

Re: Response to August 15, 1985 Letter
Application for Power Plant Siting Certification
Resource Recovery Facility
Solid Waste Authority
Palm Beach County, Florida

Dear Mr. Oven:

Accompanying this letter are 45 copies of the response to your letter of August 15, 1985, in which a number of questions/comments were raised by the Department of Environmental Regulation's Southeast Florida District Office concerning the application. Individual responses to each of the Programs (i.e. Solid Waste Program, Industrial Waste Programs, etc.) as outlined in your letter are included on each response booklet for distribution.

It should be noted that the information included in the "Update to the Application for Power Plant Site Certification" dated December, 1985, has superseded some of the responses the the questions/comments.

Should you have any questions, please contact our office.

Very truly yours,

Thomas R. Keith
Director of Environmental
Programs

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

RECEIVED
AUG 19 1985

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY

August 15, 1985

Mr. Tim Hunt, Jr.
Executive Director
Palm Beach County Solid
Waste Authority
5114 Okeechobee Blvd.
Suite 2C
West Palm Beach, FL 33409

RE: Palm Beach County Resource Recovery Facility
PA 84-20

Dear Mr. Hunt:

Please respond to the attached comments from the department's Southeast Florida District Office concerning sufficiency of the certification application.

Sincerely,

Hamilton S. Oven, Jr.
Hamilton S. Oven, Jr., P.E.
Administrator
Siting Coordination Section

HSOjr/sb

Attachment

cc: William Kendrick
All Parties

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee			
To: <u>Buck Owen</u>	Locn: <u>TT-545</u>		
To: _____	Locn: _____		
To: _____	Locn: _____		
From: _____	Date: _____		
Reply Optional ☐	Reply Required ☐	Info. Only ☐	
Date Due: _____	Date Due: _____		

TO: Hamilton S. Owen, Jr., P.E.

FROM: D. B. White, P.E. *Lt.*

DATE: August 9, 1985

SUBJECT: Palm Beach County Solid Waste Authority Resource
Recovery Facility Power Plant Siting Certification
Application

In addition to my letter of July 24, 1985 wherein were requested various program applications, please make it clear to the applicant that any applications which cannot be submitted before certification will be required to be submitted in a timely fashion as a special condition of the certification. Also, as we review the program applications, request additional information and then ultimately approve the application, we may require subsequent information such as monitoring data, etc. in the body of the letter approving the program applications and the resource recovery facility itself.

Please relay the following comments also regarding sufficiency of the certification application:

Solid Waste Program

1. What is the depth of the existing N.E. borrow lake?
2. On page 2-13 paragraph 3, a statement is made that "Resistivity soundings can be repeated in exactly the same locations"...as shown in Figure 2.3-1. Please explain how readings numbers 1, 2, 3, 4 and 6 can be done as stated above when Figure 2.1-2 illustrates that this will be landfilled and dredge lakes? How can accurate or meaningful data be obtained?
3. On page 2-27, paragraph 4, the statement is made that the high analyses recorded from Well #2 for total dissolved solids, chlorides and sodium were due to "piles of illegally disposed trash on the site". Please explain how these piles of trash on top of the ground could have possibly affected a well 60 feet deep and why the adjacent shallow Well #7 (5 feet deep) was not affected.

4. Due to the fact that the closed western portion of Dyer Landfill (approximately 80 acres) was disposed of into the water table, please explain if the groundwater analyses recorded on the eastern side of Site 7 indicates a plume emanating from Dyer?
5. Table 2.3-7d reveals higher analyses for organic nitrogen and total nitrogen in SW 2, 4, and 5. Please explain where this source of pollution is coming from.
6. Table 2.3-7d reveals high numbers of fecal streptococci in SW-3 and fecal coliform in SW-10. Please explain where this source of pollution is coming from.
7. Figure 3.2-3, Appendix 10.4 sheet 4 of 25 and sheet 20 of 25 illustrate that the applicant intends to construct the Class I landfill on top of EPB-10 Canal. Please provide detailed engineering drawings and cross sections of this plan. In addition, please explain in detail what steps will be taken for the prevention of an accidental leachate discharge into this surface water?
8. What precautions will be taken during liner construction over the EPB-10?
9. Explain why surface waste runoff from the landfill could not be directed into the southwest dredge lakes first, then easterly along 45th Street to the Turnpike, then northerly into EPB-10, instead of under the landfill.
10. On page 3-32 of 3.5.3, the applicant states that Well DW10A will be utilized for "potable water" at the plant site. Further statements are made that a plume of mineralized waters is emanating from the Dyer Landfill in this same direction. Please explain how one can utilize an 18 foot deep well that may be contaminated for human consumption?
11. On page 4-8, paragraph 1, reference is made to "the continuous pumping of 4 wells aligned along the eastern side of the Class I and III landfills as shown on Figure 4.2-1." This figure was not provided in the application. Please submit.
12. On page 4-8, paragraph 1, please show by figure which 2 wells (if already existing) will be continuously pumped at the Dyer Landfill, and their depths.

13. On page 4-8, paragraph 3, please explain how sealant will be "injected into the area of liner destruction or leakage?"
14. In Appendix 10.4, please explain item 32 of the solid waste disposal facility data form what is indicated to be "EPB IV-Cond" for class of receiving waters?
15. Provide detailed engineering drawings of the Class I and Class III liners overlapping sections. In addition provide details of the liner anchoring and seaming installation.
16. Provide details of quality assurance and quality control techniques utilized for liner seaming.
17. Provide an agreement between the landowner(s) and applicant identifying and explaining the terms of lease or contract. The only attachment in the application was a list of the owners.
18. The applicant has failed to sign and date the application.
19. The Executive Director shall submit a letter from the Palm Beach County Solid Waste Authority Board authorizing him to sign the application.
20. The date is not completed below the engineer of records signature.
21. Item #29 of the Solid Waste Disposal Facility Data Form was not completed indicating the method of treatment for leachate.

Industrial Waste Program

1. A detailed design of the treatment system to treat the effluent prior to deep well injection must be submitted in the Industrial Waste Permit Application format (DER Form 17-1.204(2)). As provided for in Section 17-6.300(1)(n)1., F.A.C., the source shall, as a minimum level of treatment, provide secondary waste treatment as required by Section 403.085, Florida Statutes. This treatment shall be applied against the total untreated waste produced by the plant. If the combined waste stream is shown to be not amenable to biological treatment, a comparable degree of treatment will be determined and applied through the issuance of department permit, or specific conditions applied to the letter of approval of this program application.

2. The design of the treatment system must also address "low volume wastestreams" including, but not limited to, floor drains, cooling tower basin cleaning wastes and metal cleaning wastes (with or without chemical cleaning compounds) generated from cleaning metal process equipment such as boiler tubes.
3. In accordance with Section 17-6.300(1)(p), F.A.C. all sources of industrial wastes reasonably expected to be sources of pollution to Class G-IV Waters shall provide a minimum level of treatment such that the waste to be discharged does not:
 - a. affect the mechanical integrity of the well;
 - b. jeopardize the integrity of the confining zone;
 - c. alter the hydrologic characteristics of the injection zone to the point of endangering underground sources of drinking water.

Domestic Waste Program

There is proposed a 29,000 gpd extended air activated sludge STP for domestic wastewater only, as generated by employees of site with effluent discharge to the deep injection well. This proposal if constructed and operated in compliance with F.A.C. Chapter 17-6 to meet technology based secondary treatment without disinfection will satisfy State statutes and Department rules. The following information should be required prior to approval of construction of the STP (F.A.C. 17-6.070):

SWA RESPONSE

- 1
 1. Application for construction or equivalent submittal signed and sealed by engineer (previously requested).
 2. Complete construction drawings (signed and sealed by engineer).
 3. Brief engineering report.
- 2
 - Following completion of construction the following submittals are required for compliance with F.A.C. Rule Sections 17-6.140 and 17-6.150:
 1. Certification of Completion
 2. Operation and Maintenance manual
 3. Application for approval of operation.
 4. Compliance with operator and reporting requirement of F.A.C. 17-16 and 17-19.

SWA
RESPONSE

3

The proposal for diversion of wastewater to leachate basin does not appear practical nor desirable during plant upsets. Such provision is not required. Treated effluent could be diverted under emergency conditions to a holding basin during periods when the injection well is out of service.

4

If the leachate is considered an industrial waste, F.A.C. Rule Section 17-6.300 (1) m and (n) appears to apply. This rule implies that the statutory requirement for secondary treatment applies to industrial waste.

Air Program

Since the Palm Beach County Solid Waste Authority has submitted a complete application to construct/operate an air pollution source, the only comment we have is that the air section needs complete documentation on the process and pollution control equipment after the vendors have been selected.

Dredge & Fill Program

1

Please note the request already forwarded for a valid dredge and fill jurisdiction determination to be made. It is quite probable that dredge and fill jurisdiction will remain. In addition, jurisdiction may also be applicable to the transmission line corridor, which corridor was not addressed in the dredge and fill application submitted with PA 84-20. This can be corrected by the submission of the dredge and fill application requested to you by letter dated July 24, 1985.

2

The applicant has indicated that mitigation is in order, however, no plan has been presented and no time frame given. These items must be quantified prior to the program application approval.

UIC Program

1

All UIC projects for Class I Injection wells are normally reviewed by the Technical Advisory Committee. This system has served very well both for the initial review and for the review of progress during construction. Many of the specific specifications such as the setting depth of the final string of casing, location (depth) of the monitoring wells, cementing program, etc., must be determined during construction and the TAC's recommendation has been invaluable in assuring optimum specifications. In addition, problems encountered during construction such as lost tools down-hole, requires the review of a knowledgeable group to determine whether proposed corrective actions are acceptable.

SWA
RESPONSE

2

We also have some questions about the monitoring proposed for the system. The proposal to monitor a single zone (approximately 1800') is a departure from previous practice which will require justification. Rather than attempt to define all questions via correspondence I suggest we add a condition to the certification such as the following:

For the injection well system the bid specifications and plans shall be submitted to the Technical Advisory Committee (TAC) for the Southeast Florida District Office for review and approval prior to beginning the bidding process.

Drinking Water Program

An "Application to Construct" was requested in my letter of July 24, 1985.

General Comments

1

The agency having the responsibility to enforce compliance with design standards during construction does not appear to be designated. Will this be designated official(s) of the Palm Beach County Solid Waste Authority? If not, who will it be?

2

If certain contractual rights are transferrable, the application should state, and the certification should require who will be responsible for compliance with certification, fully identifiable by us and fully subjected to the limitations and conditions of the certification. The Office of General Counsel of the Department of Environmental Regulation should review all contracts between the Palm Beach County Solid Waste Authority and its contractors and vendors. We need legal access to both the Palm Beach County Solid Waste Authority and the operator in case of compliance trouble.

3

Referring to 3.7.2 "Hazardous Wastes", the applicant must submit facility designs for the isolated storage of hazardous wastes for further disposition. The applicant refers to the training of personnel for the identification of potentially hazardous wastes, but does not indicate how a final hazardous waste determination will be made. Will all suspect materials be manifested? Will there be onsite laboratory capability for an analytical determination of suspected materials? What assurance will we have that the material handling equipment will not puncture or otherwise cause containers of potentially hazardous materials to leak their contents into this resource recovery system?

Mr. Owen
Page 7 of 7
August 9, 1985

SWA
RESPONSE

Historically, some significant environmental threats from this type of operation have been prompted by management deficiencies, omissions and perversities. An important aspect of the project is the management plan which will.

- 4 1. Allow the operator sufficient financial incentive to operate an environmentally safe plant. The management plan should provide for reasonable tipping fees, power sale rates and other income items and a means for periodically re-opening these considerations. And not freezing them for the life of an extended operating contract.
- 5 2. Provide for a planning procedure for expansion which will mesh all operating aspects of the system to keep them in balance. For instance, without adequate landfill site acquisition plan, there will not be adequate landfill cells. Without adequate landfill cell space, the incinerator ash will not be properly elevation-graded according to the plan.
- 6 3. Require the Palm Beach County Solid Waste Authority, or the properly authorized financial authority to present a long term financial plan for the financial "nutrition" of the system so that the system can be properly operated. The short and long term operating budgets must display all supplemental financing needs in a forthright and reasonably accurate manner in order that timely action can be taken as needed. Of course, the operating budgets shall be as complete as possible to include all important aspects: Projected income, all operating costs including amortization, maintenance costs, manifesting costs, personal and financial liability, spare parts costs, inventory costs etc.
- 7 4. Include written operating procedures for all aspects of the operation which are critical to the uninterrupted operation of the system.
- 8 5. Include written contingency plans for the continued operation of the system during breakdowns etc., stoppages which compromise the integrity of the operations must have appropriate contingency plans.
- 9 6. Require the maintenance of "as-built" and modified engineering plans and documents in order to facilitate the smooth acquisition or fabrication of spare parts, mechanical modifications etc.

DBW:my:6

cc: Roy M. Duke

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Letter Dated August 15, 1985

AIR PROGRAM

ITEM 1: Since the Palm Beach County Solid Waste Authority has submitted a complete application to construct/operate an air pollution source, the only comment we have is that the air section needs complete documentation on the process and pollution control equipment after the vendors have been selected.

RESPONSE: Complete documentation on the process and pollution control equipment will be submitted to the State of Florida Department of Environmental Regulation as soon as the Vendor has or Vendors have been selected and such documentation becomes available.



United States Department of the Interior

NATIONAL PARK SERVICE SOUTHEAST REGIONAL OFFICE

75 Spring Street, S.W.

Atlanta, Georgia 30303

IN REPLY REFER TO:

N3615(SER-OPS)

AUG 16 1985

Mr. Tom Rogers
Bureau of Air Quality Management
State of Florida
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Rogers:

Thank you for sending us a copy of the Palm Beach County Resource Recovery power plant site certification application for a proposed resource recovery facility in Palm Beach County, Florida, approximately 120 km northeast of Everglades National Park. Your early notification of this project is appreciated.

We have reviewed the information you sent to us and, based on that information, we would not expect emissions from the proposed facility to adversely impact the air quality or air quality values of Everglades National Park.

However, we have several comments regarding the air quality and control technology analyses contained in the application. These comments are discussed in the enclosed technical review document. We ask that you consider these comments while performing your review of the application. We also ask that you forward us a copy of your preliminary determination document once your technical review of the project is completed. We will review your preliminary determination and submit any additional comments regarding the project during the 30-day public comment period.

If you have any questions regarding the enclosed comments, please contact Mark Scruggs of our Air Quality Division in Denver at (303) 236-8765.

Sincerely,

Regional Director
Southeast Region

Enclosure

DER

AUG 22 1985

BAQM

DEPARTMENT OF ENVIRONMENTAL REGULATION

**ROUTING AND
TRANSMITTAL SLIP**

ACTION NO

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION)

Ed Svec

Initial

Date

2.

Initial

Date

3.

Initial

Date

4.

Initial

Date

REMARKS:

*National Park Service
Comments on the Palom
Beach County RRF*

INFORMATION

Review & Return

Review & File

Initial & Forward

DISPOSITION

Review & Respond

Prepare Response

For My Signature

For Your Signature

Let's Discuss

Set Up Meeting

Investigate & Report

Initial & Forward

Distribute

Concurrence

For Processing

Initial & Return

FROM:

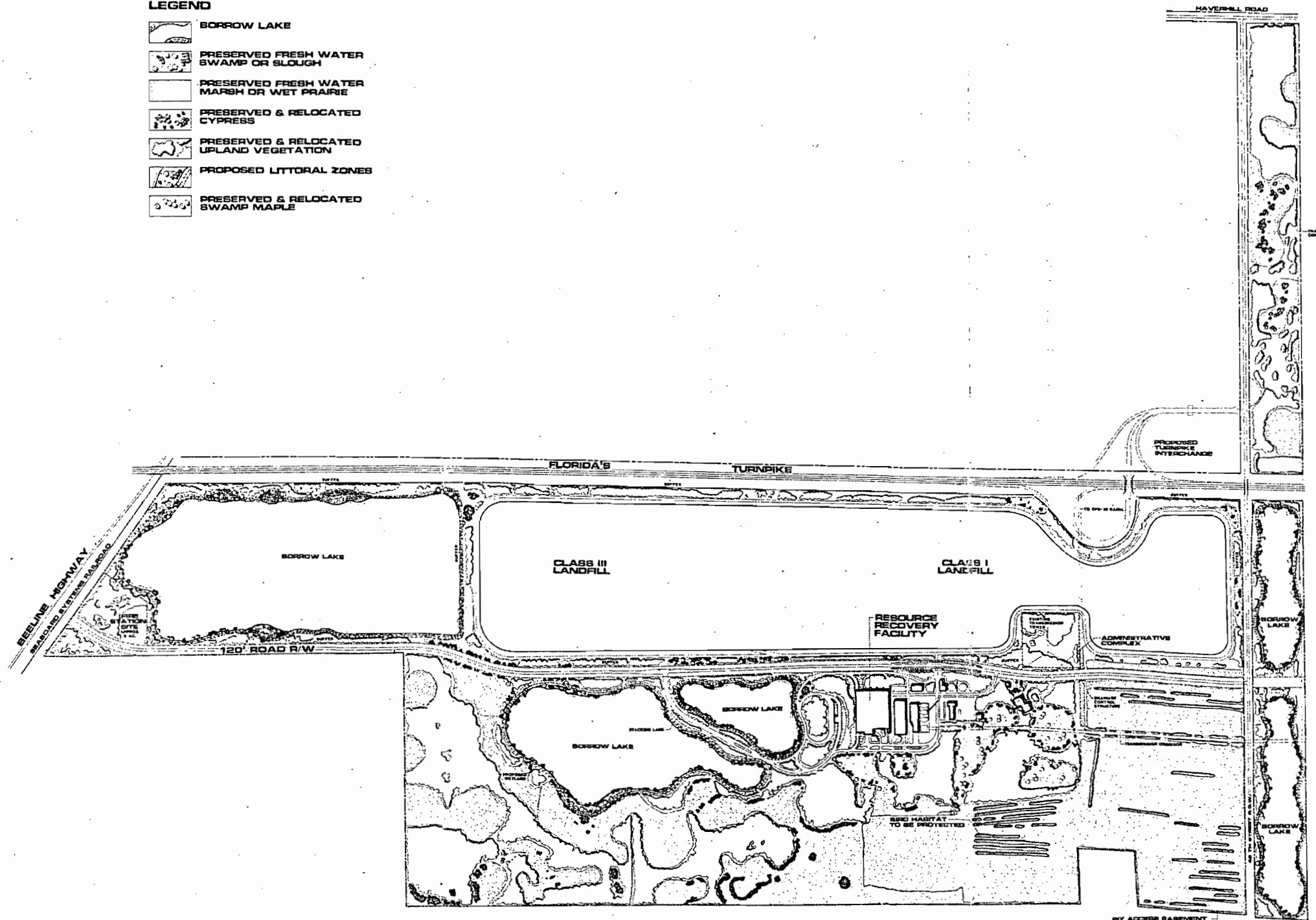
Von

DATE
3/23

PHONE

LEGEND

-  BORROW LAKE
-  PRESERVED FRESH WATER SWAMP OR SLOUGH
-  PRESERVED FRESH WATER MARSH OR WET PRAIRIE
-  PRESERVED & RELOCATED CYPRESS
-  PRESERVED & RELOCATED UPLAND VEGETATION
-  PROPOSED LITTORAL ZONES
-  PRESERVED & RELOCATED SWAMP MAPLE



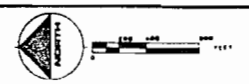
UPDATED: DEC. 2, 1985

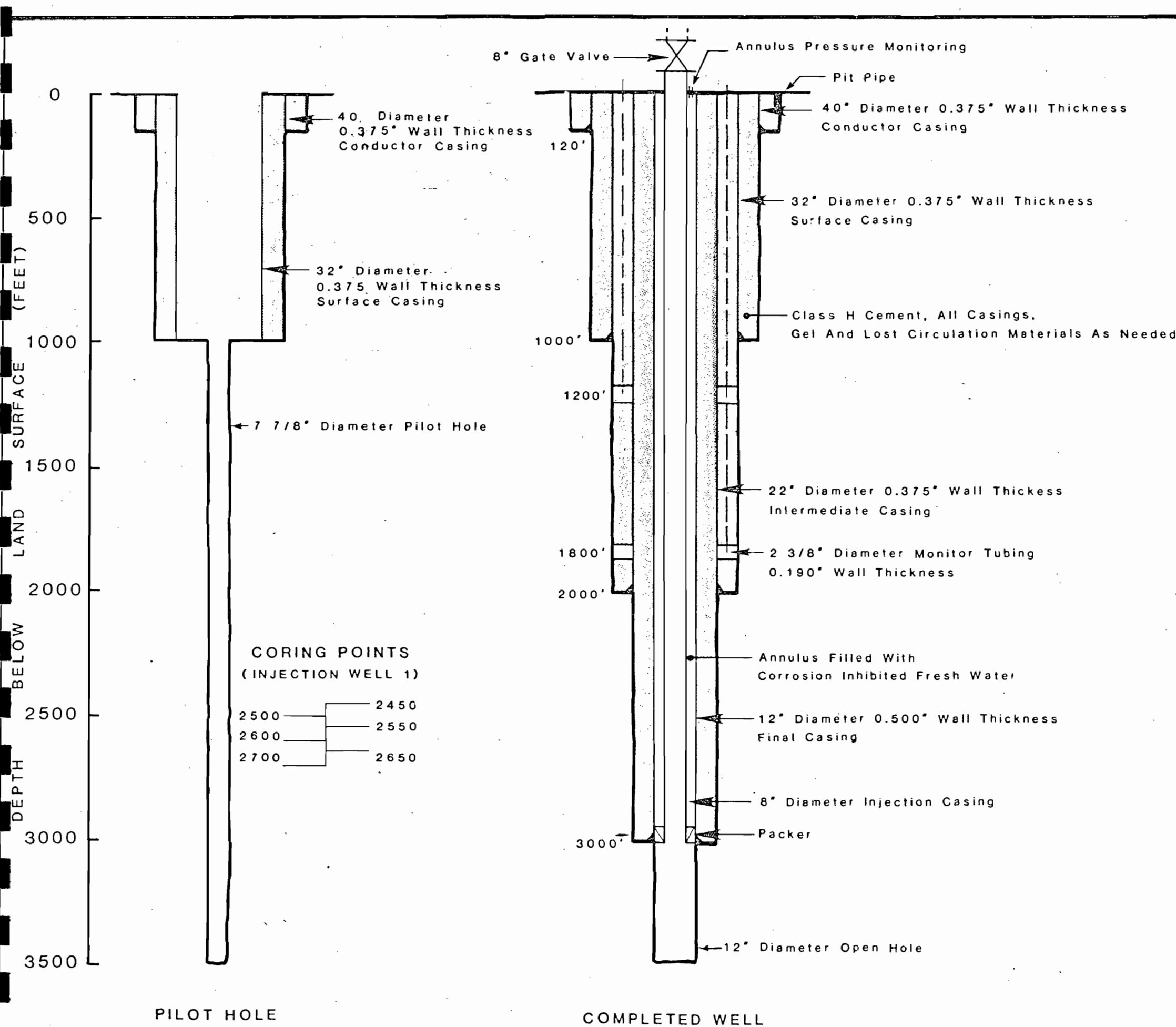
FIG. 3.2-3

PALM BEACH COUNTY SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



MASTER SITE PLAN





CASING SCHEDULE

Conductor	40-Inch Diameter, Casing: 0.375 Inch Wall Pipe May Be Spiral Wound, ERW, Or DSAW Pipe, Welded Joints
Surface	32- Inch Diameter, Casing: 0.375 Inch Wall Pipe May Be Spiral Wound, ERW, Or DSAW Pipe, Welded Joints
Intermediate	22- Inch Diameter, Casing: 0.375 Inch Wall Pipe May Be Spiral Wound, ERW, Or DSAW Pipe, Welded Joints
Final	12- Inch Diameter, Casing: 0.500 Inch Wall, Seamless, Welded Joints
Injection	8- Inch Diameter, Casing: 0.352 Inch Wall, Threaded And Coupled

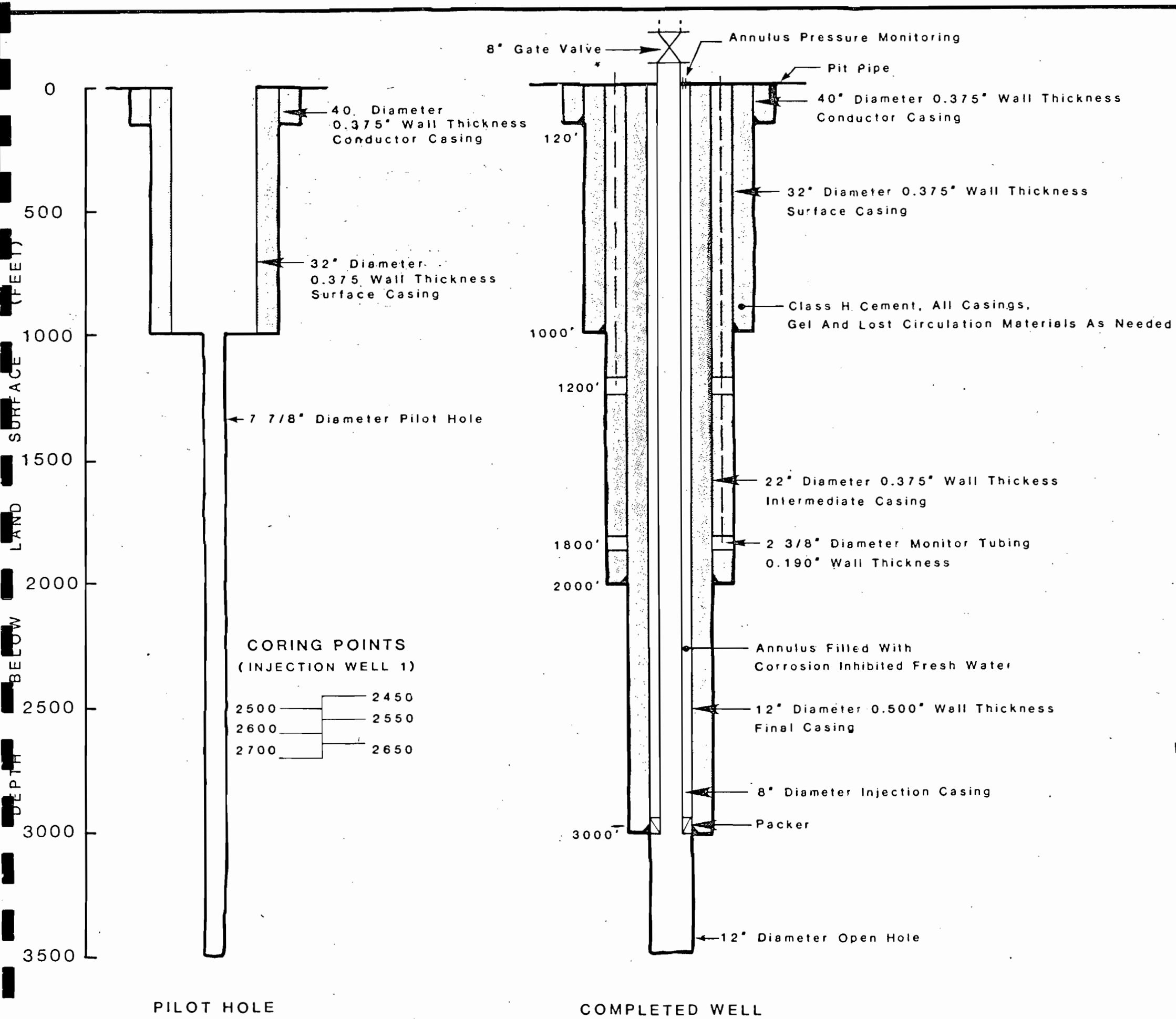
RESPONSE, JULY 17, 1985



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY

INJECTION WELL DESIGN
AND DETAILS OF THE CORING
AND TESTING PROGRAM

FIGURE 16-1



CASING SCHEDULE

Conductor	40-Inch Diameter,
Casing:	0.375 Inch Wall Pipe May Be Spiral Wound, ERW, Or DSAW Pipe, Welded Joints
Surface	32- Inch Diameter,
Casing:	0.375 Inch Wall Pipe May Be Spiral Wound, ERW, Or DSAW Pipe, Welded Joints
Intermediate	22- Inch Diameter,
Casing:	0.375 Inch Wall Pipe May Be Spiral Wound, ERW, Or DSAW Pipe, Welded Joints
Final	12- Inch Diameter,
Casing:	0.500 Inch Wall, Seamless, Welded Joints
Injection	8- Inch Diameter,
Casing:	0.352 Inch Wall, Threaded And Coupled

RESPONSE, JULY 17, 1985



INJECTION WELL DESIGN
AND DETAILS OF THE CORING
AND TESTING PROGRAM

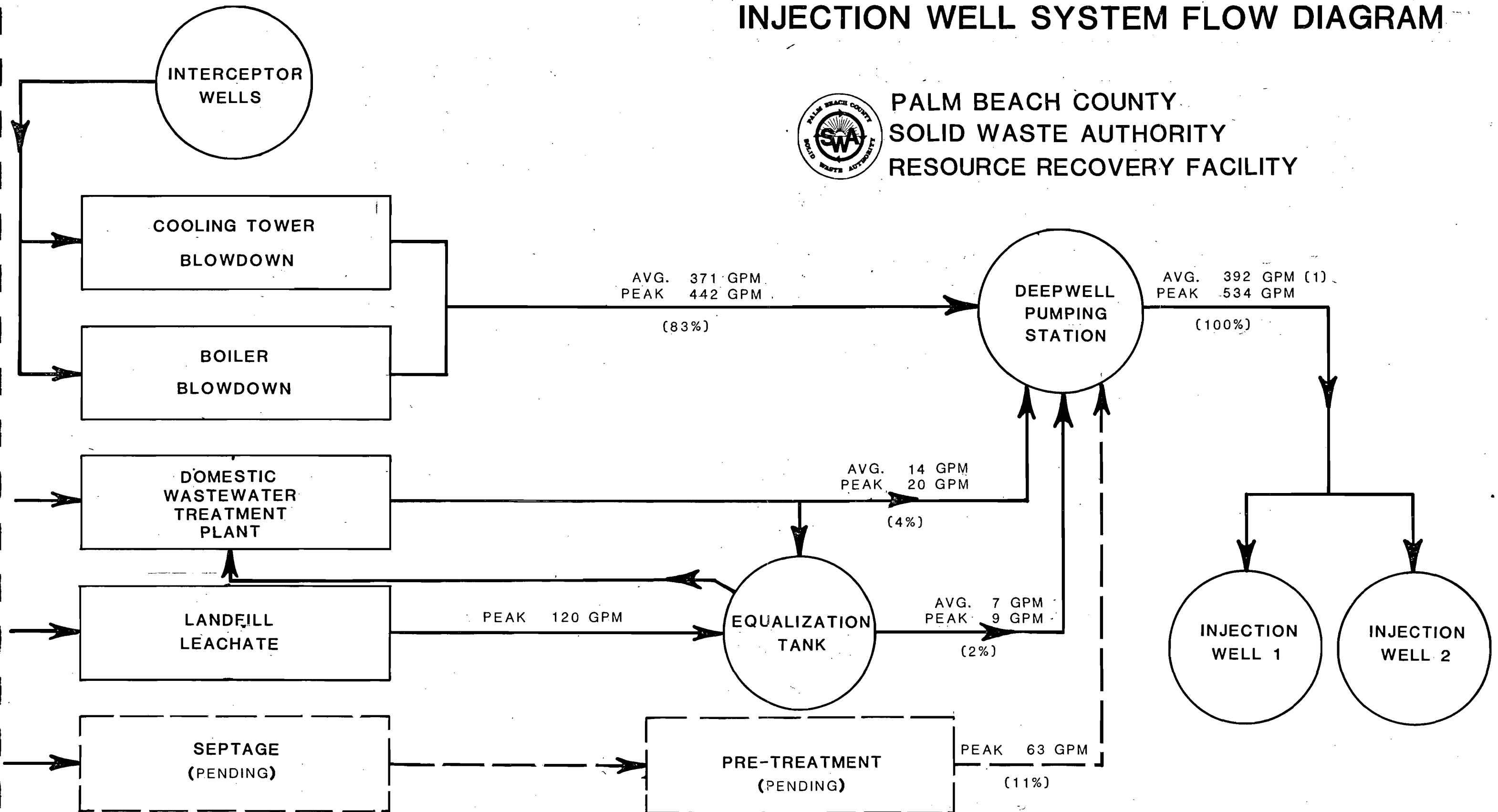
PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY

FIGURE 21-1

INJECTION WELL SYSTEM FLOW DIAGRAM



PALM BEACH COUNTY
SOLID WASTE AUTHORITY
RESOURCE RECOVERY FACILITY



(1) EXCLUDES SEPTAGE FLOW

RESPONSE: JULY 17, 1985

FIGURE 29-1

file

SOLID WASTE AUTHORITY



OF PALM BEACH COUNTY

5114 Okeechobee Boulevard, Suite 2C
West Palm Beach, Florida 33417
Telephone: 407/471-5770

September 18, 1989

Mr. Buck Oven, Program Coordinator
Power Plant Site Certification Program
Florida Department of Environmental Regulation
2600 Blainstone Road
Tallahassee, FL 32301

RECEIVED

OCT 4 1989

DER-BAQM

Re: Solid Waste Authority of Palm Beach County
North County Regional Resource Recovery Project
Understanding of Regulatory Agency Expectations

Dear Mr. Oven:

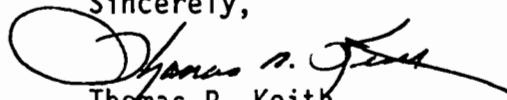
On September 15, 1989, representatives of the Solid Waste Authority of Palm Beach County met with representatives of Region IV, United States Environmental Protection Agency, and your Department (Mr. Pradeep Ravel) for the purposes of clarifying our understanding of the regulatory agencies' expectations relative to initial operations of the Authority's North County Regional Resource Recovery Facility. Pursuant to that meeting, and in accordance with direction provided by your representative, the Authority seeks your written concurrence with the following statements.

It is the Authority's understanding that as the Permittee, under both the State Conditions of Certification and the Federal PSD permits, that it maintains sole responsibility to the regulatory agencies for compliance with permit limitations. Consequently the Authority, as permittee, would be the party subject to any State or Federal action which might be instituted pursuant to the referenced permits and not the Authority's Contract Operator.

It is the Authority's further understanding that the 180-day initial start-up period provided by the Conditions of Certification and the PSD Permit is a shake-down period during which excursions, with respect to actual facility emissions, are not unexpected and do not constitute permit violations nor grounds for enforcement actions as long as the Facility is operated in accordance with generally accepted good operating and combustion practices.

I trust that Mr. Raval has relayed the urgent nature of the Authority's need to have the foregoing understandings confirmed by the Department. Your efforts to expedite your review and comment to this office would be most appreciated.

Sincerely,


Thomas R. Keith
Deputy Executive Director

TRK/ja.

cc: Bernie Conko
Craig Potter

copied CFF/BT } 10-5
BARRY } PR
PR }

Received DER

PALM BEACH COUNTY, FLORIDA

JAN 17 1986

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

PPS

LETTER DATED AUGUST 15, 1985

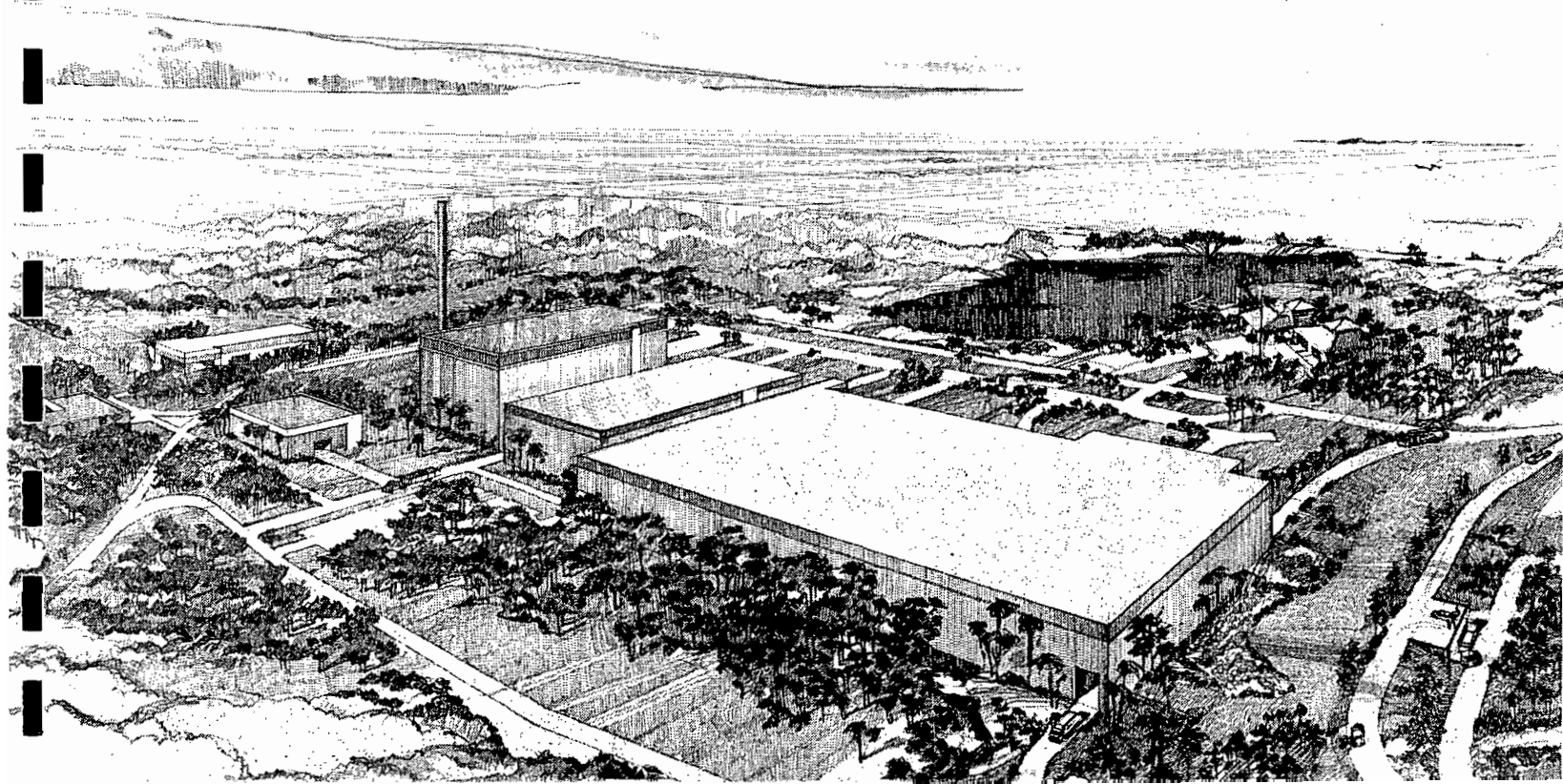
PALM BEACH COUNTY RESOURCE RECOVERY FACILITY

PA 84-20

DOAH CASE NO. 85-2032

SUBMITTED BY

THE PALM BEACH COUNTY SOLID WASTE AUTHORITY



Received DER

JAN 13 1986

P.P.S

PALM BEACH COUNTY, FLORIDA

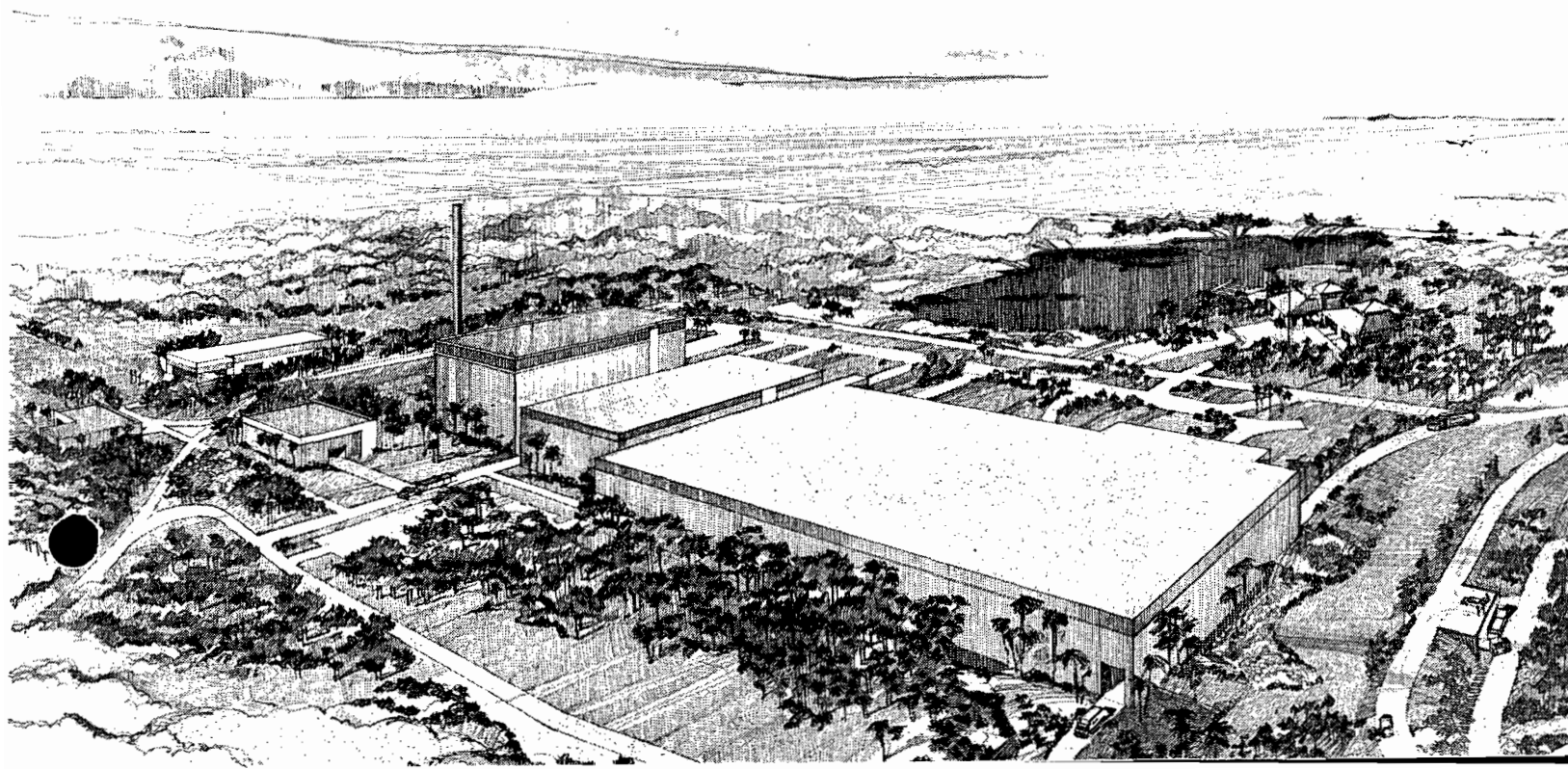
SOLID WASTE RESOURCE RECOVERY FACILITY
UPDATE TO THE APPLICATION FOR
POWER PLANT SITE CERTIFICATION

SUBMITTED BY

SOLID WASTE AUTHORITY Palm Beach County



DECEMBER, 1985



Received DER

NOV 27 1985

PALM BEACH COUNTY, FLORIDA

RESPONSE TO FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

LETTER DATED AUGUST 22, 1985

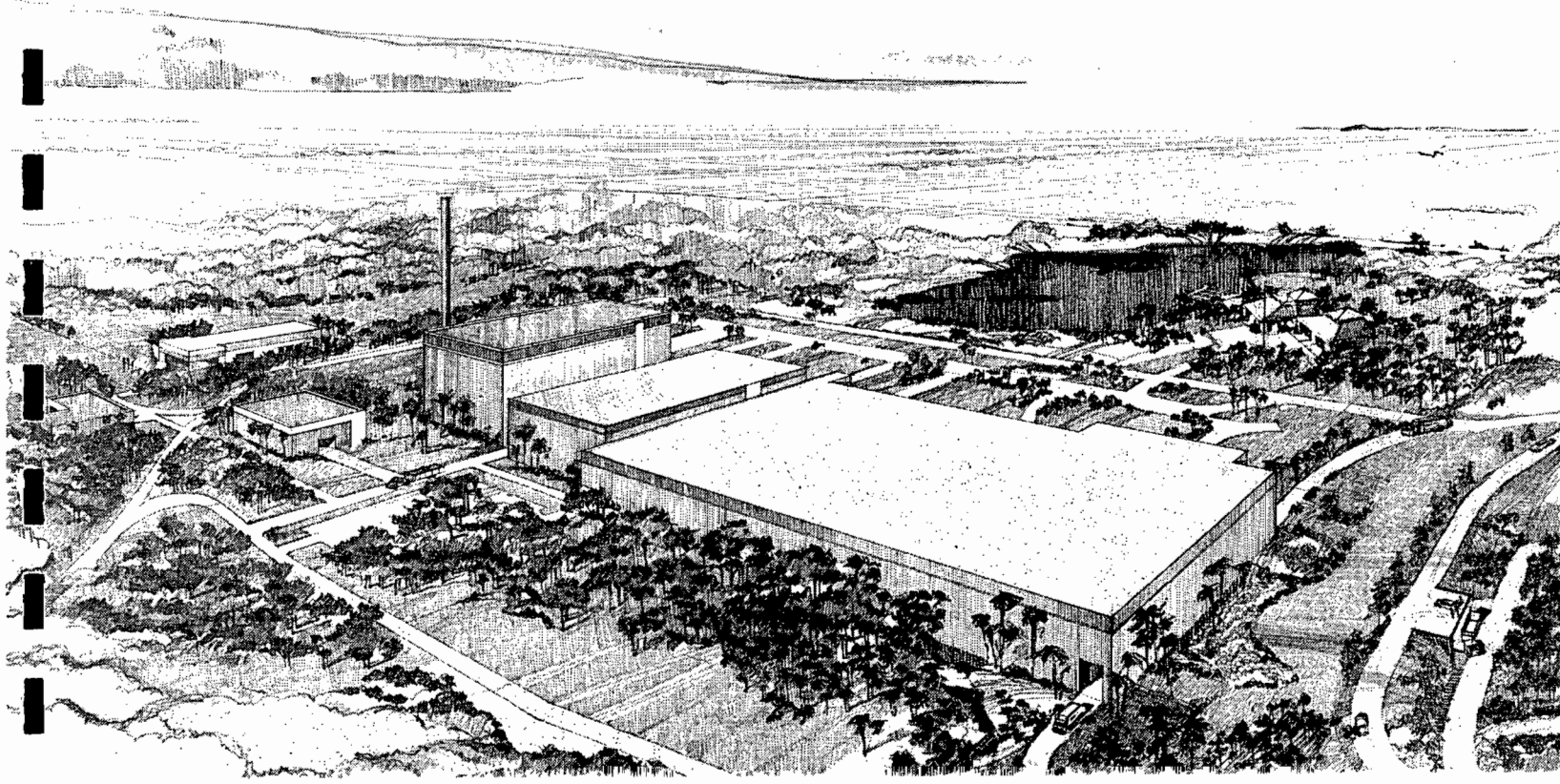
PALM BEACH COUNTY RESOURCE RECOVERY FACILITY

PA 84-20

DOAH CASE NO. 85-2032

SUBMITTED BY

THE PALM BEACH COUNTY SOLID WASTE AUTHORITY





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

DER

SEP 20 1985

BAQM

SEP 17 1985

REF: 4APT-AP

Mr. Timothy F. Hunt
Executive Director,
Palm Beach County
Solid Waste Authority
West Palm Beach, Fl. 33409

RE: Palm Beach County Solid Waste Resource Recovery Facility

Dear Mr. Hunt:

On November 22, 1983, the EPA approved Florida's Prevention of Significant Deterioration (PSD) regulations as part of the federally approved State Implementation Plan (SIP), Florida Administrative Code §17.2-500, thereby transferring to Florida the legal authority to process and issue PSD permits to sources in Florida which are required to obtain PSD permits. However, EPA recently became aware that, due to a conflict between the language of the Florida Electrical Power Plant Siting Act (PPSA), Public Health Code §§403.501-403.519, and that of the PSD regulations in the Florida SIP, EPA's approval of the PSD regulations as part of the SIP is void as to sources which are subject to the PPSA. Therefore, a source which obtains certification pursuant to the PPSA is still required to obtain a valid PSD permit before constructing or modifying.

We understand that Florida is currently processing, under the PPSA, a request by the Palm Beach County Solid Waste Authority to construct a solid waste resource recovery facility which shall generate electric power from combustion of refuse derived fuel and recover recyclable materials. This is to notify you that any such certification issued by Florida does not abrogate your responsibility to obtain a federal PSD permit. Construction of the source without a valid PSD permit will be considered a violation of the Clean Air Act and subject your facility to enforcement action.

We are currently engaged in discussions with the Florida Department of Environmental Regulation (DER) regarding courses of action that would enable a source subject to the PPSA to apply for a federal PSD permit with the DER. One possible solution currently under consideration by the DER and EPA involves placing the responsibility for the technical and administrative portions of the federal PSD review with the DER and the responsibility for issuance of the PSD permit with EPA.

DEPARTMENT OF ENVIRONMENTAL REGULATION

**ROUTING AND
TRANSMITTAL SLIP**

ACTION NO

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION)

Clair

Initial

Date

2.

*Send copy to Buck Owen's & Suec
letter to me*

Initial

Date

3.

sent 9/24

Initial

Date

4.

Initial

Date

REMARKS:

*ed Green -
for file*

INFORMATION

Review & Return

Review & File

Initial & Forward

DISPOSITION

Review & Respond

Prepare Response

For My Signature

For Your Signature

Let's Discuss

Set Up Meeting

Investigate & Report

Initial & Forward

Distribute

Concurrence

For Processing

Initial & Return

FROM:

Steve Smallwood

DATE

PHONE

LEGEND

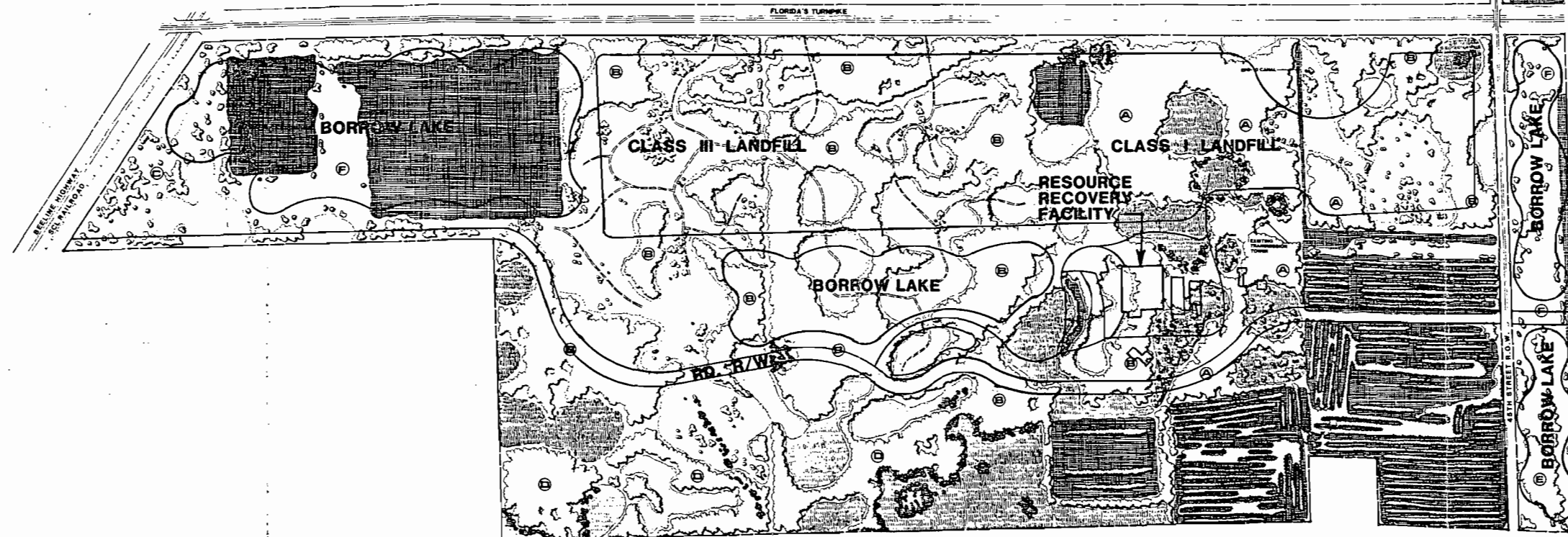
-  BORROW LAKE DREDGED FOR FILL & COVER MATERIAL, PRESENTLY OPEN WATER.
-  ABANDONED SHELL PITS USED FOR SHELLROCK & GRAVEL MATERIAL.
-  FRESH WATER MARSH DOMINATED BY SPIKERUSH, SAWGRASS AND PICKERELWEED, WITH ABSENCE OF TREES & WOODY VEGETATION.
-  FRESH WATER SWAMP DOMINATED BY MAPLE SWALLOW WITH PICKERELWEED, ARROWHEAD AND SAWGRASS IN WETTER AREAS.
-  FRESH WATER SLOUGH DOMINATED BY WAX MYRTLE, WILLOW, SAWGRASS & OTHER WETLAND VEGETATION.
-  WET PRAIRIE DOMINATED BY GRASSIE & SEDGES WITH SCATTERED WETLAND BROADLEAF SPECIES.
-  CYPRESS FOREST FOUND IN DEPRESSIONS, ROCKETS IN UPLAND & WETLANDS, SPOKELADES, WILLOWS, WETLAND GRASSES & MAPLES PRESENT.
-  DRAINAGE CANALS

- A** MIXED FOREST LIVE OAK, LAUREL OAK, RED MAPLE & SLASH PINE COMMUNITY.
- B** PINE FLATWOODS DOMINATED BY SLASH PINE WITH UNDERSTORY OF SAW PALMETTO, MYRSINE, ILEX & MYRTLE IN WETTER AREAS.
- C** PALMETTO PRAIRIES DOMINATED BY SAW PALMETTO WITH SCATTERED PINES & UNDERSTORY GRASSES.
- D** PALM HAMMOCK BASAL PALM HAMMOCK WITH EPiphytic FERNS, ORCHIDS & VINES; FERNS ARE DOMINANT GROUND COVER.
- E** EXOTIC VEGETATION AREAS TAKEN OVER BY MELALUCA, BRAZILIAN PEPPER, OR AUSTRALIAN PINE.
- F** DISTURBED GROUND SCRAPED AREAS WITH RE-ESTABLISHED HERBS & GRASSES.

DREDGE AND FILL ACRES

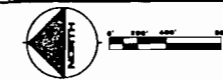
A. ACRES DREDGED		
Location	Upland	Wetland
Existing Lake Expansion	37.0	8.0
Lake West of Landfill	43.3	24.7
Lake South of 45th Street	40.0	—
TOTAL ACRES	120.3	32.7
B. ACRES FILLED		
Use	Upland	Wetland
Landfill	253.9	131.1
Resource Recovery Plant	35.0	14.6
North-South Roadway *	29.4	12.2
TOTAL ACRES	417.3	157.9

* Acres of wetlands disturbed by construction of the north-south roadway are approximate depending upon final alignment.



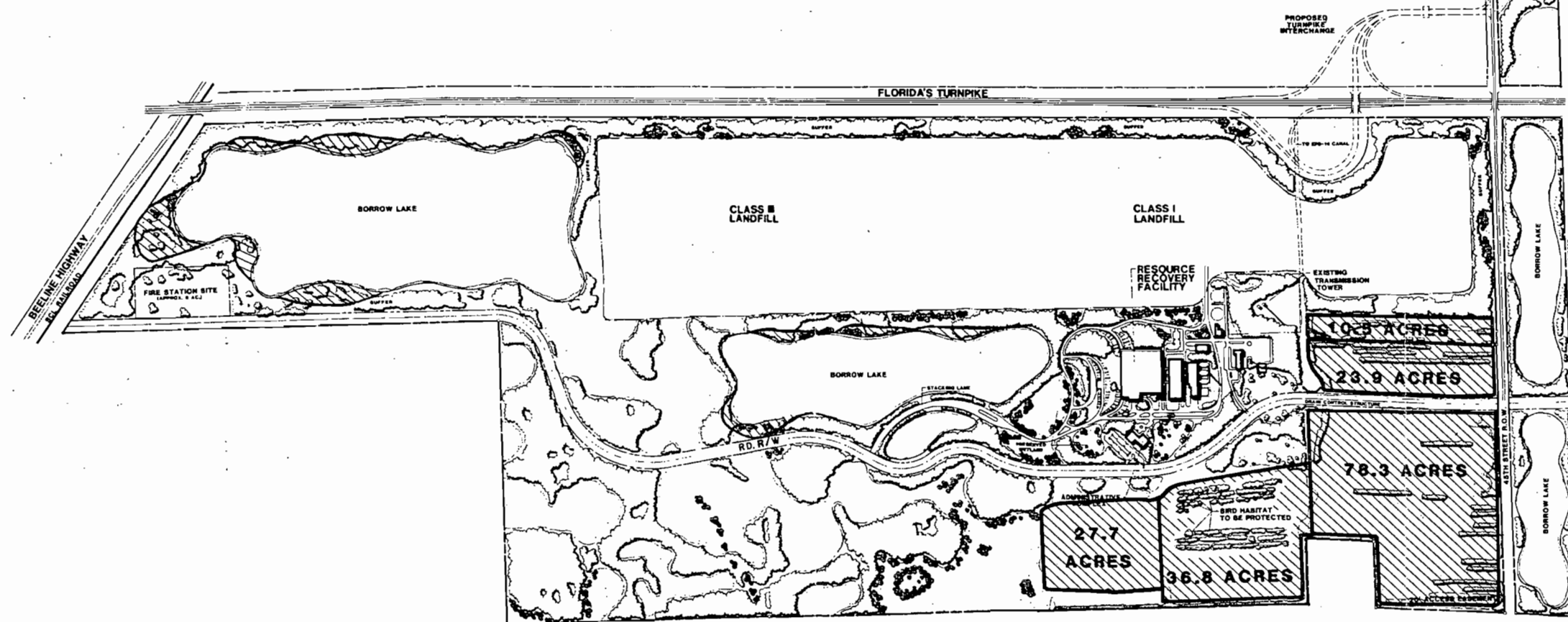
RESPONSE: JULY 2, 1985

FIGURE 5-1



LEGEND

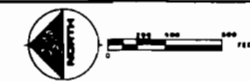
-  BORROW LAKE
-  PRESERVED FRESH WATER SWAMP OR SLOUGH
-  PRESERVED FRESH WATER MARSH OR WET PRAIRIE
-  PRESERVED & RELOCATED CYPRESS
-  PRESERVED & RELOCATED UPLAND VEGETATION
-  MITIGATED WETLANDS

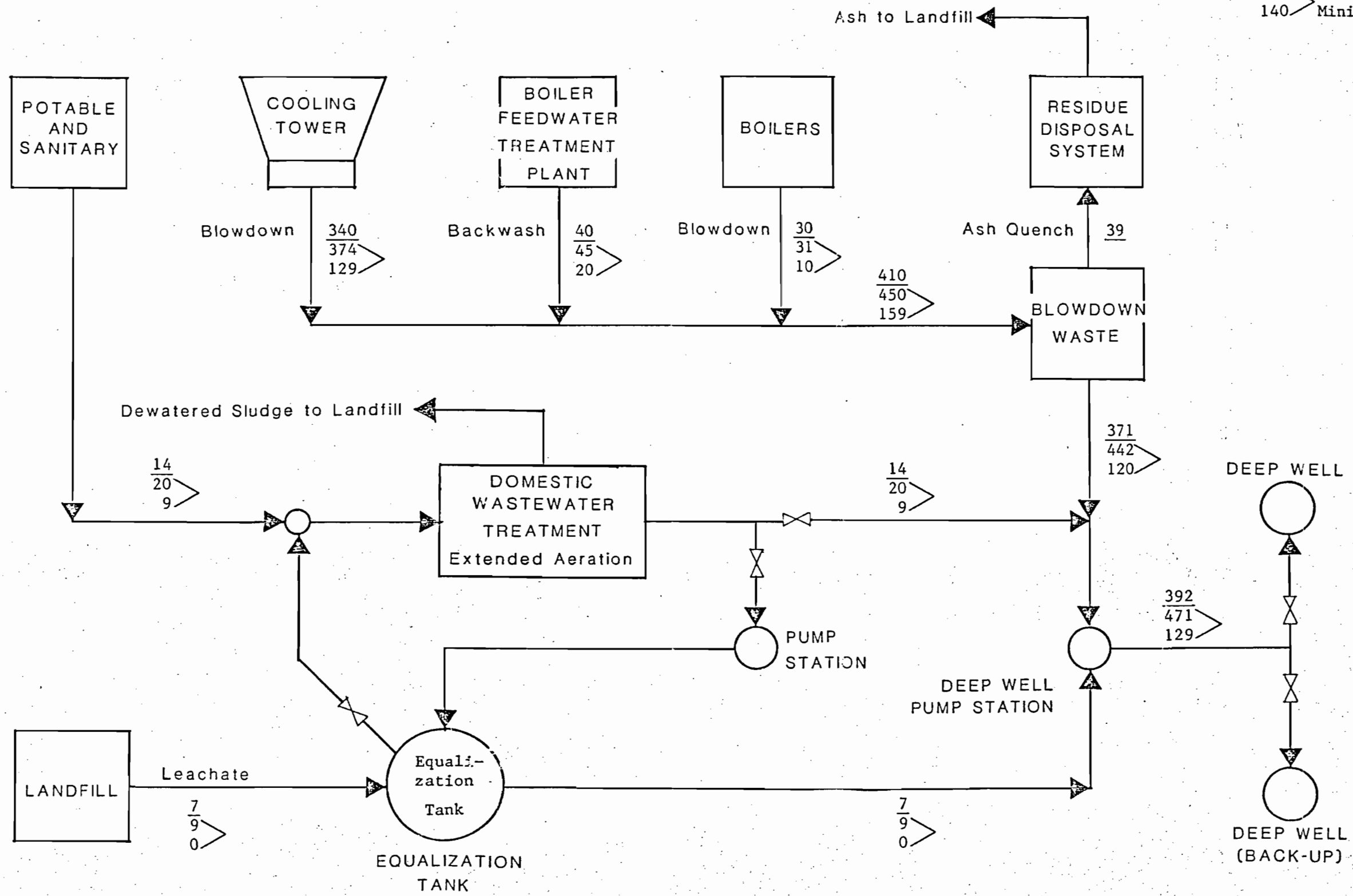


TOTAL MITIGATED WETLANDS - ± 190 ACRES

RESPONSE: JULY 2, 1985

FIGURE 5-2





LEGEND

391 Average Flow - GPM
 462 Maximum Flow - GPM
 140 Minimum Flow - GPM

RESPONSE: JULY 2, 1985



**PALM BEACH COUNTY
 SOLID WASTE AUTHORITY
 RESOURCE RECOVERY FACILITY**

**CHEMICAL AND BIOCIDES
 WASTE FLOW DIAGRAM**

FIGURE 9-1