HDR Henningson, Durham & Richardson
Suite 108
9455 Koger Boulevard
St. Petersburg, FL 33702
(813) 577-9455

Received DER

JUL 26 1983

P. P. S

Mr. Hamilton S. Oven, Jr., P.E.
Administrator
Power Plant Siting Section
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Oven:

In accordance with Chapter 17-17, FAC, we are pleased to transmit forty-five (45) copies of the Application for Power Plant Site Certification for the expansion of the solid waste processing capacity at the Pinellas Resource Recovery Facility. The proposal described therein features the addition of a third boiler and a second turbine-generator (29 MW gross).

As discussed previously with the Department, only changes to the information in the original application (October, 1978) are detailed in this report. Unchanged topics are cited accordingly.

It is hoped that the report will be sufficient in content to satisfy the Department's requirements. If you have questions, please do not hesitate to call.

Very truly yours,

HENNINGSON, DURHAM & RICHARDSON, INC.

R. J. Van Deman / KB

Robert J. Van Deman, Jr., P.E.

Enclosures

Architecture
Engineering
Planning
Systems
Sciences

Alexandria
Atlanta
Austin
Charlotte
Chicago
Dallas
Denver
Houston
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Norfolk
Omaha
Pensacola — Jim Andrews 432-2481
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Seattle

Pinellas County
Resource Recovery Project

Application For Power Plant Site Certification

PINELLAS COUNTY
SYSTEM

July 1983

HDR
Henningson, Durham & Richardson

DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

1. TO: (NAME, OFFICE, LOCATION) Buck Over – Power Pl. Siting	INITIAL / DATE
2.	INITIAL / DATE
3.	INITIAL / DATE
4.	INITIAL / DATE

ACTION NO.

ACTION DUE DATE

REMARKS: Pinellas Co. Res. Rec. Unit addition.

I have reviewed the documents for completeness. They appear to be complete w/ regard to ecological effects. I will review for sufficiency by the end of August.

Larry

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 & REPT
- INITIAL & FORWARD
- DISTRIBUTE
- CONCURRENCE
- FOR PROCESSING
- INITIAL & RETURN

FROM: Lawrence A. Olsen

DATE: 2 August 1983

PHONE

BOARD OF COUNTY COMMISSIONERS

DEPARTMENT OF SOLID WASTE MANAGEMENT
2800 110TH AVENUE NORTH
ST. PETERSBURG, FLORIDA 33702
PHONE (813) 825-1565

P.O. Box 21623
St. Petersburg, FL 33742-1623

June 28, 1983

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

ATTN: Mr. Hamilton Oven

Re: Application for Power Plant Siting Certification (PPSC), Phase II

Gentlemen:

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

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

Activities covering our application to the Public Service Commission for a Certificate of Need are underway at this time.

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

Sincerely,

D. F. Acenbrack, Director
Solid Waste Management

ACE:ltl
Encl

Engineer Submitting Application:

Patrick L. Byrne, P.E.
Registration Number: 22751

NCNB

NCNB National Bank of Florida · Trust Department
Post Office Box 1469
Tampa, Florida 33601

43737

63-027
631

No. 015278

DATE 7/19/83

TWENTY-FIVE THOUSAND AND NO/100

$ *****25,000.00

NCNB National Bank of Florida

TRUST DEPARTMENT

TO THE ORDER OF

STATE OF FLORIDA, DEPT ENVIR REG
TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE FL 32301

AUTHORIZED SIGNATURE

Pinellas County
Resource Recovery Project

Application For Power Plant Site Certification

July 1983

HDR
Henningson, Durham & Richardson

PINELLAS COUNTY RESOURCE RECOVERY FACILITY

APPLICATION FOR POWER PLANT SITING

Table of Contents

PERTINENT APPLICANT INFORMATION

Company or Applicant's Official Name:	Pinellas County
Address:	315 Court Street Clearwater, Florida 33516
Address of Official Headquarters:	Same
Business Entity:	County Government
Name and Title of Business Head:	Barbara Sheen-Todd, Chairman of Board of County Commissioners
Name, Title and Address of Official Representative Responsible for Obtaining Certification:	Gene Jordan, Director Public Works and Utilities 315 Court Street Clearwater, Florida 33516
Site Location:	Pinellas County
Nearest Incorporated City:	Pinellas Park
Latitude & Longitude:	27°52' N, 82°40' W
UTMs Northerly:	3084.1
UTMs Easterly:	335.2
Name Plate Generating Capacity Existing:	50.1 MW
Proposed:	Additional 29 MW
Remarks:	Pinellas County does not operate, maintain, or construct facilities for the purpose of electric generation. Neither does Pinellas County distribute electrical energy generated at facilities operated by others. The sole purpose of the proposed addition is to dispose of solid waste and recovery energy and materials. The proposed addition will afford Pinellas County a more flexible method of solid waste disposal which will substitute for the present landfilling operations.

CHAPTER 1
PURPOSE OF THE FACILITY

1.0 The Resource Recovery Facility (RRF) was planned and constructed as the ultimate solution to solid waste disposal in Pinellas County, Florida. Since the submittal of the site application for the original two boiler plant in 1978, refuse generation rates have risen faster than was anticipated. To meet the added demand on the processing capacity of the plant an additional boiler is needed.

The capacity afforded by the third boiler will minimize the landfilling of Class I solid waste in the future; this is the stated policy of the Board of County Commissioners, Pinellas County, Florida. Based on current estimates, all Class I material can be incinerated by a three boiler plant through 1996.

CHAPTER 2
THE SITE

2.1 Changes in Site Location and Layout

This proposal involves no substantial changes in land use. Figure 2-1 shows the existing facility and the proposed additional equipment. The battery limits of the plant will not be enlarged. The electrical generation capacity will be increased by 29 megawatts (MW).

2.2 Changes in Regional Demography, Land and Water Use

Pinellas County continues to be one of the most densely populated of all Florida Counties. Since the original PPSC application in 1978 the four cities adjacent to the site (St. Petersburg, Largo, Pinellas Park and Kenneth City) have all increased their boundaries by annexation. Those increases that are within a five-mile radius of the Facility are indicated in Figure 2-2. The resident populations (1970 and 1980 census) for the above cities and for the rest of the County are listed in Table 2-1. Figure 2-3 shows solid waste generation projected through 2001.

The present and projected land use within the five-mile radius is essentially the same as it was previously. The one notable change is the area within about two miles which is becoming more industrialized, and this change is reflected in the latest land use and zoning plans prepared by the County and the various municipalities. Figures 2-4 and 2-5 show the changes in the zoning between the original application and the present.

The proposed changes at the RRF will increase non-potable water consumption by 50%. Existing water mains from the St. Petersburg and Largo reclaimed water sources are capable of conveying the added flow.

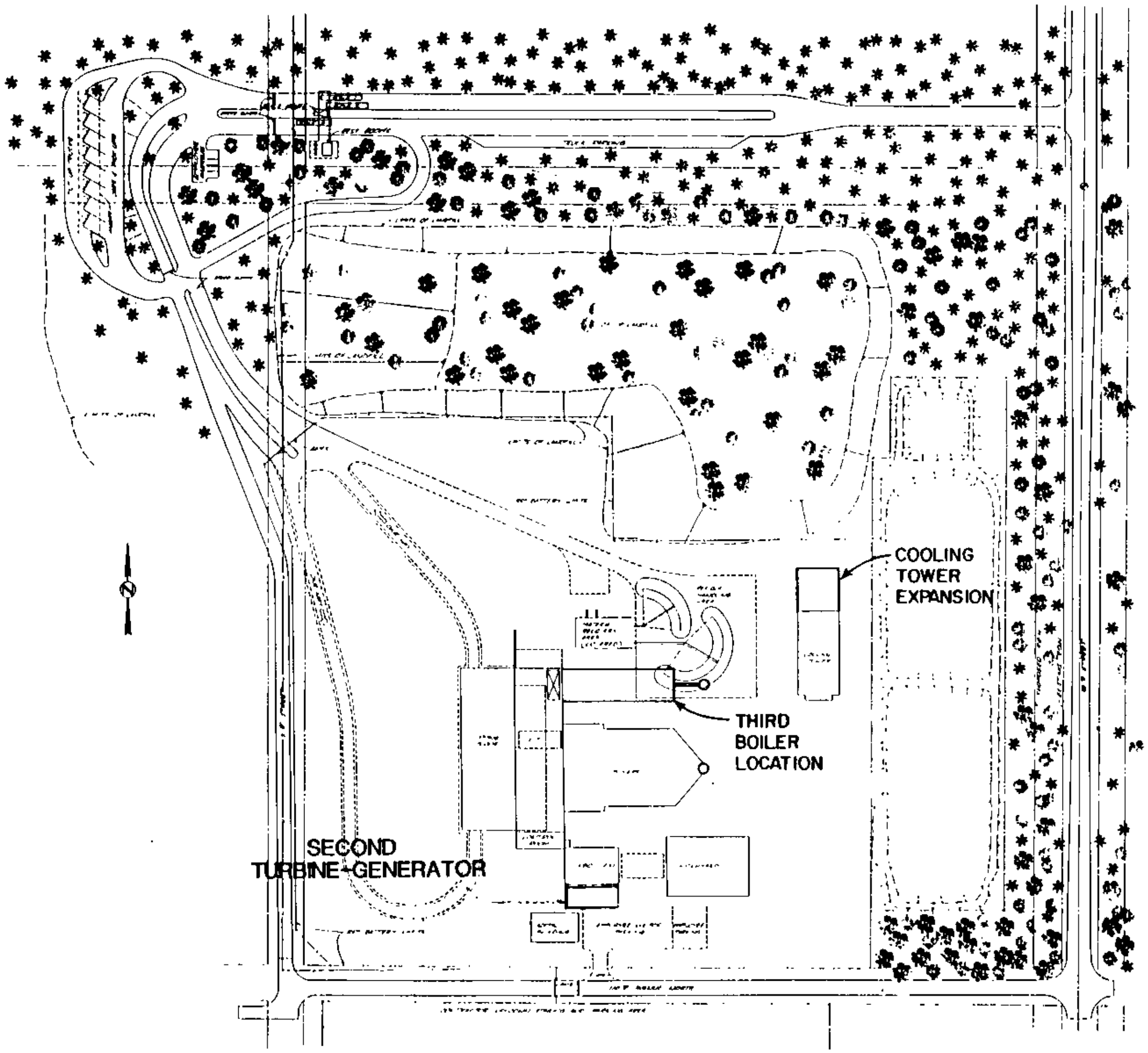


FIGURE 2-1

PINELLAS COUNTY
SOLID WASTE OPERATION PLAN

HENNINGSON, DURHAM & RICHARDSON, INC.

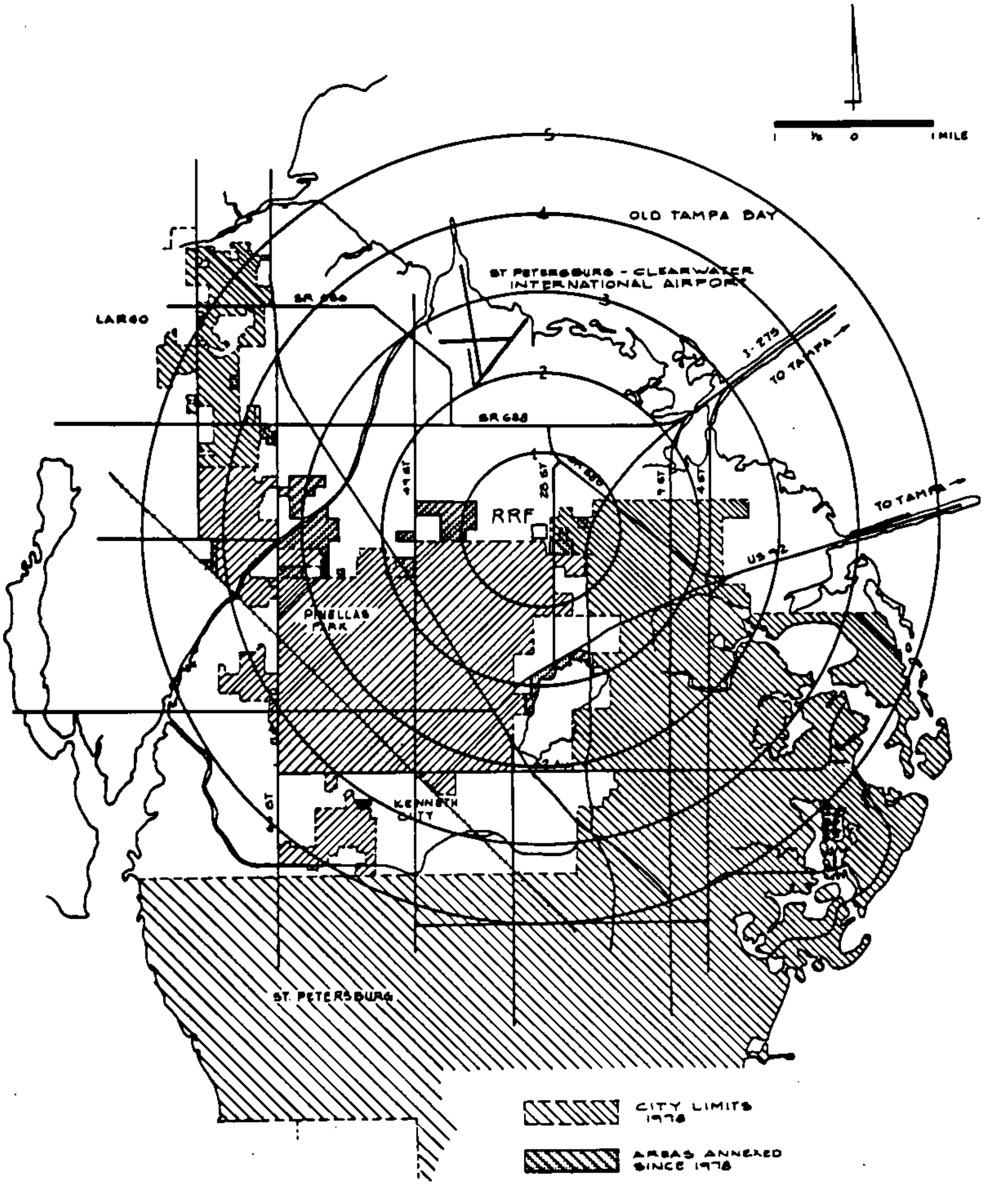
Table 2-1

Pinellas County, Florida

1970 and 1980 Census Counts

	Resident Populations		
	1970	1980	Percent Change
Belleair	2,962	3,673	24.0
Belleair Beach	952	1,643	72.6
Belleair Bluffs	1,910	2,522	32.0
Belleair Shores	124	80	(35.5)
Clearwater	52,074	85,528	64.2
Dunedin	17,639	30,203	71.2
Gulfport	9,976	11,180	12.1
Indian Rocks Beach	2,666	3,717	39.4
Indian Shores	791	981	24.4
Kenneth City	3,862	4,344	12.5
Largo	24,230	58,977	143.4
Madeira Beach	4,177	4,520	8.2
North Redington Beach	768	1,156	50.5
Oldsmar	1,538	2,608	69.6
Pinellas Park	22,287	32,811	47.2
Redington Beach	1,583	1,708	7.9
Redington Shores	1,733	2,142	23.6
Safety Harbor	3,103	6,461	108.2
St. Petersburg	216,159	238,647	10.4
St. Petersburg Beach	8,024	9,354	16.6
Seminole	2,121	4,586	116.2
South Pasadena	2,465	4,188	69.9
Tarpon Springs	7,118	13,251	86.2
Treasure Island	6,120	6,316	3.2
Total Incorporated	394,382	530,599	34.5
Total Unincorporated	127,947	197,932	54.7
Total County	522,329	728,531	39.5

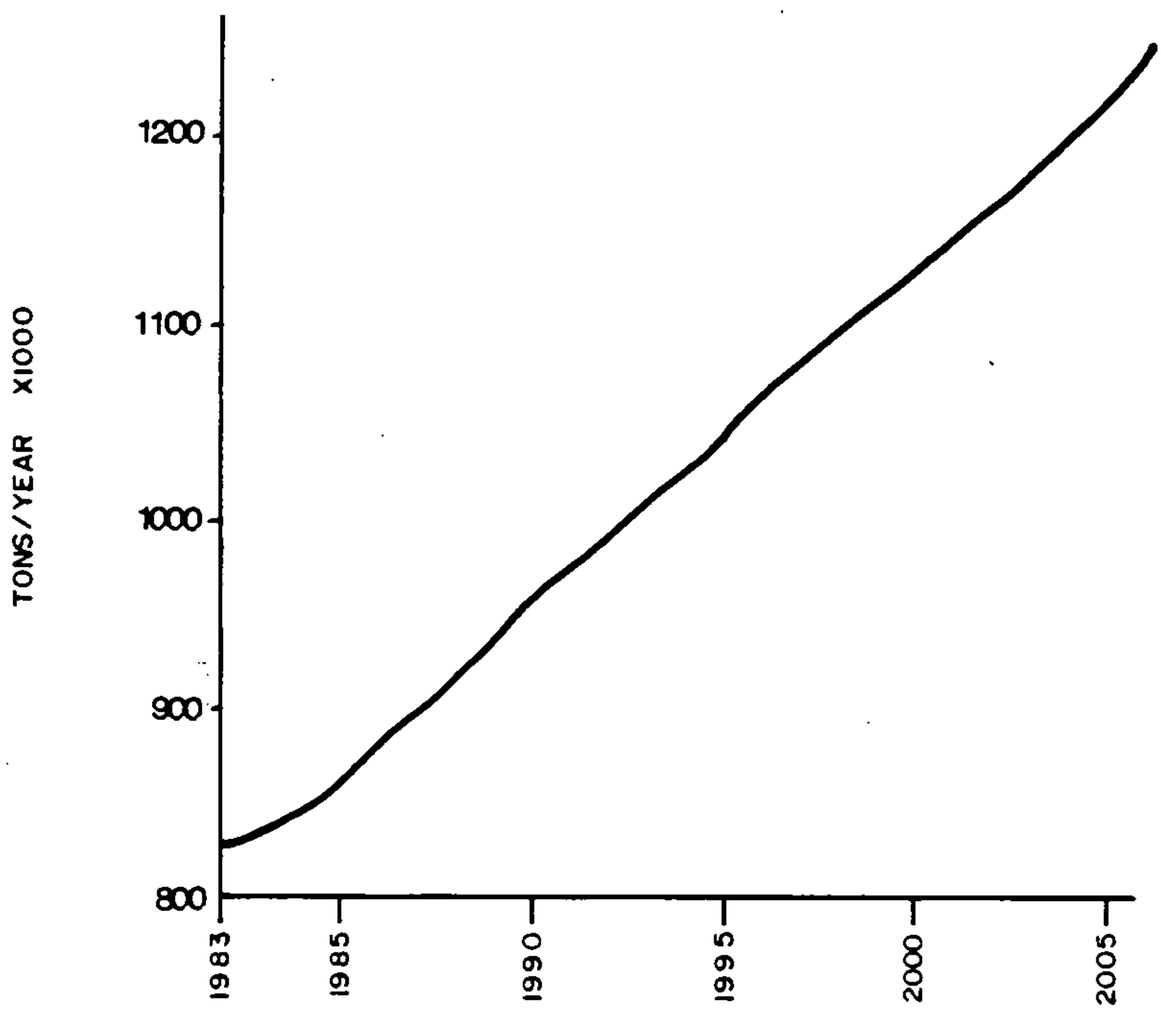
Source: U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population and Housing - Florida, Advanced Reports (PHC80-V-11).

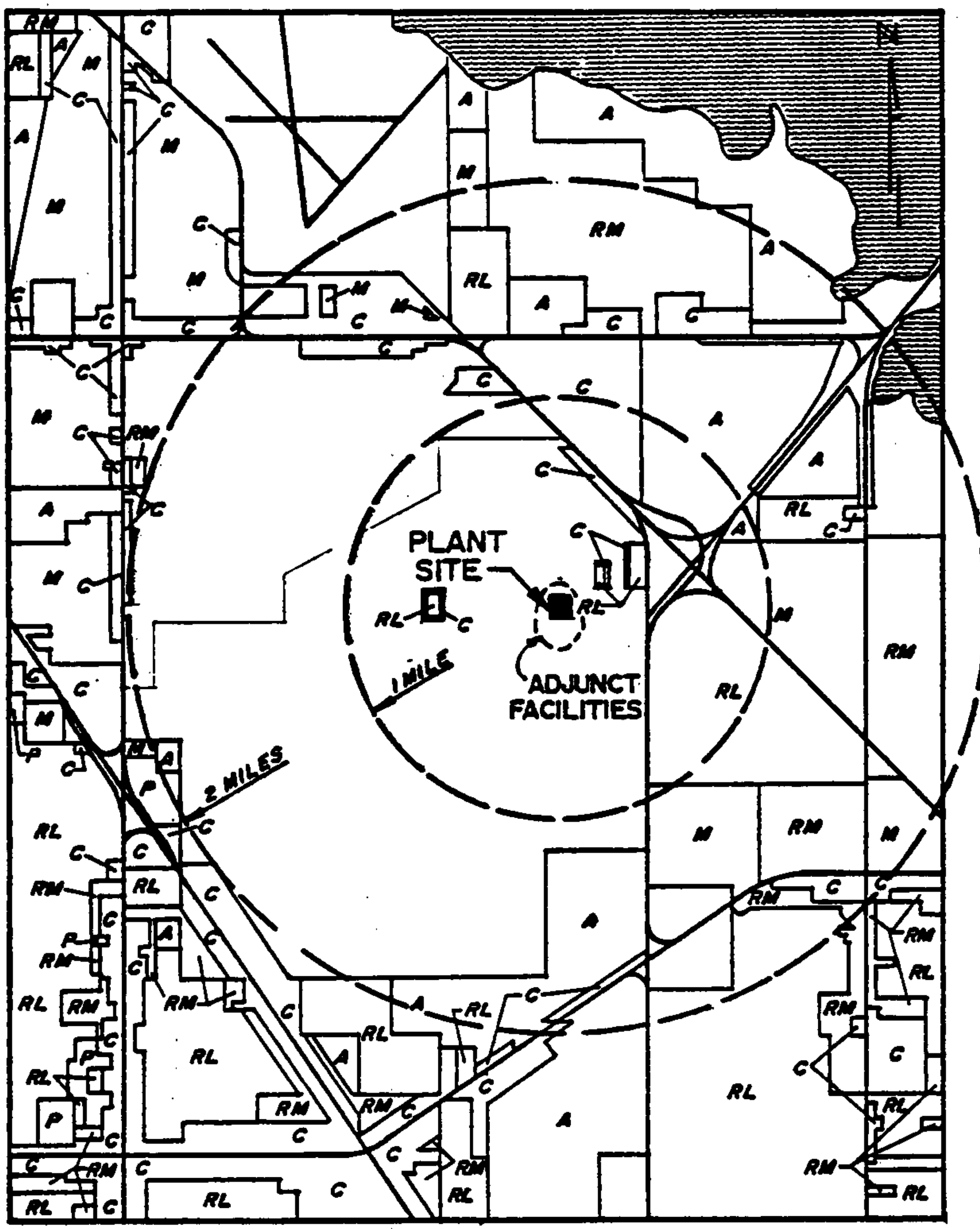


ANNEXATION CHANGES

FIGURE 2-2

FIGURE 2 - 3
SOLID WASTE PROJECTIONS



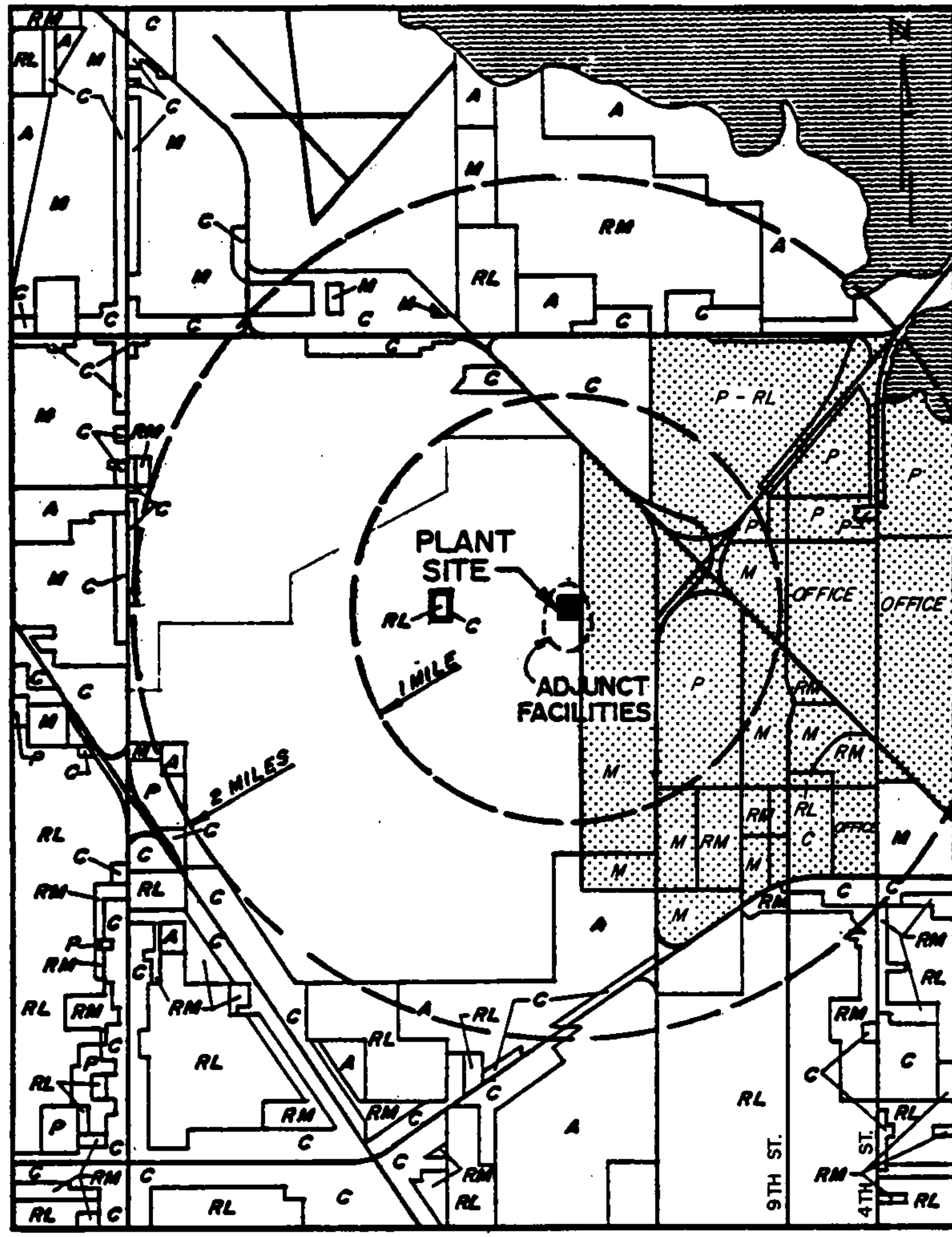


LEGEND

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

ORIGINAL ZONING IN THE STUDY AREA

FIGURE 2-4



LEGEND

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

CHANGES OF ZONING IN STUDY AREA

FIGURE 2-5

2.3-2.7 No changes from original application

2.8 Ambient Air

See Section 3.7

2.9 Other Environmental Features

No additional factors to be added.

/

CHAPTER 3
THE PLANT

3.0 The Plant

The expansion features a third Martin combustion unit capable of handling 1050 tpd of solid waste at 5000 Btu/#. Two additional cells will be added to the cooling tower system and a 29 MW (gross) turbine-generator will be installed adjacent to the existing one. A new 161 ft. stack will be constructed just north of the one present. There will be minimal changes to other parts of the facility as needed by the third unit.

3.1 Changes in External Appearance

Figure 2.1 shows a plot plan with the changes as planned for the facility. The visible changes include the second stack, an additional turbine-generator, the expanded cooling tower, and the boiler house. The figure also shows the construction that has taken place since the original application was submitted.

3.2 Fuel

The facility will be capable of handling up to 22,050 tons of solid waste per week, an increase of 7,350 tons. The third unit will allow for higher available capacity during times of maintenance or other unit shutdown. Solid waste projections are shown on Figure 2-3.

Based on operations at the existing RRF, the average composition of incoming solid waste to the plant is 85% Class I (garbage), 5% Class III material which is processible (P), 5% Class III material which is not processible (NP), and 5% construction debris (not requiring DER permit). Six categories of boiler discharges are generated at the average rates listed below:

1.	Ferrous metals	88 tpd
2.	Aluminum	6 tpd
3.	Heavy non-ferrous,	3 tpd
4.	+10" Iron	18 tpd
5.	Aggregate	460 tpd
6.	2-10" non-magnetic	15 tpd

3.3 Plant Water Use Changes

Figure 3-1 presents the revised design water use rates for normal and peak load operation of the facility with the addition of the third unit.

3.4 Heat Dissipation System Changes

Flow will increase from 33,400 gpm to 50,100 gpm, and the heat rejection load will increase from 450,000,000 BTU/hr to 675,000,000 BTU/hr. Table 3-1 shows the typical analysis of the cooling tower supply waters. A preliminary water quality review of the makeup water potential of stormwater indicates it to be lower in dissolved solids, but high in suspended solids.

3.4.1 - No changes from the original application.

3.4.2 Source of Cooling Water

Cooling tower make-up water is now obtained from the City of St. Petersburg Northeast Advanced Wastewater Treatment Plant (AWT). A second source from the City of Largo AWT will be available in the near future. Another source contemplated is the storm water runoff from the resource recovery site. Quantities available from (1) and (2) are sufficient to supply the requirements individually. The Largo supply will ultimately be the primary source and the St. Petersburg system used as back-up. Use of stormwater runoff in the towers would be intermittent and based

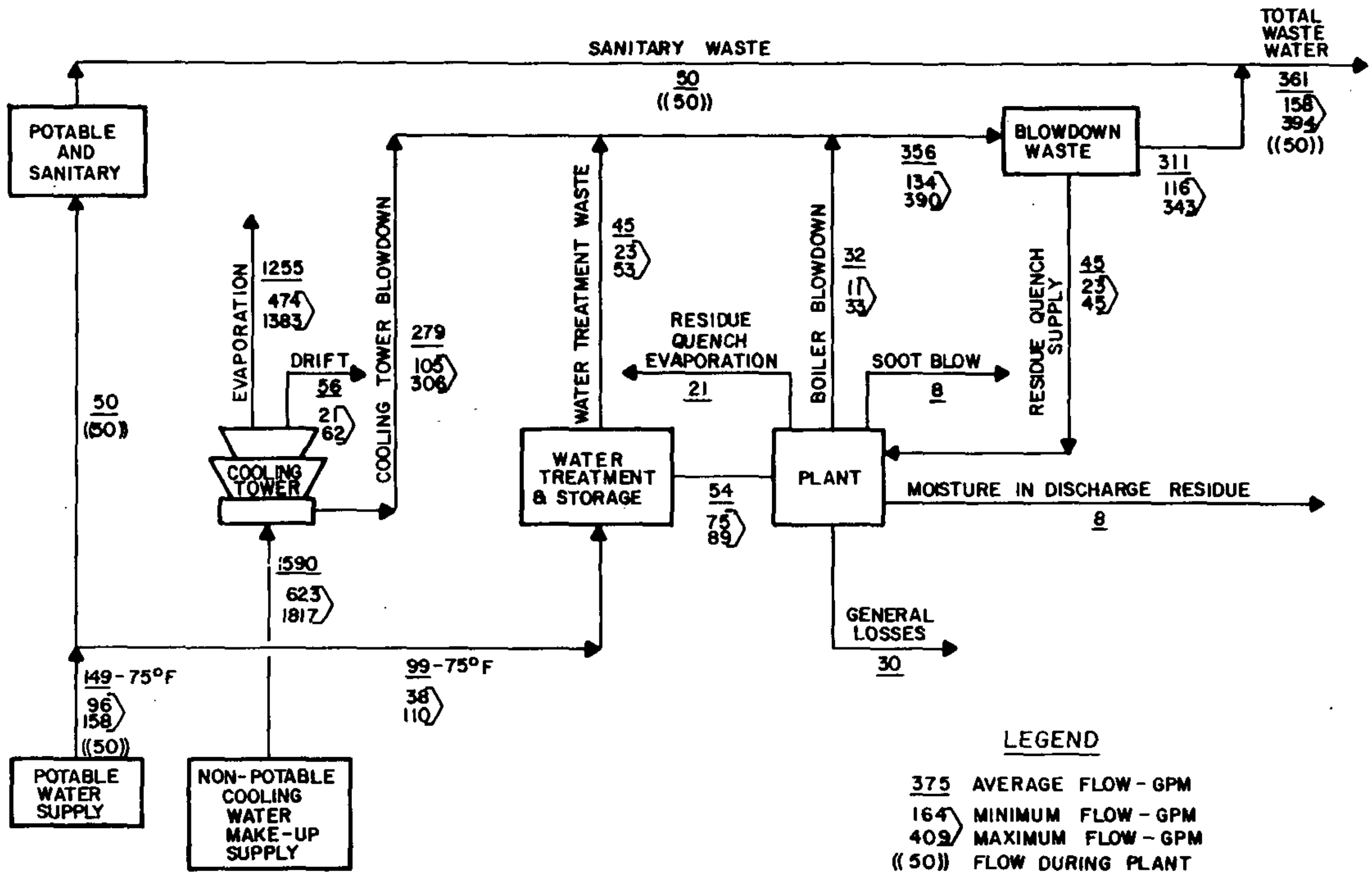


FIGURE 3-1

SUMMARY WATER FLOW DIAGRAM
(BASED ON USING LARGO WATER)

Table 3-1

Chemical Characteristics of Facility Cooling Water Influent

Chemical Constituent	Potable Supply Pinellas County	Non-Potable Supply 1 Largo STP	Non-Potable Supply 2 St. Pete. NE STP
pH	7.7	7.6	6.9
Total hardness as ppm $CaCO_3$	124	248	412
Calcium hardness as ppm $CaCO_3$	108	232	282
Total Alkalinity as ppm $CaCO_3$	90	270	240
P-Alkalinity as ppm $CaCO_3$	-	0	0
OH-Alkalinity as ppm $CaCO_3$	0	0	0
Total dissolved solids, ppm	20	670	1394
Suspended solids, ppm	10	9	30
Conductivity, micromhos/cm	268	938	2390
Calcium, ppm Ca	43	80	97
Magnesium, ppm Mg	4	6	43
Ferric iron, ppm Fe	.05	.11	.298
Bicarbonate, ppm HCO_3	110	324	293
Carbonate, ppm CO_3	0	0	0
Sulfate, ppm SO_4	0	40	100
Chloride, ppm Cl	26	95	522
Silica, ppm SiO_2	16	19	20
Aluminum, ppm $Si0_2$	.1	.1	.1
Zinc, ppm Zn	.05	.016	.06
Orthophosphate, ppm PO_4	0	3.3	5

on the need to reduce water levels in on-site detention facilities.

3.4.3 System Design

The quantities of water withdrawn from sources of supply are shown in Figure 3-1. The average potable withdrawal is 149 gpm (maximum = 158 gpm and minimum = 96 gpm). The average non-potable withdrawal is 1590 gpm (maximum = 1817 gpm and minimum = 623 gpm).

The consumptive usage rate for the system is shown in Figure 3-1. The consumptive use of water by the facility is through cooling tower losses in the form of evaporation and drift. The average evaporative loss will be 1255 gpm (minimum = 474 gpm and maximum = 1383 gpm), and the average drift loss will be 56 gpm (minimum = 21 gpm and maximum = 62 gpm).

The location of the cooling towers was shown on the facility layout (Figure 2-1). The cooling tower system will consist of a six (6) cell group of Class 600 Marley cross flow towers or approved substitutes. The average blow down rate for the towers is 279 gpm (minimum = 105 gpm and maximum = 306 gpm). The cooling tower blow down will accumulate along with the boiler demineralization back flush water average flow 45 gpm, minimum = 23 gpm, maximum = 53 gpm), and the boiler blow down water (average flow 32 gpm, minimum = 11 gpm, maximum = 33 gpm) for a total process blow down average flow of 356 gpm (minimum = 134 gpm, maximum = 390 gpm). The water that is used to quench the residue discharged from the boiler grates will be drawn from the process blow down cumulative flow, leaving an average process discharge rate of 311 gpm. Minimum and maximum process flows are 116 gpm and 343 gpm, respectively. Sanitary flow, discharged at a rate of 50 gpm, will be added to the process flow for an average total discharge of 361 gpm (minimum = 158 gpm, maximum = 394 gpm).

The cooling water increases in temperature from 86°F to 110°F in the process of condensing the exhaust steam from the turbine. The water is then cooled by evaporation in the cooling tower. The flow rate through the cooling tower is 56,250 gpm, and the evaporation rate from the tower will average 1255 gpm or approximately 2.2% of the circulation rate. No intake structure is anticipated at this time, since the cooling water will be drawn from a pressurized main which carries non-potable water. The potable water supply will also be drawn from a pressurized main. This plant effluent, with a maximum temperatue of 92° F, will be pumped to the Pinellas Park lift station; from there it will be diluted in the Pinellas County sewage collection and treatment system.

3.4.4 - No change from the original application.

3.4.5 Blowdown and Trash Disposal

Blowdown will be from the boilers, the cooling towers and the demineralizers as described in Section 3.4.3 above. This cumulative flow, less the 45 gpm which goes to quench the residue, is discharged after neutralization and stabilization to the sanitary sewage collection system. The physical-chemical characteristics of the blowdown mixture are shown in Table 3-2.

3.4.6-3.6 No changes from original application.

3.7 Air Emissions

With the addition of the third unit, the facility will then consist of three combustion units and two stacks. Units 1 and 2 will be vented through a single stack, and Unit 3 will have a separate stack. A full discussion of the air pollution aspects is contained in Appendix A under separate cover.

3.8 No changes from the original application.

Table 3-2

Characteristics of Blowdown Mixture (Using Largo Supply)

Parameter	Boiler Blowdown			Cooling Tower Blowdown			Demineralizer			R.O. Reject		
	Q(gpm)	mg/l	#/Day	Q(gpm)	mg/l	#/Day	Q(gpm)	mg/l	#/Day	Q(gpm)	mg/l	#/Day
Ca	32	0	0	279	400	1340	5	36	2	40	236	113
Mg	32	0	0	279	30	101	5	5	1	40	17	8
Na	32	350	135	279	445	1491	5	3398	204	40	248	119
HCO_3	32	100	38	279	475	1592	5	144	9	40	266	128
CO_3	32	0	0	279	0	0	5	0	0	40	0	0
SO_4	32	0	0	279	1445	4842	5	6277	377	40	118	57
Cl	32	100	38	279	475	1592	5	144	9	40	266	128
PO_4	32	40	15	279	17	57	5	5	1	40	9	4
TDS	32	800	308	279	3017	10109	5	10194	612	40	1337	642
TSS	32	100	38	279	75	251	5	0	0	40	50	24
pH	32	10.5	-	279	7.5	-	5	8.5	-	40	6.5	-

3.9 Associated Facilities

All items designated as "to be constructed" for the original project have been constructed.

3.10 On-Site Drainage

Site stormwater is conveyed to a 20 acre stormwater detention basin located south of the plant. Water in the pond is pumped to existing aeration-oxidation ponds for treatment and subsequent land spraying on perimeter berms. An alternative stormwater management project being investigated is the use of stormwater as a makeup water source for the cooling towers. The volume of water supplied in this manner would be small in comparison with total makeup water requirements. Water levels in site storage facilities could be effectively regulated by this technique, assuming the stormwater is amenable to any required pretreatment.

CHAPTER 4
ENVIRONMENTAL EFFECTS OF CONSTRUCTION

4.1 Site Preparation and Plant Construction

No changes from original application except those changes concerning air quality. The air quality discussion is contained in Appendix A of this document.

4.2-4.4 No changes from original application.

CHAPTER 5
ENVIRONMENTAL EFFECTS OF PLANT OPERATION

5.0 All of the fundamental plant processes remain the same. Changes in water flows are described in Section 3.4. It is proposed that the stormwater-leachate treatment concept described in the original application be modified. This is due to the findings of a forthcoming USGS report which documents the treatment efficiency of the existing aeration-oxidation pond. At present the oxidation ponds are vegetated by cattails; the aeration basin is lined and is supplied with a 20 HP floating mechanical aerator. The data indicate that substantial water quality improvement is attained after aeration alone and that polishing by hyacinths may not be warranted. A copy of this report will be forwarded to the Department as soon as it is available.

The effect of added air emissions is detailed in Appendix A. All other discussions are as presented in the original application.

5.1-5.3 No changes from original application.

5.4 Effects of Air Emission

Discussed in Appendix A.

5.5-5.7 No changes from original application.

CHAPTER 6

ENVIRONMENTAL MEASUREMENTS & MONITORING PROGRAMS

6.0 As required by the Conditions of Certification of the original Power Plant Site Certification an environmental monitoring plan was prepared and submitted to the Department. The proposal was found to be acceptable and major components of the plan have been implemented. Addition of the third boiler does not cause any changes in the original monitoring plan; therefore the document is inserted here to fulfill the requirements of this chapter. Since the plan was originally submitted for Department review, more detailed information on well construction and leachate plume detection methods have been added.

EXECUTIVE SUMMARY

PROGRAM OBJECTIVES

This monitoring program is designed to fulfill the requirements of the Conditions of Certification (COC) of the Power Plant Site Certification (PPSC) and to ensure that the operation of the plant does not cause harm to the surrounding environment and human population.

PROGRAM SUMMARY

The monitoring program is shown schematically in Figure 6.1 and described in Tables 6.1 and 6.2; program implementation is presented in Figure 6.2. The monitoring program consists of startup and continuous regimens, some of which are stipulated in the COC; others, which are labeled additional tests, are performed as insurance that the facility is operating in an environmentally sound manner. A specific sampling and analysis team is assigned to each task in as shown in Table 6.1. On May 24, 1983, Pinellas County contracted with the firm of Environmental Science and Engineering, Inc. (ESE) of Gainesville, Florida, to perform analytical tasks associated with the residue and water quality sampling. The County has also signed a contract with the Florida State Epidemiology Laboratory to conduct virus monitoring of the cooling towers. Noise sampling, initiated prior to plant construction, is being conducted by the Pinellas County Department of Environmental Management (DEM). The one year's background data prior to plant startup was collected by

FIGURE 6-1
PROGRAM SCHEME

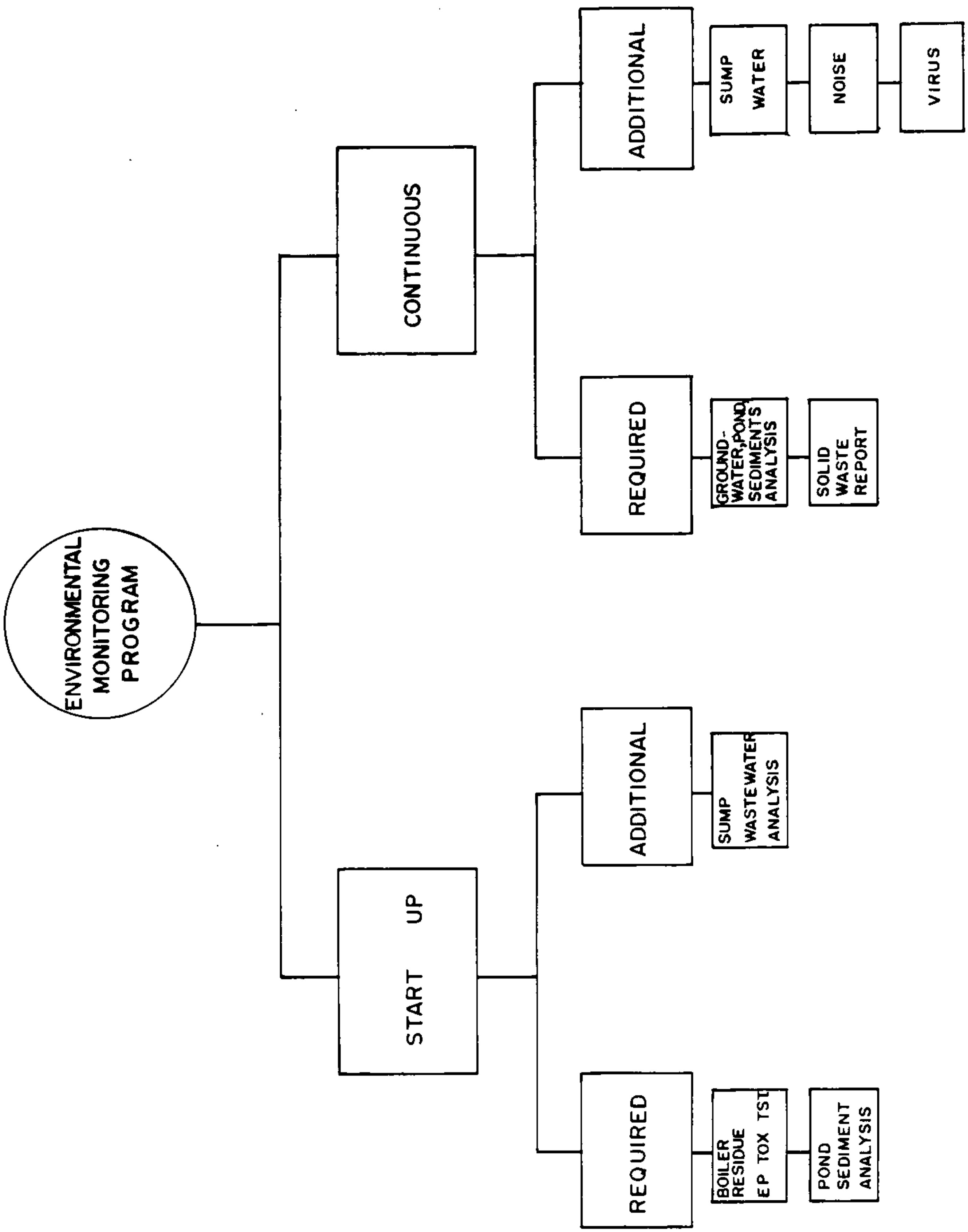


TABLE 6.1

PROGRAM SUMMARY

Program Component	Type/Regimen	Project Assignments
Boiler Residue	Required/Startup	ESE
Initial Pond Water & Sediment Tests	Required/Startup	ESE
Quarterly Groundwater, Pond Sediment Tests	Required/Continuous	ESE
Solid Waste Report	Required/Continuous	Pinellas County
Blowdown Sump Wastewater	Additional/Continuous	Refuse Tech, Inc. & ESE
Noise	Additional/Continuous	Pinellas County
Virus	Additional/Continuous	Florida HRS

TABLE 6.2

SUMMARY OF MINIMUM MONITORING REQUIREMENTS

Requirement	Frequency of Analysis	Purpose
Analyze water quality of pond water, sediments	Once, prior to pumping leachate and/or storm-water through system	To establish background concentrations in the pond system.
Collect groundwater data	Continuous for one year prior to plant startup	To establish background concentrations under sprayfield.
Analyze pond water & sediments	Quarterly, commencing within 3 months after commencement of pumping into system	To establish treatment effectiveness, heavy metal uptake and correlation with groundwater data.
Monitor groundwater quality	Quarterly	To determine impact of sprayfield and treatment pond system operation on underlying groundwater.
Solid waste report	Monthly, submit to District DER quarterly	To document fill quantity and applied treatment.
Analyze boiler residue	Completed on June 6, 1983	To determine if the boiler residue is a hazardous material.

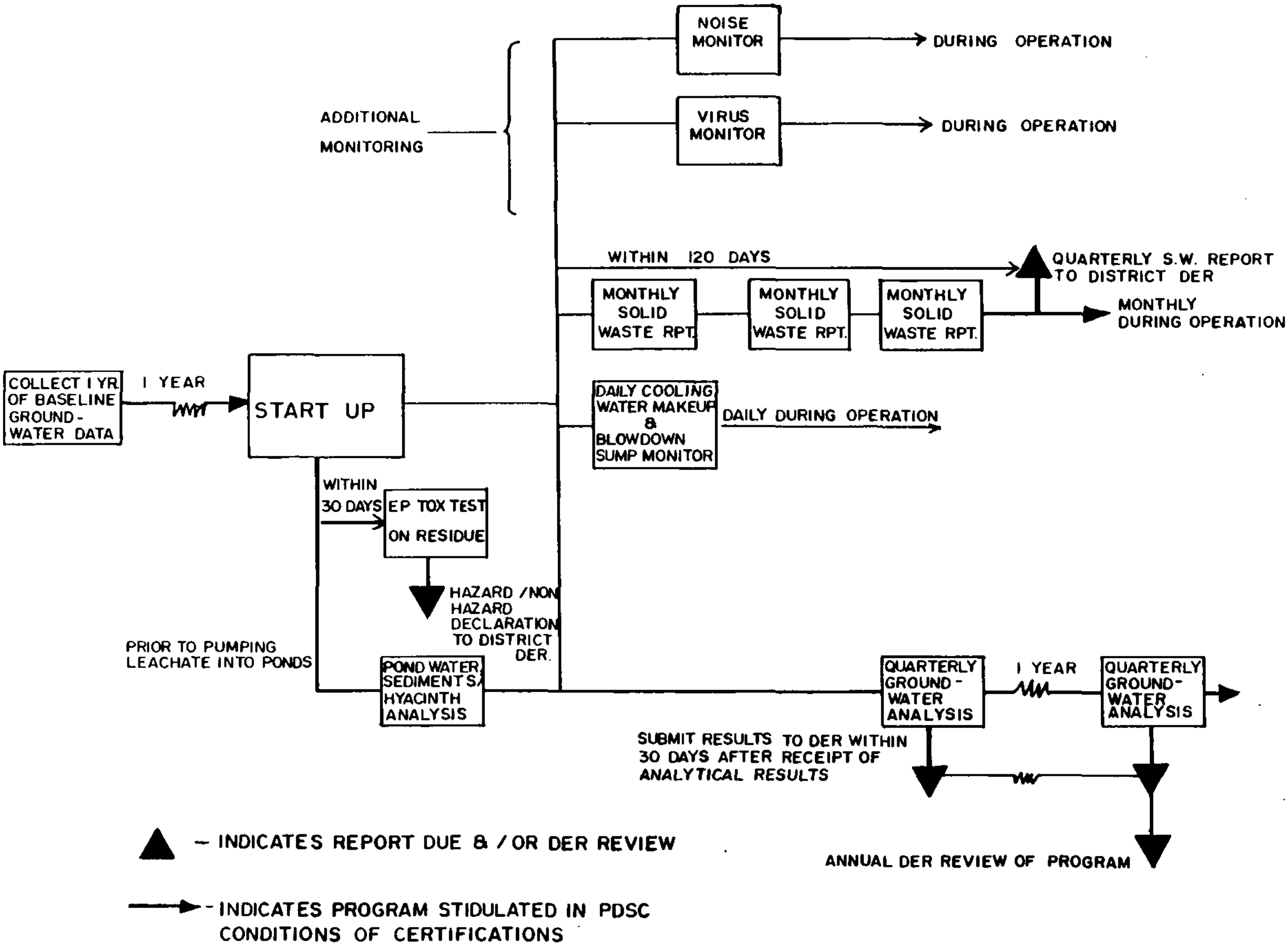


FIGURE 6-2

IMPLEMENTATION SCHEDULE

the U. S. Geological Survey (USGS) under contract with Pinellas County. A statistical analysis of the data from selected wells was submitted to the DER (Tallahassee) on March 8, 1983.

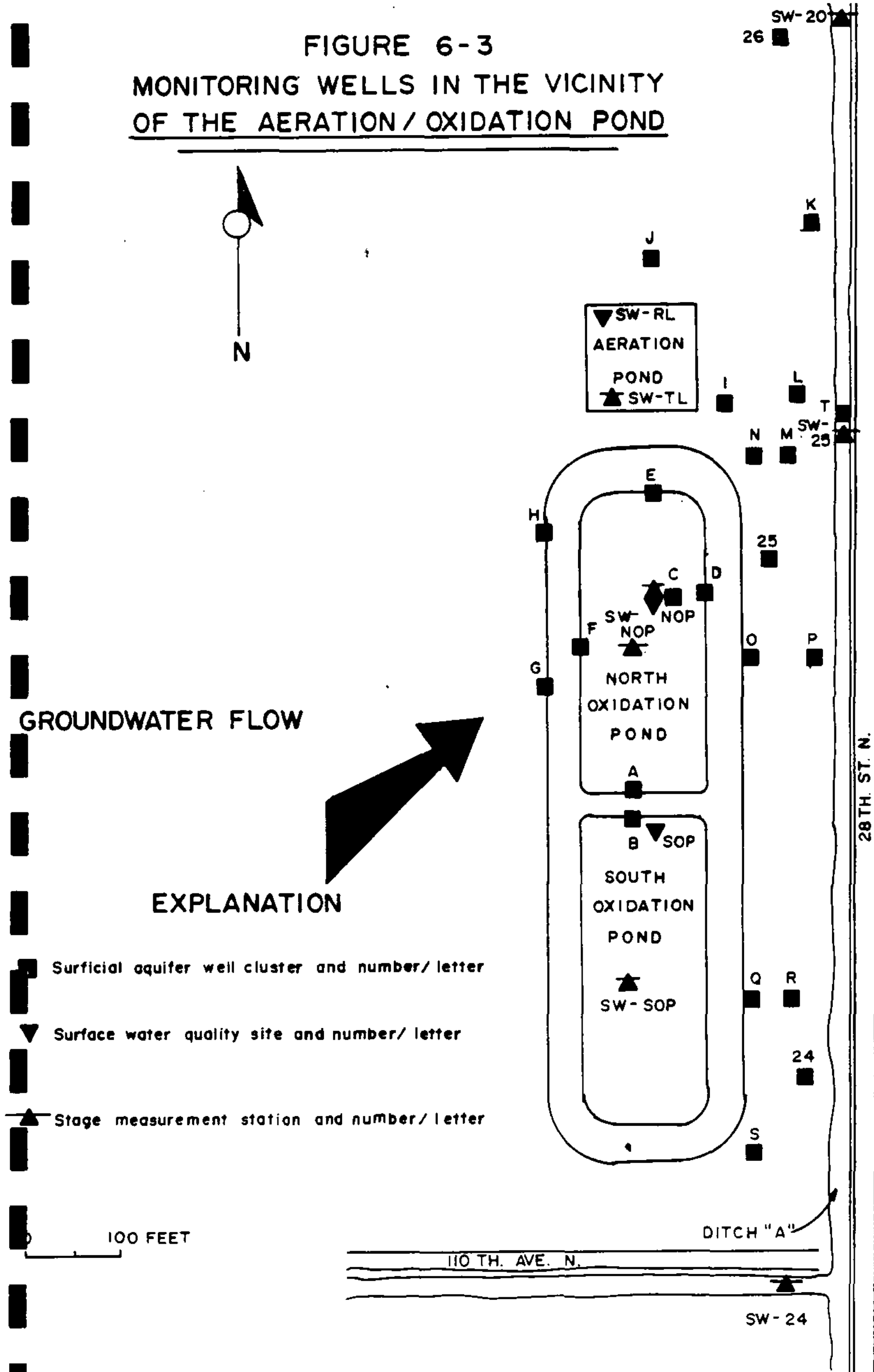
DESCRIPTION OF THE MONITORING PROGRAM

BACKGROUND DATA

In accordance with paragraphs 3a and 3b of Section D of the COC, at least one year prior to plant statup groundwater quality data shall be collected from a minimum of four wells: one upgrade hydrologically from the southern boundary of the Bridgeway Acres II landfill, one located in the immediate vicinity of the aeration/oxidation pond, and two located down slope from the landfill/sprayfield area. Locations of the wells constructed by the USGS under contract with Pinellas County are shown in Figure 6.3. Not shown in this Figure are wells LF-18, LF-15, and LF-30 and surface water station SW-2. LF-18 and SW-2 are located in the U.S. Homes area (they are both now destroyed), well 30 is at the northwest corner of the stormwater holding pond (Lake Acenbrack), and LF-15 is just north of U.S. Homes in a perimeter ditch bordering County property. The required parameters listed in the COC for routine monitoring are as follows:

Conductivity	Arsenic	Barium
Nitrates	Selenium	Silver
Iron	Cadmium	Chlorides
COD	Chromium	pH
Nickel	Copper	Lead
Aluminum	Mercury	Zinc
Total Coliform Bacteria		

FIGURE 6-3
MONITORING WELLS IN THE VICINITY OF THE AERATION / OXIDATION POND



WELL LOCATIONS

Well clusters will be sited in locations best suited to monitor the ground water quality and identify any possible sources of contamination. The use of the cluster construction will provide vertical definition of any contaminant plumes. All well locations appear in Figure 6.4.

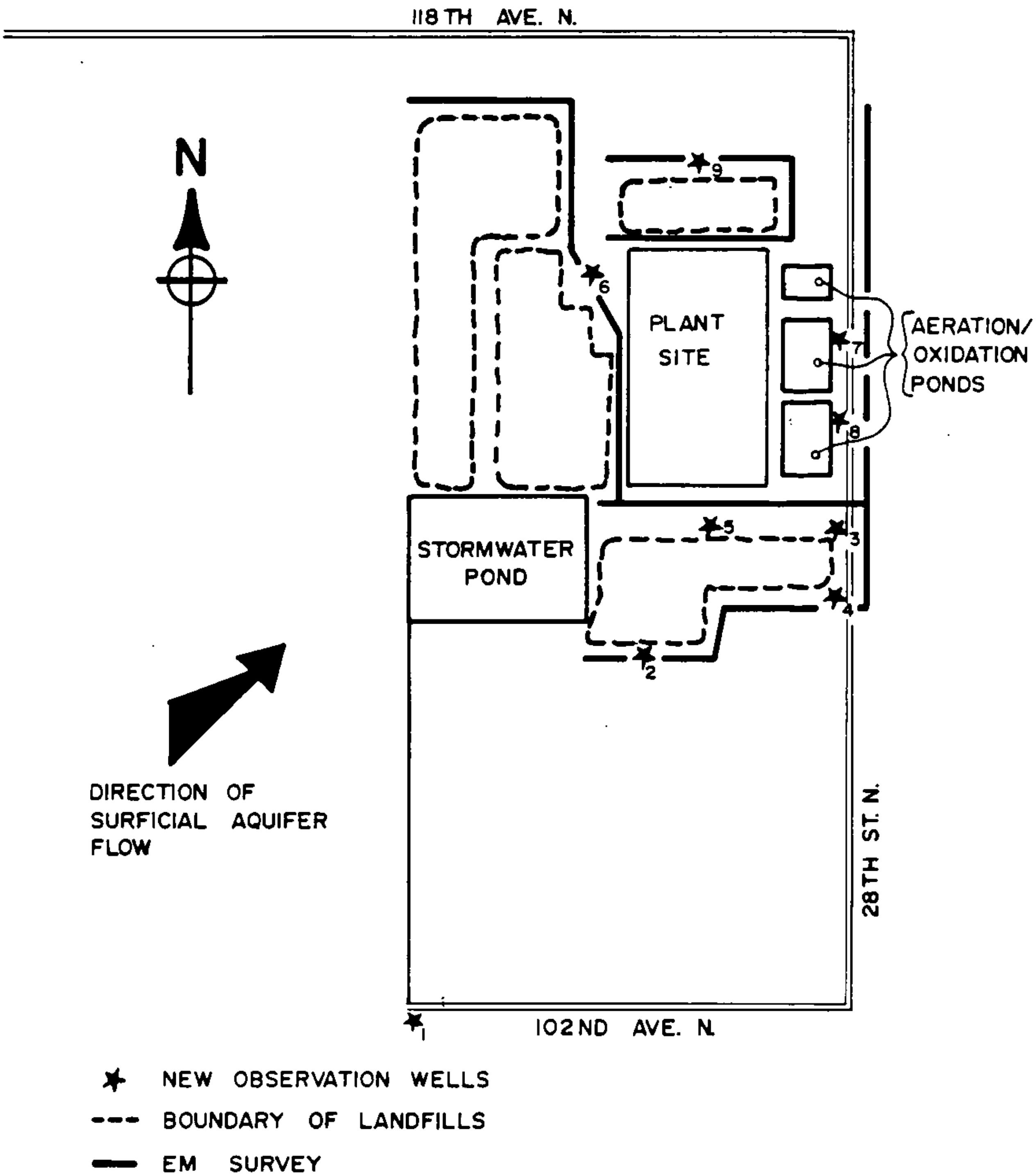
A limited EM survey of the site will be conducted using a Geonics EM-31 non-contact terrain conductivity meter. The purpose of this survey will be to determine the existence and extent of any subsurface contaminant plume. Parallel transects, 25 ft. apart, will be run at the site (see Figure 1 for transect locations). EM reading will be taken and recorded at 25-ft intervals along each transect. On-site analysis of the data will be performed and, if a plume is suspected, a grid pattern with readings of 25-ft. spacing will be used to determine its extent.

WELL CONSTRUCTION

Each well cluster will contain two wells and will be installed so as to monitor the entire permeable zone and the underlying Floridan aquifer. All wells will be drilled using a water-rotary rig and will be constructed using 2-inch, schedule 40, flush-fitting, threaded PVC casing and screen. No glue or solvents will be used during construction. Undisturbed samples will be taken from the permeable zone and from the confining layer at four of the cluster locations (C-5, C-6, C-7, and C-9).

FIGURE 6-4

WELL LOCATIONS AND EM SURVEY LINES



The first well in the cluster will penetrate to the top of an underlying confining layer which is located at an average depth of 29 ft. below the site. The well will be screened throughout the more permeable sand stratum. The second well will penetrate to the first zone of high transmissivity encountered in the limestone of the Floridan aquifer which underlies the site at an average depth of 54 ft.

Well screen and casing will be installed in the completed hole and will extend approximately 2 ft. above the land surface. The annulus around the screen will be packed with sand to a point approximately 2 ft. above the top of the screen. A 2-ft. bentonite seal (1 ft. in the shallow wells) will be placed above the sand pack to prevent vertical migration of water in the borehole. The hole will then be grouted to the surface and a 4-in protective steel casing installed. All wells will be developed by pumping until the water runs clear.

Hydraulic testing (commonly called slug testing) will be performed on all newly installed monitor wells and selected existing wells to determine hydraulic conductivity of the surficial aquifer. The slug tests will be performed using a small-diameter pressure transducer which is lowered into the well; the pressure that corresponds to the water level is recorded with an Envirolab 2-channel pressure recorder. After the well has been allowed to stabilize, a mechanical slug is placed into the well to quickly raise the water level in the well. The slug will remain in place while the water levels are recorded at 1-second intervals until the well has reached equilibrium. At that pont the slug is removed and the water levels are recorded until equilibrium is reached again. Data obtained during the slug tests will be used to develop plots from which hydraulic conductivity can be determimed.

BOILER RESIDUE ANALYSIS

This test is to establish whether the boiler residue is a hazardous material in accordance with the Resource Conservation and Recovery Act (RCRA). It will yield data to assess the ignitability, corrosivity, reactivity, and toxicity of the residue. Test procedures are documented in the Federal Register, Vol. 43, No. 243 (12/18/78) and Vol. 45, No. 98 (5/19/80 amended 7/7/81). On June 6, 1983, individual composite samples were taken from three boiler residue streams: total combined residue as it flows off the conveyor, aggregate, and 2 - 10" non-magnetic (Figure 6.5). The results of the tests show that the residue is not hazardous. A declaration of this has been submitted to the DER.

STARTUP AND CONTINUOUS SAMPLING OF POND WATER, SEDIMENTS AND GROUNDWATER.

ESE will collect separate water and sediment samples at the RRF. Each well will be evacuated for a minimum of 3 well volumes. Conductivity, temperature, and pH will be measured on-site using portable S-C-T meters and pH meters which have been calibrated at the beginning of each trip. Well sampling will be accomplished using a bailer constructed of PVC materials. The samples will be collected in a manner which will minimize aeration and prevent oxidation of reduced compounds. All containers will be filled to the top and tightly stoppered. All samples

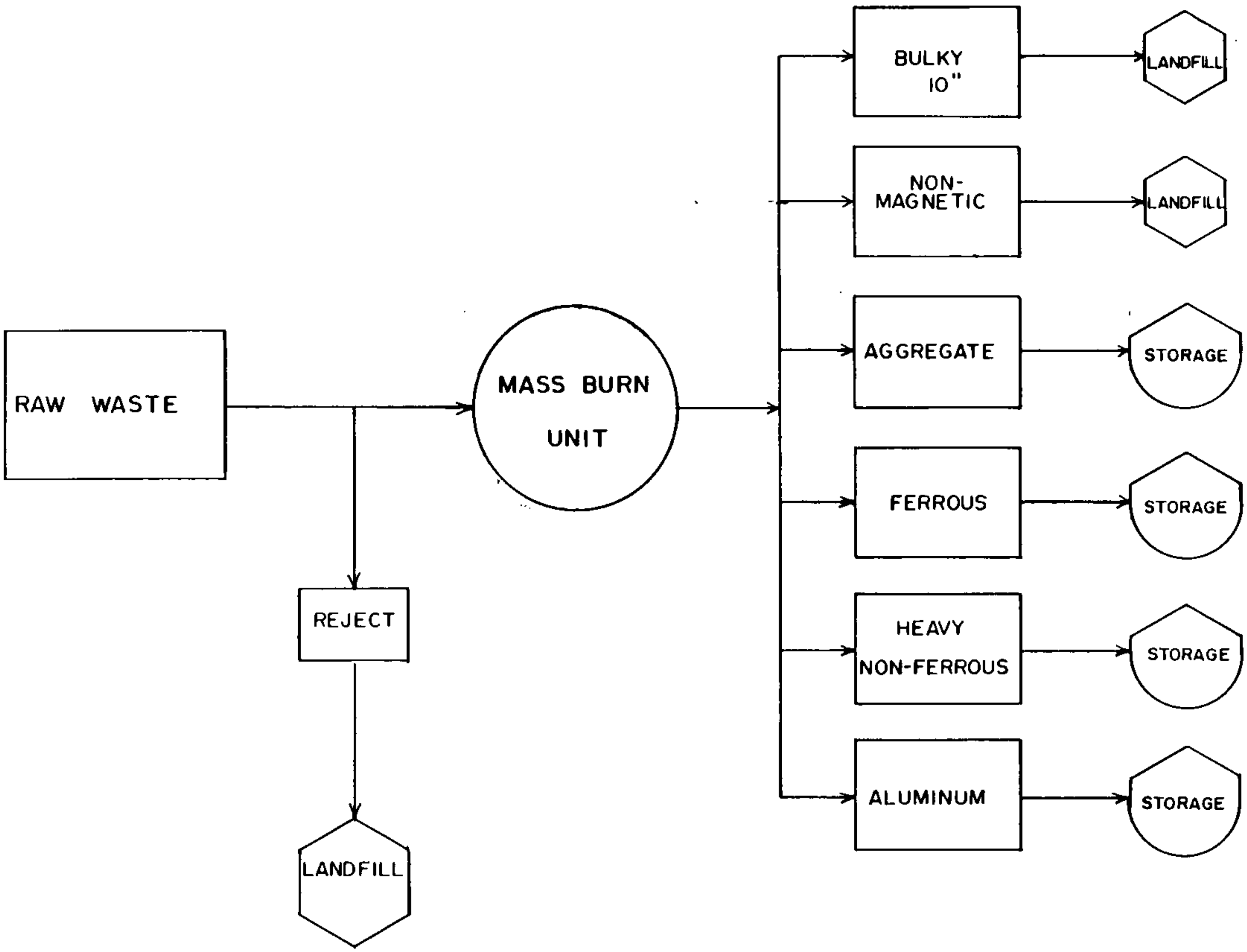


FIGURE 6-5
FATE OF RAW WASTE

will be chilled, preserved as appropriate, and transported to the Gainesville laboratory for analysis; all equipment will be rinsed between collections to avoid any posssible cross-contamination.

Samples will be drawn using a peristaltic pump and a vacuum bottle. The vacuum bottle for these samplings will be the actual sample bottles. A separate Teflon tube and stopper will be provided for each sampling station. The pump will create a vacuum in the sample container which will in turn draw the sample out of the well.

The samples will be preserved upon arrival at the laboratory as follows:

Metals fraction:	HNO_3 to pH 2
COD fraction:	H_2SO_4 to pH 2

Samples will be filtered and analyzed for total parameters (Table 6-3).

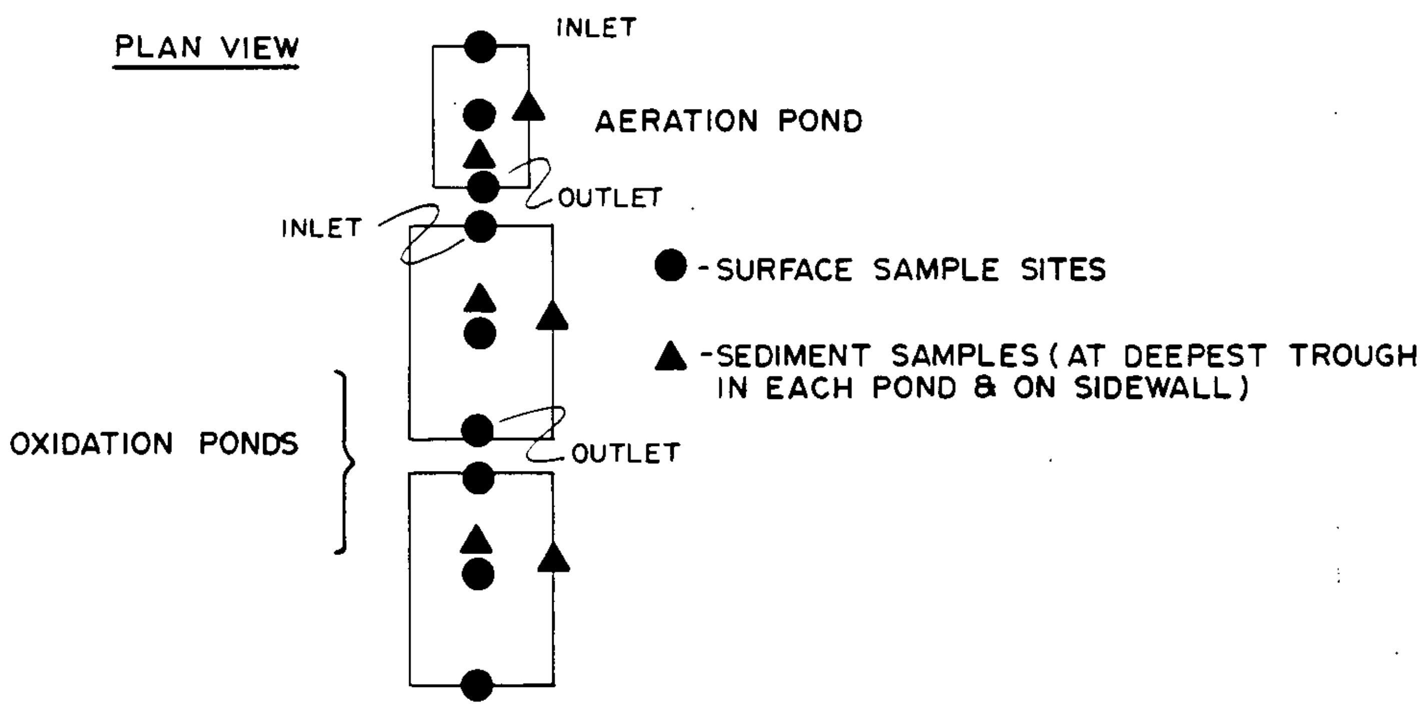
Samples of the pond surface and pond bottom waters will be composited from three locations in each of the three ponds shown in Figure 6.6. Sample volumes shall be sufficient to perform analyses of specified parameters (see Table 6.3). Individual samples of pond sediments shall be taken from the top four inches of the sediment layer at the locations specified in Figure 6.6.

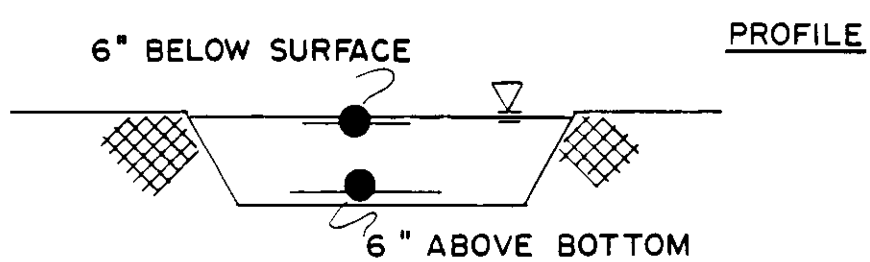
SOLID WASTE REPORT

Monthly solid waste reports are prepared and submitted to the Southwest

FIGURE 6-6

SAMPLING LOCATIONS FOR POND WATER & SEDIMENTS





(NOT TO SCALE)

TABLE 6.3

PARAMETERS FOR ANALYSIS

SURFACE WATER SAMPLES			
Parameter	STORET #	Parameter	STORET #
Conductivity	00095	Nitrates	00620
Iron	01045	COD	00340
Total Coliform	31506	Aluminum	01105
Barium	01007	Arsenic	01002
Chromium	01034	Lead	01051
Mercury	71900	Selenium	01147
Silver	01077	Chlorides	00940
pH	00400	Copper	01042
Zinc	01092	Nickel	01067
Cadmium	01027		
SEDIMENT SAMPLES			
Barium	01008	Iron	01170
Nickel	01068	Aluminum	01108
Arsenic	01003	Cadmium	01028
Chromium	01029	Lead	01052
Mercury	71921	Selenium	01148
Silver	01078	Copper	01043
Zinc	01093		

District DER office on a quarterly basis. This function is performed by the Solid Waste Management Division of Pinellas County. The following items are to be included in ths report:

A. Amount and type (i.e., putrescible, special wastes, boiler residue, rejects, etc.) of materials landfilled.

B. The treatment provided (i.e., daily cover - if required, etc.).

BLOWDOWN SUMP ANALYSES

In accordance with Tables I and II of Appendix I of the Construction Agreement and Appendix D of the Management Agreement for the existing facility, maximum water quality values for system blowdown have been established. Accordingly, routine sampling and analysis for those parameters are performed. Supplementary sampling and analysis will be conducted by ESE.

NOISE MONITORING

Routine noise monitoring is now conducted by the Pinellas County Department of Environmental Management. Sampling sites are located in the more sensitive areas surrounding the facility, namely the residential areas southwest of the plant. Sampling frequencies are arbitrary and based on normal plant operating conditions. Maximum facility-associated noise can be anticipated when truck traffic is at a peak and during plant blowdowns.

VIRUS MONITORING

Virus monitoring is conducted for two reasons: (1) to ensure that viruses are not being discharged to the environment through the cooling towers and, (2) to allow adjustments to the chlorine dioxide dose in the cooling tower makeup water. The County has contracted with the State of Florida Epidemiology Research Center (DHRS) to collect and analyze samples for viruses. Specific sampling frequencies are determined by that agency, though monthly regimens are specified. Samples are taken prior to entry of water into the cooling tower and after it passes through the tower's recirculation sump.

CHAPTER 7
ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATIONS

7.1 Benefits

The capacity afforded by the third boiler will minimize the landfilling of Class I solid waste; this is the stated policy of the Board of County Commissioners, Pinellas County, Florida. Based on current waste generation estimates, all Class I material can be incinerated by the three boiler plants through the year 1996. Specific benefits derived from this operation are as follows:

1. Drastically reduced land requirement for disposal of solid waste with a resultant savings in real estate costs.

2. Landfilling of the boiler residue, in contrast with garbage, will not contaminate ground water.

3. As boiler residue does not attract gulls and disease vectors, public health and aviation safety will be enhanced.

4. The increase in electrical generation capacity will reduce foreign oil import requirements by 4,521,957 barrels over a ten year period which translates conservatively into a savings of $135,658,707.

5. The additional 29 MW of electricity will satisfy the energy requirements for over 8500 Pinellas County homes.

7.2 Costs

The additional boiler, stack, turbine generator, cooling tower units, and associated hardware will be financed by a supplemental revenue bond issue. The 1983 construction cost for the expansion is $52.5 million, which will be escalated throughout construction until completed in 1986.

Revenue produced by the sale of electricity from the three boiler, two turbine-generator facility will help offset O&M costs throughout its operating life. It is estimated that $135,658,707 of revenue will be generated between 1986 and 1996 by energy sales.

CHAPTER 8

ALTERNATE ENERGY SOURCES AND SITES

8.1-8.3 No changes from original application.

CHAPTER 9
PLANT DESIGN ALTERNATIVES

9.0 Construction of a new resource recovery plant in northern Pinellas County was proposed as an alternative method to provide the required capacity. This proposal was rejected in favor of the third boiler plan for the following reasons:

1. It is more economical to add the capacity at the existing facility.

2. No suitable site for the north County plant could be designated at this time.

3. Capacity could be added more quickly at the existing facility.

Once the ultimate capacity of the three boiler Pinellas Park plant is exceeded, future expansion, in the form of a new facility, will occur in northern Pinellas County.

No alternative incineration technology was evaluated. The utilization of the Martin process is the logical choice for integrating a third boiler into an operating Martin system.

APPENDIX A

AIR QUALITY ANALYSIS

AIR QUALITY SECTION

I. BEST AVAILABLE CONTROL TECHNOLOGY

A. INTRODUCTION

Best Available Control Technology (BACT) is defined in the 40 CFR 52.21 as follows:

> "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 such pollutant".

Table I-1 lists the air emissions for which an evaluation for BACT was conducted and control alternatives (both commercially available and in the research stage) which were 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 I-2.

TABLE I-1
BACT POLLUTANTS AND CONTROL ALTERNATIVES

Air Emission Parameter	Control Alternatives
Particulate	Electrostatic Precipitator (ESP) Wet or Dry Scrubber Fabric Filter Electrostatic Baghouse
Sulfur Dioxide	Wet Scrubber Dry Scrubber Low Sulfur Fuel
Nitrogen Oxide	Ammonia Injection Wet Scrubber Catalytic Reduction Design and Operating Procedures
Carbon Monoxide	Design and Operating Procedures
Lead & Beryllium & Particulate Mercury	Electrostatic Precipitator (ESP) Wet or Dry Scrubber Fabric Filter
Hydrogen Fluoride & Gaseous Mercury	Wet & Dry Scrubber

TABLE I-2
BACT POLLUTANTS AND ANNUAL EMISSIONS

Air Emission Parameter	Tons/Year
Particulate	109
Sulfur Dioxide	577
Nitrogen Oxide	577
Carbon Monoxide	288
Lead	58
Beryllium	0.0019
Mercury (particulate & gaseous)	2.1
Hydrogen Fluoride	28

This BACT evaluation of the above described control alternatives considered their technical feasibility, energy usage and certain environmental factors. The proposed unit is projected to be on-line approximately 80-85% of the time. Air pollution control equipment must be reliable to minimize contribution to unit downtime. A projection of the equipment's reliability can be developed only after it has received commercial application; therefore, commercial application of the equipment was reviewed in formulating BACT. Installation of air pollution control equipment increases the facility cost, but results in benefits to the surrounding area and population. 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. Air pollution control equipment will lessen the facility's air emissions, however, increasing the waste requiring land disposal resulting from the additional equipment operation is not advantageous.

B. TOTAL SUSPENDED PARTICULATE (TSP), LEAD, BERYLLIUM AND PARTICULATE MERCURY

In this section, BACT for control of total suspended particulate (TSP) emissions is proposed. The control device which is BACT for TSP will also concurrently control lead, beryllium and the particulate form of mercury, and is thus also proposed as BACT for these pollutants.

An electrostatic precipitator with an outlet particulate loading of 0.03 gr/dscf, corrected to 12% CO_2, is proposed as BACT for this project. Other control alternatives reviewed include ESP's with emission rates of 0.05 and 0.015 gr/dscf at 12% CO_2, two different Fabric Filters, and a Dry Acid Gas Scrubber.

1. Electrostatic Precipitators

Electrostatic precipitators function by imparting a negative charge to particulates in the flue gas stream. The particles 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 gas condensation. Acid mist condensation begins about 250°F.
- Recognized as the most reliable and efficient technology on resource recovery systems.

Table I-3 shows estimated costs for electrostatic precipitators investigated for this project.

2. Fabric Filters/Electrostatic 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 units 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.

TABLE I-3
COSTS OF ELECTROSTATIC PRECIPITATORS
1050 TPD Unit

Emission Limit gr/dscf @ 12% CO_2	0.05	0.03	0.015
Removal Efficiency, Percent	98.0	98.7	99.4
Construction Cost	$1,707,700	$2,003,400	$2,592,300
Annual Cost:			
Net Dedt Service	$ 299,500	$ 351,400	$ 454,700
Operating and Maintenance Costs	$ 179,300	$ 222,400	$ 298,100
Total	$ 478,800	$ 573,800	$ 752,800
Unit Cost:			
Per Ton MSW (300,000)	$ 1.60	$ 1.91	$ 2.51
Per Ton Particulate Removed	$ 45	$ 53	$ 69
Incremental Costs:			
Additional Tons Removed	base	100	45
Additional Annual Cost	base	$ 95,000	$ 179,000
Per Ton Removed		$ 863	$ 3,980
Per Ton MSW (300,000)		$ 0.31	$ .60

- Consideration must be given to prevention of corrosion caused by acid gas condensation.

- Experience on resource recovery facilities is very limited.

Table I-4 shows estimated costs for the baghouse systems investigated for this project. The TSP emission rate would be guaranteed less than 0.01 gr/dscf corrected to 12% CO_2.

3. Dry Scrubbers

Dry scrubbers are devices which are designed to remove SO_2 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 SO_2 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:

- SO_2, acid gases and other flue gas constituents, that may condense with lower exit gas temperatures are controlled.

- Acid gas corrosion may be less of a problem.

- Approximately twice as much residue is produced.

- Experience on resource recovery facilities is even more limited.

Table I-5 shows estimated costs for a dry scrubber and baghouse system, guaranteed for a TSP emission limit of 0.01 gr/dscf, corrected to 12% CO_2, and guaranteed to remove 70% of the SO_2 and 70% of the HCL in the flue gas stream.

C. SULFUR DIOXIDE (SO_2) AND ACID GASES

Use of a low sulfur fuel is currently considered by many as BACT for control of sulfur dioxide emissions Municipal solid waste (MSW) is inherently a low sulfur fuel with a sulfur content of approximately 0.15 $\pm$ 0.1%.

A control alternative which was examined for this report is the use of a dry scrubber system for SO_2 control, which simultaneously controls emissions of acid gases. Use of a dry scrubber has been examined for particulate control in the particulate BACT analysis. Wet scrubbing for SO_2 control was not investigated due to the presence of a vapor plume. Even though the gas has been cleaned the steam plume is considered unacceptable and eliminates this option.

TABLE I-4
COSTS OF FABRIC FILTER SYSTEMS
1050 TPD Unit

	Pulse Jet Fabric Filter	Reverse Air Fabric Filter
Emission Limit, * gr/dscf @ 12% CO_2	0.01	0.01
Removal Efficiency, Percent	99.6+	99.6+
Construction Cost	$1,381,000	$1,620,000
Annual Cost:		
Debt Service	$ 151,200	$ 177,700
Operating and Maintenance Costs	$ 359,000	$ 421,200
Total	$ 510,500	$ 598,900
Unit Cost:		
Per Ton MSW (120,000 tpy)	$ 1.70	$ 2.00
Per Ton Particulate Removed	$ 47	$ 55
Incremental Annual Cost	base	$ 88,400
Incremental Cost Per Ton MSW	base	$ 0.30

* Due to nature of fabric filters the collection efficiency and emission limit cannot be specified. The listed values indicate minimum acceptable performance.

TABLE I-5
DRY SCRUBBER/FABRIC FILTER SYSTEM
1050 TPD Unit

	Dry Scrubber Plus Fabric Filter
Emission Limit, gr/dscf @12% CO_2	0.015
Removal Efficiency, Percent	99 +
Construction Cost	$5,000,000
Annual Cost:	
Debt Service	$ 823,500
Operating and Maintenance Costs	$1,425,000
Total	$2,248,500
Unit Cost:	
Per Ton MSW (300,000 tpy)	$ 7.50
Per Ton Particulate Removed	$ 206

Table I-6 shows general effects of SO_2 control alternatives.

TABLE I-6
EFFECTS OF SO_2 CONTROL ALTERNATIVES

Area of Effect	Low Sulfur Fuel	Dry Scrubber
Energy Consumption	No effect	Increased facility energy consumption
Environmental	Reduced emissions of SO_2 compared to other fossil fuels	Reduced emissions of SO_2, HF and gaseous mercury; increased amounts of residues requiring land disposal
Economic	No direct facility related costs	Increased facility capital and operating costs

1. Low Sulfur Fuel

The emission rate of sulfur dioxide is dependent on the amount of sulfur in the fuel. Municipal solid waste is estimated to have a sulfur content of less than 0.2%. Generally, coal-fired facilities have switched from high (5-7%) to low (1-2%) sulfur coal to comply with laws and regulations. The proposed unit will utilize municipal solid waste which is much lower in sulfur content.

2. Dry Scrubbers

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 particulate removal device is located downstream to remove the sulfate and sulfite particulates. The first commercial scale dry scrubber has just gone on-line at the coal-fired Northern States Power Company's Riverside Power Plant in Minneapolis, Minnesota. The system's costs and effects were based upon projections provided by system vendors.

Table I-7 shows estimated costs of a dry scrubber to control particulates, SO_2 and acid gases.

TABLE I-7
DRY SCRUBBER COSTS

Total Annual Cost (Debt Service + O&M)	\$2,248,500 (1)
Annual Cost attributable to particulate control	\$ 573,800/year (2)
Annual Cost attributable to SO_2 + acid gas control	\$1,674,700/year (3)
Incremental Cost per ton of SO_2 + acid gas controlled	\$ 1,600/ton (4)

Notes:
1. From Table I-5
2. Proportioned such that cost for particulate removal is equal to cost for electrostatic precipitator.
3. Total cost less that attributable to partiulate.
4. Based on guaranteed removal efficiencies, i.e. 70% removal of SO_2 and 90% removal of HCL.

D. NITROGEN OXIDE

The technologies for nitrogen oxide (NO_x) control include ammonia injection, wet scrubbers, and catalytic reduction. However, none have been utilized on a commmercial scale at either resource recovery facilities or coal-fired power plants in the United States.

Research relative to ammonia injection has revealed the following utilization limiting factors:

- When the flue gas temperature is between 1600°F and 1650°F, the reaction:

  $$NH_3 + NO + O_2 \rightleftharpoons N_2 + 3/2\ H_2O$$

  readily takes place, controlling NO emissions. Above 1800°F, the NH_3 is oxidized to NO. Below 1600°F, the reaction does not take place. A supplemental heating source may be required to maintain the appropriate temperature envelope.

- Ammonia can react with sulfur trioxide in the flue gas to form ammonium sulfate or ammonium bisulfate. Ammonium bisulfate can condense after emission to the atmosphere and act as a corrosive agent.

- Cyanide formation at the ammonia injection zone has occurred in the presence of hydrocarbons.

- Ammonium Chloride formation has been documented and forms a pervasive visible plume.

Research on nitrogen oxide control with catalytic reduction processes has identified the following problems:

- Formation of ammonium bisulfate with resulting corrosivity
- Blinding of the catalyst
- Catalyst corrosion
- Formation of unexpected compounds

The wet scrubber has been demonstrated only on a glass manufacturing furnace. The information is insufficient to judge its applicability to a municipal solid waste fired resource recovery facility.

Nitrogen oxides (NO_x) result from the reaction of atmospheric nitrogen and oxygen in the combustion zone and the partial combustion of nitrogenous compounds in the fuel. Important factors affecting NO_x production are flame and furnace temperature, residence time of combustion gases at flame temperature, rate of gas cooling, and amount of excess air.

Given the state of the art of NO_x control technologies, refuse feeding, and the importance of temperature zone parameters in NO_x generation, the BACT recommendation for the proposed resource recovery facilities is the use of proper boiler design and operating procedures.

E. CARBON MONOXIDE

Carbon Monoxide is a product of incomplete combustion. The generalized reaction is shown below:

$$HC + O_2 \rightarrow CO + HC' + H_2O$$

When incomplete combustion takes place energy is lost, carbon monoxide and another hydrocarbon are formed. The new hydrocarbon is a pyrolyisis product and may combust further. BACT is the use of state-of-the-art boiler controls to insure sufficient underfire and overfire air so that the emissions of products of incomplete combustion are minimized.

The underfire air has three purposes: 1) to ignite the refuse, 2) cool the grates, and 3) supply air to all parts of the fuel bed. The overfire air causes turbulence in the fire ball to assist in complete burnout.

There are four steps in the combustion of refuse or any damp fuel:

1) drying
2) volitization
3) pyrolyzing
4) direct combustion

The step that contributes to carbon monoxide production is the pyrolysis step. Pyrolysing is the breaking down of larger organic compound in to smaller organic compounds by the application of heat. This differs little from cracking of crude oils into various fractions.

In a mass burn system, this cracking takes place in the presence of some air but still in a reducing atmosphere. Incomplete combustion can take place producing carbon monoxide. In a properly designed system, the products of pyrolysis are consumed in the fire ball section of the incinerator.

The fireball's intensity is controlled by high velocity overfire air. As long as sufficient overfire air is supplied to insure approximately 100% excess air, carbon monoxide production will be minimized.

There are no controls for carbon monoxide production other than state-of-the-art boiler design and control is BACT for CO control. The boiler will be designed to operate at peak efficiency which will minimize products of incomplete combustion.

II. AIR QUALITY ANALYSIS

A. INTRODUCTION

Available data indicate that emission levels as listed in Table II-1 are attainable by mass burn resource recovery facilities. These emission levels at a throughput of 1,050 TPD will be used in the modeling required for the PSD permit. This data was developed by comparing 14 mass burn facilities throughout the USA and Europe. The analysis is attached.

TABLE II-1
EXPECTED EMISSIONS

Pollutant	lb of Pollutant per ton of MSW	lb of Pollutant per hour
Particulate	0.6	26.3
Sulfur Dioxide	3.0	131
Nitrogen Dioxide	4.3	188
Carbon Monoxide	0.8	35
Hydrocarbons	0.2	8.7
Lead	0.1	4.4
Mercury	0.003	0.13
Beryllium	1.0×10^{-5}	4.4×10^{-4}
Fluorides	0.1	4.4
Chlorides	5.3	232

Table II-1 is expanded in Table II-2 to indicate the equivalent emission factors used in the various parts of the Air Quality Analysis. The Resource Recovery Facility (RRF) is a PSD significant source for all criteria and several non-criteria pollutants. Table II-3 lists the stack parameters used in the analysis of this unit.

TABLE II-2
3rd UNIT
RRF EMISSIONS AND STACK PARAMETERS

Pollutant	lb per ton MSW	Equivalent Factors lb/hr	TPY	gm/s
Particulate	0.6	25	110	3.15
Sulfur Dioxide	3.0	131	574	16.5
Nitrogen Dioxide	4.3	188	823	23.7
Carbon Monoxide	0.8	35	153	4.4
Hydrocarbons	0.2	8.7	38	1.1
Lead	0.07	4.4	19	0.55
Mercury	.003	0.13	.6	0.016
Beryllium	7.7×10^{-5}	4.1×10^{-4}	1.9×10^{-2}	5.5×10^{-5}
Fluorides	0.1	4.4	19	0.55
Chlorides	5.3	232	1016	29

TABLE II-3
STACK PARAMETERS

Parameters	Unit 3 Metric	English
Volumetric Flow	118.0 m^3/s	251,000 acfm
Stack Diameter	2.37 m	7.8 ft
Stack Height	49.1 m	161 ft
Exit Velocity	26.8 m/s	88 ft/s
Exit Temperature	505 ^oK	450 ^oF

TABLE II-6
IMPACT OF THE ALL 3 UNITS OF RESOURCE RECOVERY PROJECT

Pollutant	Averaging Time	Peak Modeled Concentration (ug/m^3)	Location [a]
SO_2			
	3-hour	86.10	(110 M, -40 m)
	24-hour	26.20	(-310 m, -110 m)
	Annual	1.07	(2,000 m, 90°)
TSP	24-hour	5.00	(500 m, 247.5°)
	Annual	0.20	(2,000 m, 90°)
NO_2	Annual	1.53	(2,000 m, 90°)
Lead	24-hour	0.26	(500 m, 247.5°)
Mercury	24-hour	0.088	(500 m, 247.5°)
Beryllium	24-hour	8.8×10^{-5}	(500 m, 247.5°)
Fluoride	24-hour	0.88	(500 m, 247.5°)

T7019/5-24-83

[a]The locations of peak concentration are expressed with respect to the location of the project (0,0). The 3-hour and 24-hour SO_2 maximum locations are based on a Cartesian coordinate system while the others are based on a polar coordinate system.

TABLE II-10
DE MINIMIS IMPACTS AS COMPARED WITH
MODELED IMPACTS FOR THE PROJECT

Pollutant	De Minimus Level (ug/m^3)	Average Time	Modeled Concentration (ug/m^3)
Carbon Monoxide	575	8-hour	14.4 (3 hour)
Nitrogen Dioxide	14	Annual	0.52
Particulate	10	24-hour	1.7
Sulfur Dioxide	13	24-hour	8.7
Lead	0.1	24-hour	0.09
Mercury	0.25	24-hour	0.029
Beryllium	5.0×10^{-4}	24-hour	2.9×10^{-5}
Fluoride	0.25	24-hour	0.29

T7014/5-24-83

E. MONITORING

The PSD regulations require air monitoring to determine the existing air quality. Sources may be exempted from monitoring if the modeled impacts are below certain de minimis values. The de minimis values and the modeled impacts are shown in Table II-10.

Based on the data in Table II-10, the lead value is very close to the De Minimus impact. In order to remain very conservative in the analysis, monitoring data will be supplied for lead.

The lead monitoring data will be supplied from the Sheriff's and Azalea Park monitoring stations. These stations are beyond the facility's highest impact area but are located to record the highest lead levels expected within the county. This technique will distinguish the facility's highest impact added to the county's highest monitored level.

The ambient lead levels have fallen significantly in the past three years. The quarterly maximum has fallen from a high of 1.0 ug/m^3 in 1979 to 0.3 ug/m^3 in 1981. Table II-11 shows the highest quarterly average for the past three years.

TABLE II-11
AMBIENT LEAD CONCENTRATIONS
LEAD QUARTERLY MAXIMUMS
(ug/m^3)

Station	1979	1980	1981
Azalea Park	0.9	0.6	0.5
Sheriff's	1.0	0.5	0.3

It can be seen that the unit's highest 24-hour average level concentration (0.09 ug/m^3) added to the county's highest recorded quarterly average level in the past three years (1.0 ug/m^3) is still significantly below the NAAQS of 1.5 ug/m^3. Therefore, the facility will not violate the NAAQS for lead.

F. CONTINUED COMPLIANCE

To demonstrate compliance with the final permits stack testing will be performed as required. The tests performed will be as requested by the DER and will be performed according to the procedures found in 40 C.F.R. Part 60 Appendix A.

III. ADDITIONAL IMPACT ANALYSIS

A. PURPOSE

The basic purpose of the additional impacts analysis is to determine the effects of applicable criteria and noncriteria pollutant emissions on visibility, soils and vegetation. This assessment will be helpful in providing the Federal land manager with information regarding the potential impacts on Class I areas (Scenic areas, designated by Congress, to be protected from manmade air pollution, 33 U.S.C. 1288). In addition, this chapter of the air permit will help to inform the general public of potential impacts related air quality.

Three components of the additional impact analysis are: (1) a growth analysis, (2) a visibility impairment analysis, and (3) a soils and vegetation impact analysis. The final section of this chapter will summarize the results of these analyses.

B. GROWTH ANALYSIS

The Pinellas County Department of Planning estimates that the Pinellas County population will increase from the 1980 Census figure of 728,531 to 796,000 persons in 1985. This increase of approximately 68,000 people represents a 9% increase in five years or 1.8% per year. Future projections by the Department indicate an estimated population of 1,003,000 in the year 2000 which is a 38% increase over 20 years or an average of 1.6%/year.

The construction force is expected to range between 200 to 300 persons throughout the construction phase of the third unit. This represents less than 0.06% of the total population. It is expected that all of the construction work force except certain supervisory personnel will be from the local area. If there is any relocation of workers, housing is available in the vicinity of the proposed project. A sample of the types and numbers of construction workers is shown in Table III-1.

The operation of the proposed facility will require approximately 6 additional persons. A sample of the types and numbers of operations personnel is shown in Table III-2. It is expected that these personnel will also be from the local area.

The implementation of the proposed facility will cause a positive economic impact on Pinellas County because most, if not all, of the construction and operations work forces will be from the local community. Since there will not be a major influx of workers into the area, there will a minimal impact on the environmental quality of the community due to growth in the area's work force or secondary construction caused by the facility.

TABLE III-1

ESTIMATED CONSTRUCTION WORK FORCE
1050-TPD UNIT

Types	Work Force
Boilermakers	50
Carpenters	30
Electricians	15
Ironworkers	40
Laborers	50
Masons	15
Millwrights	25
Painters	5
Pipefitters	20
Total	250

TABLE III-2

ESTIMATED ADDITIONAL OPERATIONAL STAFF
1050 TPD UNIT

Types	Work Force
Supervisory	0
Clerical	1
Operators per shift	3
Maintenance	2
Security	0
Janitorial	0
Total	6

C. VISIBILITY ANALYSIS

The Clean Air Act Amendments of 1977 require evaluation of new and existing emission sources to determine potential impacts on visibility in Class 1 areas. These source evaluations are to be used as part of a regulatory program to prevent future and remedy existing impairment of visibility in Class 1 areas that results from man-made air pollution. The visibility analysis discussed below is taken from EPA's "Workbook for Estimating Visibility Impairment", November, 1980, which provides a general guidance for determining the potential impacts of an emissions source on visibility in a Class 1 area.

There are two separate types of visibility impairment: atmospheric discoloration and visual range reduction (increased haze); see Figure 1. EPA has defined "visibility impairment" to mean any humanly perceptible change in visibility (visual range, contrast, coloration) from that which would have existed under natural conditions. An important part of a visibility analysis is to determine the frequency of occurrence and magnitude of visual impact in, or within view of, a Class 1 area.

A schematic of EPA's recommended visibility screening analysis procedure is shown in Figure 2. A Level 1 analysis has been performed and is included in Appendix B. The input data included in the analysis estimated NO_2, SO_2 and the particulate emissions for the proposed resource recovery facility. Regional visual range and distance to the nearest Class 1 areas were used. The nearest Class I area is the Chassahowitzka National Wildlife refuge, located on the west coast of Florida, 75 miles north of the site. A plume contrast rating load was established with reference to the sky, the terrain and the primary and secondary aerosols. EPA has established a rating factor for the plume contrasts which provides guidance for determination of further analysis. If the calculated plume contrast is less than 0.1, no further analyses of potential visibility impacts are necessary. The absolute values of each plume contrast for the proposed facility were calculated to be less than 0.001, which is less than the EPA rating factor. Therefore, further analyses of potential visibility impacts are unnecessary, as it is considered highly unlikely that the proposed facility would cause adverse visibility impairment in Class 1 areas.

D. SOILS AND VEGETATION ANALYSIS

The electrostatic precipitators and the stack height of the proposed Facility will be designed so that neither Florida Ambient Air Quality Standards (FAAQS) nor the PSD increments will be violated. The facility will not violate the secondary FAAQS's, estalished to protect vegetation, materials, visibility, etc. The secondary standards for CO, NO_x, O_3 and HC are equivalent to their respective primary standards, as can be seen in Table III-3. The secondary standards for TSP and SO_2 are more stringent than their respective primary standards.

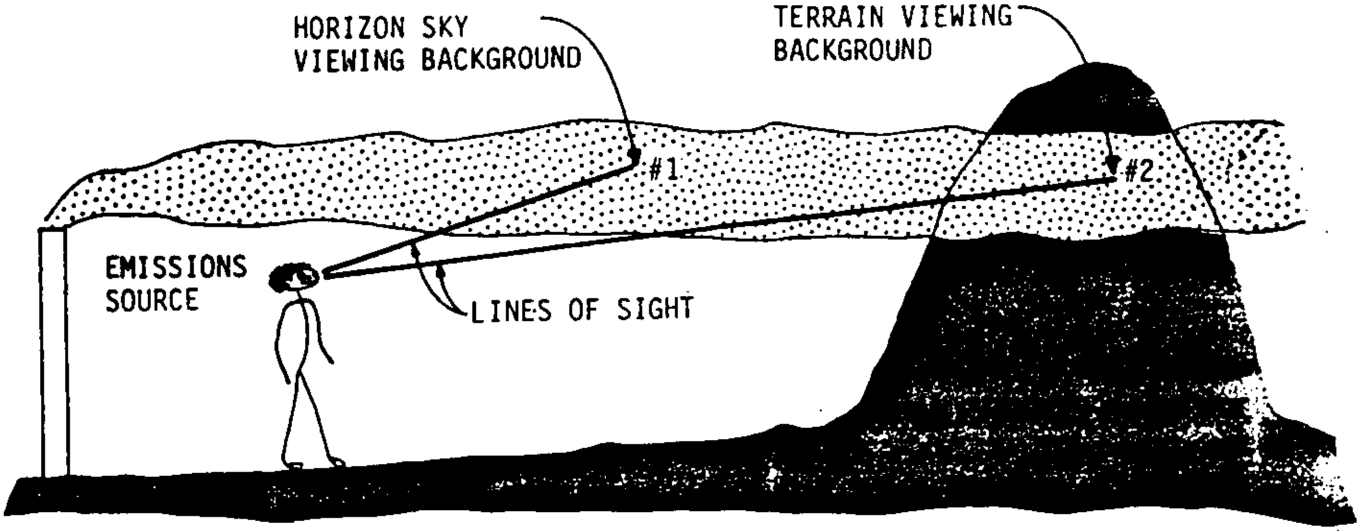


Figure 10. Two types of plume visibility impairment considered in the level-1 visibility screening analysis.

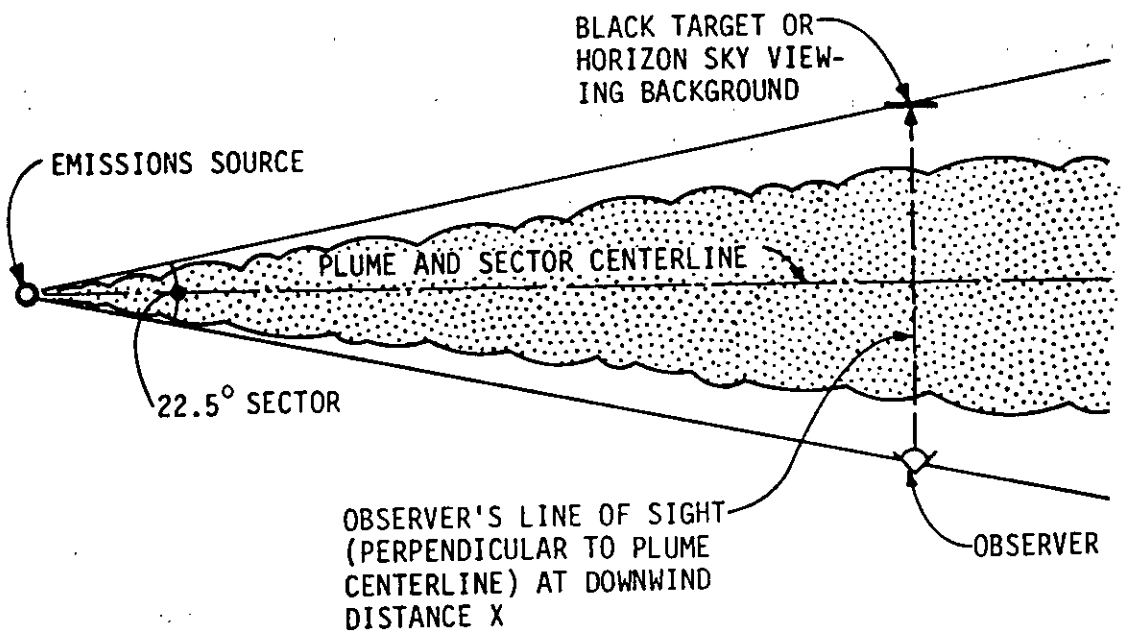


Figure 11. Geometry of plume, observer, and line of sight used in level-1 visibility screening analysis.

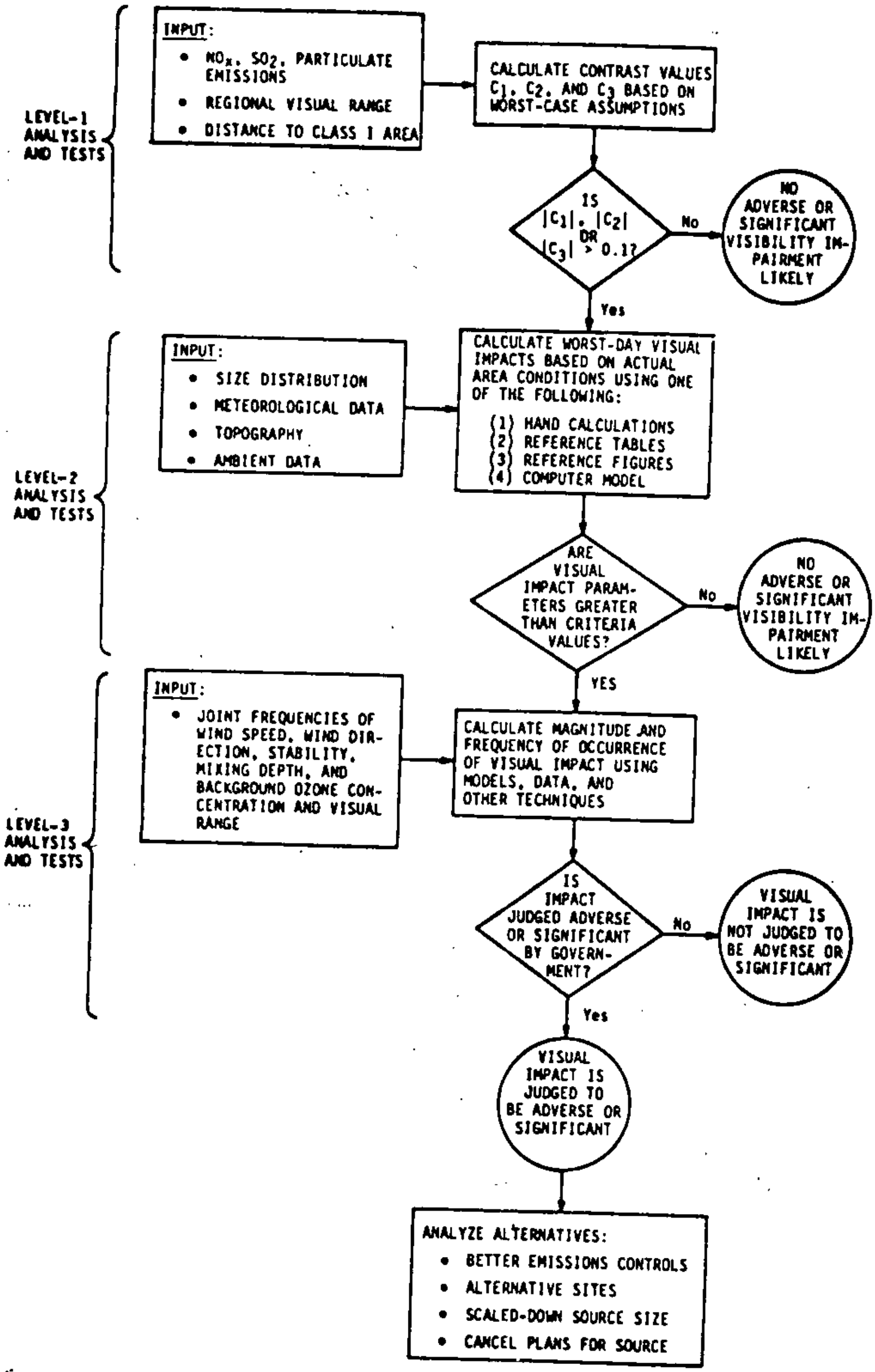


Figure 1. Schematic of visibility screening analysis procedure. The numerical meaning of the terms "significant" and "adverse" differ on a case-by-case basis and will be defined after an in-depth policy analysis of each case.

TABLE III-3
FLORIDA AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time[1]	Primary Standards	Secondary Standards
Particulate matter	Annual geometric mean	75 ug/m^3	60 ug/m^3
	24-hour	260 ug/m^3	150 ug/m^3
Sulfur oxides	Annual arithmetic mean	80 ug/m^3 (0.03 ppm)	---
	24-hour	365 ug/m^3 (0.14 ppm)	---
	3-hour	---	130 ug/m^3 (0.5 ppm)
Carbon monoxide	8-hour	10 mg/m^3 (9 ppm)	same
	1-hour	40 mg/m^3 (35 ppm)	same
Nitrogen dioxide	Annual arithmetic mean	100 ug/m^3 (0.05 ppm)	same
Ozone	1-hour	240 ug/m^3 (0.12 ppm)	same
Lead	Calendar quarter	1.5 ug/m^3	same

1. The 1-, 3-, 8-, or 24-hour standards are not to be exceeded more than once per year.

1. Soils

The air pollutants from a major stationary source could alter soil characteristics, which may affect vegetation in the area. Vegetation can also be affected directly by acid rain, the result of SO_2 and NO_x emissions. There are pollutant levels at which soils and vegetation are not affected. In fact, the soil is a natural sink for many pollutants such as CO. Soils in the temperate zone have been estimated to remove and assimilate, on the average, 8.44 mg of $CO/hr/m^2$ from the atmosphere (Inman and Ingersoll, 1971). Particulate matter that drops out of the atmosphere and into the soil is generally recycled as nutrients or fixed in a form that is unavailable to vegetation (Bonn, 1972, Rasmussen, et al., 1975).

Pollutants such as fluoride, mercury and beryllium are absorbed by soil and generally fixed by the organic and clay fractions of the soil.

Therefore, the pollutants would be in a form unavailable to plants. The tolerance of soils and plants is dependent on the soil type and plant species.

The most serious impact on soil would be caused by acid rain, which could increase the soil acidity and increase nutrient leaching rates. It appears unlikely that increasing annual ambient levels by 0.8 ug/m^3 of SO_2 and 0.8 ug/m^3 of NO_2 that the proposed facility would measureably alter long-term precipitation pH levels. In fact, no accurate estimation of the change in the pH of rainfall caused by the proposed facility is feasible within current state-of-the-art technology.

2. Vegetation

Native vegetation in the study is associated with specifc soil classifications. In areas of urban or agriculatural usage, non-native species have invaded or are cultivated. Table III-4 features a compilation of soil and vegetation communities found in the area.

In residential areas plantings of various ornamental species are common; also prevalent, especially in less dense residential subdivisions are backyard gardens. In vacant lots where the native vegetation has been removed, thick coppices of Brazilian pepper are found. Fringing the shores of Tampa Bay are stamps of Black Mangrove.

Table III-5 is a compilation of landscape, agricultrual and other non-native species observed in the study area. This listing presents only those speciments which commonly occur.

Backyard gardens range from several square feet to an acre in size. The local climate allows for year round planting although tender plants are generally sown in spring only. Vegetables grown include corn, beans (bush, pole, lima, and pinto), peas (English and southern), greens (collards, mustard, lettuce, cabbage, celery), tomatoes, okra, carrots, turnips, broccoli, cauliflower, eggplant, and peppers. The most common fruit are strawberries; garden specimens of citrus and avacado are not uncommon.

The land within the study area to the south and east characterized by urban usage and resultant landscape plantings. Immediately surrounding the facility site on disturbed open land are dense coppices of brazilian pepper. The tidal shoreline is fringed by black and red mangroves although the former species is more common. Severe freeze damage to the mangroves and many other tender exotics (e.g. Australian pine, cajeput) resulted from an unusually cold period during January, 1981. A few small citrus groves were identified in the far north portion of the study area.

TABLE III-4
SOIL AND VEGETATION COMMUNITIES

Soil Classification	Associated Major Community Species
Well drained deep sands	turkey oak, bluejack oak, slash pine, dogwood, hickory
Poorly drained sands over organic hardpans	pine flatwoods (slash pine, palmetto, wire grass)
Poorly drained sands over calcareous substrate	sabal palm, saw palmetto and wire grass
Well drained sands with phosphatic materials	live and laurel oaks, hickory, and pines
Tidal lands	white, black and red mangrove and black needlerush
Freshwater swamps	pond and bald cypress and sweet bay
Poorly drained acid sands	pine flatwoods (slash pine, palmetto, and wire grass)
Poorly drained neutral to alkaline soils	slash pine, water oaks, and sweet bay
Poorly drained dark colored sands	pine flatwoods (slash pine, palmetto, and wire grass)
Urban lands	landscape plantings and backyard gardens; commercial/industrial open land is covered by Brazilian pepper
Agricultural lands	pasture land of bahia grass; some citrus groves (oranges, grapefruit)

TABLE III-5
LANDSCAPE, AGRICULATURE AND OTHER
NON-NATIVE SPECIES

Common Name	Genus	Species	Location
Grasses			
Bahiagrass	Paspalum	notatum	Pastures and lawns
Bermudagrass	Cynodon	dactylon	lawns
St. Augustine Grass	Stenotaphrum	secundatum	lawns (most common lawn grass
Wire Grass	Aristida	stricta	native; pine flatwoods
Panic Grass	Panicum	sp.	native; on disturbed sites
Ground Coverings			
Periwinkle	Vinca	spp	native; disturbed sites and landscape plantings
Lily-turn	Liriope	muscari	landscape plantings
Flowers			
Chrysanthemum	Chrysanthemum	indicum	landscape plantings
Begonia	Begonia	sp	landscape plantings & hanging baskets
Geranium	Pelargonium	sp	landscape plantings
Marigold	Tagetes	spp	landscape plantings
Phlox	Phlox	drummondi	native; along roads and railroad tracks
Rose	Rosa	spp	landscape plantings
Bulbs			
Day-lily	Hemerocallis	sp	landscape plantings
Canna lily	Canna	sp	landscape plantings
Ferns			
Asparagus Fern	Asparagus	sp	hanging baskets and window pots
Succulents			
Spanish Bayonet	Yucca	aloifolia	native; landscape plantings and along roadways
Century Plant	Agave	americana	landscape plantings

TABLE III-5 (Continued)

Common Name	Genus	Species	Location
Palms			
Cabbage palm	Sabal	palmetto	native; prairies and landscape plantings (state fee)
Areca palm	Chrysali-docarpus	lutescens	landscape plantings
Canary Island data palm	Phoenix	canariensis	landscape plantings
Coconut palm	Cocos	nucifera	landscape plantings
Manila palm	Veitchia	merrillii	landscape plantings
Queen palm	Arecastrum	romanzof-fianum	landscape plantings
Native Trees			
Slash Pine	Pinus	elliottii	pine flatwoods, swamps, & left on developed land
Longleaf Pine	Pinus	palustris	on drier sites and in landscapes
Live Oak	Quercus	virginiani	better, dry soils and landscapes
Water Oak	Quercus	nigra	poorly trained sites
Red Cedar	Juniperus	silicicola	soils underlain by calcareous material and landscapes
Sweet Gum	Liquidambar	styraciflua	poorly drained sands and loams
Sweet Bay	Magnolia	virginiana	poorly drained acid sands
Turkey Oak	Quercus	laevis	excessively drained sands
Bluejack Oak	Quercus	incana	execeesively drained sands
Bald cypress	Taxodium	disthichum	riverine swamps
Pond cypress	Taxodium	ascendens	cypress domes and depressed lands among pine flatwoods along ditches and streams
Black mangrove	Avicennia	nitida	tidal swamps
Red mangrove	Rhizophora	mangle	tidal swamps seaward of black mangrove
Hickory	Carya	sp	mesic forests

TABLE III-5 (Continued)

Common Name	Genus	Species	Location
Native Shrubs			
Saw palmetto	Serenoa	sp	pine flatwoods and deep sands
Yaupon holly	Ilex	vomitoria	deep sands and landscapes
Gallberry	Ilex	coriacea	pine flatwoods
Wax myrtle	Myrica	cerifera	pine flatwoods
Exotic Species			
Australian Pine	Casuarina	spp	along roads and property lines
Citrus	Citrus	spp	oranges, grapefruits, lines, lemons, and tangerines in backyards or small groves
Jerusalem thorn	Parkinsonia	aculeata	disturbed open land and landscapes
Norfolk Island pine	Araucaria	excelsa	landscape plantings
Cajeput	Melaleuca	leucadendra	disturbed open land
Rubber tree	Ficus	sp.	landscape plantings
Banana	Musa	spp	landscape plantings
Bamboo	Bambusa	sp.	landscape plantings
Sago palm	Cycas	revoluta	landscape plantings
Pampas grass	Cortaderia	sellonna	landscape plantings
Copper leaf	Acalypha	wilkesiana	landscape plantings
Croton	Cordiaeum	Variegatum	landscape plantings
Hibiscus	Hibiscus	spp.	landscape plantings
Oleander	Nerium	oleander	landscape plantings
Surinam cherry	Eugenia	unifloria	landscape plantings
Brazilian pepper			grows in dense thickets on disturbed open land.

E. SENSITIVE ZONES

The area immediately surrounding the facility consists of open disturbed lands (created by recent construction) with some warehouse and other light manufacturing structures. The water body just east of this fill area is Tampa Bay, an emergent, or man-impacted ecosystem; it is the focal point of many area conservation groups primarily in conjunction with nesting and/or migratory bird populations. The mangrove ecosystem fringing tidal shores are important natural assets from both a fisheries and storm protection standpoints.

Tree species, such as black and red oak, white pine, gray and white birch, American elm and red maple, have been reported to be relatively sensitive to ambient SO_2 levels (Jones, et al., 1974, Davis and Wilhour, 1976). Concentrations of SO_2 between 786 and 1,572 ug/m^3 for three hours have developed visible injury symptoms (Jones, et al., 1974). White pines exposed to ambient SO_2 levels of more than 0.25 ppm are often stunted (Linzon, 1966). Maximum annual SO_2 concentrations are predicted to be less than 35 ug/m^3, which is considered to be below the threshold at which injury to even sensitive woody vegetation may occur (NAS, 1978).

Long-term exposure to 470 ug/m^3 NO_2 throughout the months of the growing season has been found to reduce growth, weight and yield in tomato plants (Spiering, 1971). However, the predicted peak annual ambient NO_2 concentration of 0.8 ug/m^3 will be well below the minimum concentration reported to cause injury to vegetation after long-term exposures.

Only small increases of ambient TSP levels, 1.44 ug/m^3 and 0.16 ug/m^3 for the 24-hour and annual averages will be caused by the proposed facility. These small increases will not be sufficient to coat foliage or block light and gas exchange (Lodge, et al., 1981).

Vegetation is extremely resistant to CO. In fact, plants exposed to 115 mg/m^3 CO for up to three weeks did not produce any visible injury (Zimmerman, et al., 1933). Predicted maximum CO levels in the vicinity of the proposed facility is 14 ug/m^3, per 8-hour interval.

Ambient lead levels are predicted to be less than 0.24 ug/m^3 for a calendar quarter. The proposed facility will contribute approximately 17% of the ambient standard. However, there have been no known reports of injury to vegetation from lead concentrations near highways where lead concentrations are expected to be high (NRC, 1979).

Plants can be particularly sensitive to fluoride emissions, especially as hydrofluoric acid. However, most of the fluoride emissions from the proposed plant will be in the form of an aerosol (suspended fine particulates), which is less damaging to vegetation. Fluorides can cause spotting or partial destruction of leaf surfaces and reduced plant growth.

Total ambient fluoride levels of 0.8 to 4.0 ug/m^3 for several days have been shown to adversely affect the most fluoride-sensitive plants, such as corn, cherry pine and gladiolus (Treshow, 1969). However, when gladiolus plants were exposed to average fluoride aerosol averaging levels of 1.9 ug/m^3 for four weeks, no damage to leaf areas was experienced (Pack, et al., 1960).

The proposed facility may have peak 24-hour averaging fluoride levels of 0.24 ug/m^3 in the immediate vicinity of the plant.

F. SUMMARY

There will be a positive economic impact on Pinellas County due to the implementation of the proposed facility, while environmental impacts will be slight. Workers for the construction and operation of the facility will be from the local work force; therefore, no growth impacts would be experienced due to an influx of workers from outside the county.

The Class 1 areas closest to the proposed facility are about at a 75 kilometers from the facility. A level 1 visibility analysis indicated that it is extremely unlikely that visibility would be affected in these areas.

The soils in Pinellas County have sufficient high clay content to resist acid precipitation, and should be good at absorbing pollutants such as particulate matter, fluoride, mercury and beryllium. Any increase in SO_2 or NO_2 due to the proposed facility should not significantly alter the pH of rainfall. In fact, any pH change experienced would not be measurable. Increased ambient levels of criteria and non-criteria pollutants due to the facility emissions are not likely to have a significant effect on vegetation in the area.

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AIR PERMIT APPLICATION FORMS

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Incinerator [X] New[1] [ ] Existing[1]

APPLICATION TYPE: [X] Construction [ ] Operation [ ] Modification

COMPANY NAME: Pinellas County COUNTY: Pinellas

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) Incinerator

SOURCE LOCATION: Street 28th SE & 110th Avenue City County

UTM: East ______ North ______

Latitude 27 ° 52 ' - "N Longitude 82 ° 40 ' - "W

APPLICANT NAME AND TITLE: Pinellas County, Dept. of Public Works & Utilities

APPLICANT ADDRESS: 310 Court Street, Clearwater, Florida 33516

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Pinellas County

I certify that the statements made in this application for a Construction Permit permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: D F Acenbrack

D. F. Acenbrack, Director
Name and Title (Please Type)

Date: 6/10/83 Telephone No. 813-825-1565

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed: Robert Van Deman

Robert Van Deman
Name (Please Type)

Henningson, Durham & Richardson, Inc.
Company Name (Please Type)

P.O. Box 5576, Clearwater, Florida 33518
Mailing Address (Please Type)

(Affix Seal)

(SEALED)

Florida Registration No. 25963 Date: 6/10/83 Telephone No. 813-577-9455

[1]See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

Addition of third combustion to existing facility. Advantages will be greater availability of energy production. Electrostatic precipitators will be used to control particulate.

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction August 1983 Completion of Construction August 1986

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

DER Powerplant Site Certification PA 78-11

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? ____ Yes X No

F. Normal equipment operating time: hrs/day 24; days/wk 7; wks/yr 52; if power plant, hrs/yr 8760; if seasonal, describe:

G. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? Yes
   a. If yes, has "offset" been applied? No
   b. If yes, has "Lowest Achievable Emission Rate" been applied? No
   c. If yes, list non-attainment pollutants. Ozone
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. Yes
3. Does the State "Prevention of Significant Deteriorlation" (PSD) requirements apply to this source? If yes, see Sections VI and VII. Yes
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? Yes
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? Yes

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): ______________________

2. Product Weight (lbs/hr): ______________________

C. Airborne Contaminants Emitted:

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5]

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. – 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard

[4]Emission, if source operated without control (See Section V, Item 3)

[5]If Applicable

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis:

Percent Sulfur: ______ Percent Ash: ______

Density: ______ lbs/gal Typical Percent Nitrogen: ______

Heat Capacity: ______ BTU/lb ______ BTU/gal

Other Fuel Contaminants (which may cause air pollution): ______

F. If applicable, indicate the percent of fuel used for space heating. Annual Average ______ Maximum ______

G. Indicate liquid or solid wastes generated and method of disposal.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: ______ ft. Stack Diameter: ______ ft.

Gas Flow Rate: ______ ACFM Gas Exit Temperature: ______ °F.

Water Vapor Content: ______ % Velocity: ______ FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs/hr Incinerated approx.	8% 7000	24% 21000	40% 35000	10% 8750	0	0	18% 15750

Description of Waste Municipal Solid Waste

Total Weight Incinerated (lbs/hr) 87500 @ 5,000Btu/lb Design Capacity (lbs/hr) 87500

Approximate Number of Hours of Operation per day 24 days/week 7

Manufacturer UOP

Date Constructed ______ Model No. ______

	Volume (ft)3	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber	Na	4.11×10^8 Btu/hr	Solid Waste	4.11×10^8 Btu/hr	1600-1800°F
Secondary Chamber					

Stack Height: 161 ft. Stack Diameter 7.78bf Stack Temp. 450°F

Gas Flow Rate: 251,000 ACFM ______ DSCFM* Velocity 88 FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner [X] Other (specify) ESP

Brief description of operating characteristics of control devices:

Electrostatic collection of particulate matter

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

solids to landfill

liquids to sewer

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight — show derivation.
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.,) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, etc.).
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3, and 5 should be consistent: actual emissions = potential (1-efficiency).
6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).
8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
[X] Yes [ ] No

Contaminant	Rate or Concentration
Particulate	0.08 gr / dscf @ 12% CO_2

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) [ ] Yes [X] No

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration
Particulate	0.03 gr / dscf at 12% CO_2

D. Describe the existing control and treatment technology (if any).

1. Control Device/System: NONE
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

a. Height: ft. b. Diameter: ft.

c. Flow Rate: ACFM d. Temperature: °F

e. Velocity: FPS

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

1.

a. Control Device: <u>SEE BACT SECTION</u>

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

*Explain method of determining efficiency.

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

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

SECTION VII – PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data

1. ________ no sites None TSP ______ ( ) SO^2* ________ Wind spd/dir

Period of monitoring ___/___/___ (month day year) to ___/___/___ (month day year)

Other data recorded Pinellas County Dept. of Environmental Management

Attach all data or statistical summaries to this application.

2. Instrumentation, Field and Laboratory

a) Was instrumentation EPA referenced or its equivalent? X Yes ___ No

b) Was instrumentation calibrated in accordance with Department procedures? X Yes ___ No ___ Unknown

B. Meteorological Data Used for Air Quality Modeling

1. 5 Year(s) of data from 1 / / 70 (month day year) to 12 / 31 / 74 (month day year)

2. Surface data obtained from (location) Tampa

3. Upper air (mixing height) data obtained from (location) Tampa

4. Stability wind rose (STAR) data obtained from (location) ________

C. Computer Models Used

1. CRSTER Modified? If yes, attach description.

2. PTP/U Modified? If yes, attach description.

3. PTDIS Modified? If yes, attach description.

4. ________ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	________ grams/sec
SO^2	________ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description on point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

*Specify bubbler (B) or continuous (C).

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

The project will create jobs and decrease need for landfill space.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

Level I Visibility Analysis

Ref. EPA 450/4-8-031 Nov 80
"Workbook for Estimating Visibility Impairment."

Q = Pinellas Co. RRF Units 1,2 + 3

Q_{part} = 1.81 metric tons/Day particulate
Q_{NO_2} = 4.31 metric tons/Day NO_x
Q_{SO_2} = 4.31 metric tons/Day SO_2

x = 75 km to Chassahowitzka Nat Wildlife Area

σ_z = 90m vertical dispersion coefficient

Plume Dispersion Parameter

$$P = \frac{2.0 \times 10^8}{\sigma_z x} = \frac{2 \times 10^8}{90 \cdot 75} = 2.96 \times 10^4$$

τ_{part} = Optical Thickness

$\tau_{part} = 10 \times 10^{-7} Q_{part} = (10 \times 10^{-7})(2.96 \times 10^4)(1.81)$
τ_{part} = ~~[illegible]~~ 5.36×10^{-2}

$\tau_{NO_2} = 1.7 \times 10^{-7} P\, Q_{NO_2} = 1.7 \times 10^{-7}(2.96 \times 10^4)(4.31)$
$\tau_{NO_2} = 2.17 \times 10^{-2}$

r_{vo} = 25 km regional background visual range (Figure 13)

$\tau_{aerosol}$ – Primary & Secondary Aerosol

$$\tau_{ar} = 1.06\times10^{-5}\ r_{vo}\ (Qpart + 1.31\ QSO_4)$$
$$\tau_{ar} = (1.06\times10^{-5})\ (25)\ (1.81 + 1.31(4.31))$$
$$\tau_{ar} = 1.98\times10^{-3}$$

C_1 = Plume Contrast / Sky

$$C_1 = \frac{-\tau_{NO_2}}{\tau_{part}+\tau_{NO_2}}\left[1-\exp\left(-\tau_{part}-\tau_{NO_2}\right)\right]\left[\exp\left(-0.78\frac{x}{r_{vo}}\right)\right]$$

$$C_1 = \frac{-2.17\times10^{-2}}{5.36\times10^{-2}+2.17\times10^{-2}}\left[1-\exp-\left(5.36\times10^{-2}+2.17\times10^{-2}\right)\right]\left[\exp\left(-0.78\frac{75}{25}\right)\right]$$

$$C_1 = -2.01\times10^{-3}$$

C_2 = Plume Contrast / Terrain

$$C_2 = \left[1-\left(\frac{1}{C_1+1}\right)\exp\left(-\left[\tau_{part}+\tau_{NO_2}\right]\right)\right]\left[\exp\left(-1.56\frac{x}{r_{vo}}\right)\right]$$
$$C_2 = \left[1-\left(\frac{1}{2.01\times10^{-3}+1}\right)\exp\left(-\left(5.36\times10^{-2}+2.17\times10^{-2}\right)\right)\right]\left[\exp -1.56\frac{75}{25}\right]$$

$$C_2 = -1.74\times10^{-5}$$

C_3 = Change in Sky/Terrain Contrast / Aerosol

$$C_3 = 0.368\left[1-\exp\left(-\tau_{ar}\right)\right]$$
$$C_3 = 0.368\left[1-\exp -1.98\times10^{-3}\right]$$

$$C_3 = 7.28\times10^{-4}$$

HDR

Project Pinellas RRF Computed FR

Subject Visibility Analysis Date 2/28/83 Sht. 3 Of 3

Note:

Since the absolute values of C_1, C_2, & C_3 are all less than 0.01 it is unlikely that the RRF will cause a visibility impairment in the Class I area.

APPENDIX A-2

MASS BURN EMISSION FACTORS

DEVELOPMENT OF EMISSION FACTORS FOR MASS BURN RESOURCE RECOVERY FACILITIES

FEBRUARY 1983

Emission factors for mass burn resource recovery facilities were developed from a survey of available emission data in the literature and in proposals made by prospective contractors in response to RFPs for the construction of mass burn resource recovery facilities. Available data are limited and frequently the literature references the same data base more than once. An effort was made only to use data from mass burn waterwall incinerators. However, for some pollutants, data from refractory lined incinerators and RDF plants were included because of limited data available from mass burn facilities.

The emission levels presented by contractors in their proposals are considered representative of average to maximum emission levels expected because contractors are concerned that these levels will be used as emission limits in the permit. Where a specific contractor has submitted different emission values for different proposals, only the highest value was used. The inconsistencies between proposals can be attributed to a changing attitude towards the margin of safety used in deriving these numbers. It is unrealistic to specify absolute maximum emission limits because of the heterogeneous composition of municipal solid waste.

The actual emissions from a new mass burn resource recovery facility may be lower than the emission values presented in this paper. In the first place, a new facility would provide current air pollution control technology whereas the technology used for the tested facilities may represent an earlier level of technology which is less efficient. Also, the composition of the solid waste which will be processed may be different from the waste from which the data were obtained. The solid waste burned will have a higher Btu content and significantly fewer glass and plastic bottles and metal cans if returnable container legislation has been enacted. The impact of this legislation may be to reduce emissions for certain pollutants such as lead, tin, and chlorides due to a reduction in the amount of cans and plastic bottles in the waste stream.

The emission factors presented herein (Tables 1 and 2) are averages of the various source data available. To avoid using the same test data twice, references that appeared to be duplicates of a previous source were eliminated. When an average emission value from three different facilities was presented in one reference, a weighted average of the three was assigned to this value. Thus, each facility tested and each proposal were given the same weight.

Emissions have been grouped into four major classifications. The first classification consists of total suspended particulates and is discussed separately. The next group consists of the major pollutants and includes SO_2, NO_x, CO, hydrocarbons, chlorides (represented as hydrogen chloride), and fluorides (represented as hydrogen fluoride). The last two groups consist of trace metals and certain organics.

1. Particulates

Uncontrolled particulate emission data is available from the Braintree, Nashville, Chicago Northwest, and Harrisburg facilities (1). The average uncontrolled particulate loading from these four plants is 26.6 lb/ton of solid waste fired. Based on seven proposals (2, 3, 4, 5, 6, 7, and 8) in which contractors estimated expected uncontrolled particulate levels, an average of 37.6 lb/ton was calculated. Contractors used these values to calculate the required efficiency of their electrostatic precipitators to meet a specific particulate emission requirement. The uncontrolled particulate emission values proposed by the contractors range from 18 to 103 pounds per ton of solid waste fired because there is a difference in the uncontrolled particulate loading based on the configuration of the proposed system and the amount of excess air used. In addition, these values vary because of the margin of safety the contractors allow themselves for meeting a guaranteed particulate loading. To be conservative without using the highest controlled values proposed by contractors, a maximum uncontrolled emission value of 60 lb/ton of solid waste was used for calculating the required particulate removal efficiency to be used in the air pollution control technology analysis. This equates to an uncontrolled particulate loading of 3 gr/dscf.

2. Major Pollutants

The emission of SO_2, chlorides, and fluorides through the stack is largely dependent on the respective amount of sulfur, chlorine, and fluorine present in the fuel. Based on SO_2 emissions from Braintree, Nashville, Chicago Northwest, and Harrisburg waterwall incinerators (1, 9) and SO_2 data given in six proposals (3, 6, 8, 11, 13, and 14), a weighted average of 3 lb SO_2/ton of solid waste was obtained. For chlorides, a weighted average of 5.3 lb/ton of solid waste was obtained using actual data from the four incinerators and data from four proposals (10, 11, 13, and 14). There was no data available on fluoride emissions from mass burn waterwall incinerators in the literature. However, the average for the four same proposals was 0.1 lb/ton of solid waste and equaled the values from the two sources found in the literature for other than waterwall incinerators.

Emissions of hydrocarbons, CO, and NO_x are dependent on the composition of the waste and on operating and design conditions at the facility. Based on data from Nashville (1) and Harrisburg (9) waterwall incinerators and six proposals (3, 6, 11, 12, 13, and 14), an emission factor of 0.8 lb of CO per ton of solid waste was derived. Data from Braintree was eliminated from the analysis because there are indications that the facility was operating under severe draft imbalance conditions at the time the tests were taken (15). The Braintree data were also eliminated when calculating the emission factor for hydrocarbons for the same reason. Based on four proposals (6, 11, 13, and 14), an emission factor of 0.2 lb of hydrocarbons per ton of solid waste was derived. Including the Braintree data would bring the weighted average up to 0.3 lb/ton. The NO_x emission factor of 4.3 lb/ton solid waste was derived from Braintree, Nashville, Chicago Northwest, and Harrisburg data (1), and emission values presented by six contractors in their proposals(3, 6, 11, 12, 13, and 14). Table 1 summarizes the derived emission factors for the major pollutants.

3. Trace Metals

Published data on trace metal emissions from incinerators in the United States and Europe were reviewed. Authors were contacted to discuss the data presented and to obtain additional data for making the proper corrections to report the data in pounds of pollutant per ton of solid

TABLE 1. EXPECTED EMISSION FACTORS OF MAJOR POLLUTANTS FROM RESOURCE RECOVERY FACILITIES

Pollutant	Pounds/Ton Solid Waste
Particulates	0.6
Hydrocarbons	0.2
Carbon Monoxide	0.8
Nitrogen Oxides	4.3
Sulfur Dioxide	3
Chlorides	5.3
Fluorides	0.1

waste fired. An effort was made to use data from mass burn waterwall incinerators only; but due to the limited available data, data from refractory lined incinerators and one RDF plant were used. The data from the RDF plant were very complete and were found to be of the same order of magnitude as the other data.

Six references (16, 17, 18, 19, 20, and 21) were found to be sufficiently complete, including additional data obtained from authors, to calculate the level of trace metals in the particulate fraction of the controlled flue gas. Table 2 summarizes these results. Each facility in the United States was given equal weight in the analysis, but all the seven facilities in Germany together were given the weight of one facility. This was done so the analysis would be more representative of data from facilities in the United States. The trace metals reported were those considered to be of concern which are listed in the USEPA report entitled "Environmental Assessment of Waste to Energy Processes" (1977). The trace metal emission factors were calculated based on a controlled particulate level of 0.6 pounds per ton (at 99% ESP efficiency) of solid waste fired. Portions of mercury, antimony, cadmium, lead, and tin emissions have been found to be present in the gaseous phase. Very little data are available quantifying the portion of these elements in the gaseous phase. Based on conversations with authors in the field, percentages were estimated as follows: mercury, 85%; antimony, 30%; cadmium, less than 10%; and lead and tin, less than 5% each. These percentages have been used to estimate the emission levels of these elements in the gaseous state. The last column in Table 2 represents a total of the various forms of the expected emissions of each pollutant.

TABLE 2. ESTIMATED TRACE METAL EMISSION FACTORS

Trace Metal	Measured Concentration in Controlled Particulates (ppm)	Estimated Uncontrolled Emissions (pounds per ton solid waste)		
		Particulate* Portion	Gaseous** Portion	Total
Antimony	1,388	8.3×10^{-4}	3.6×10^{-4}	1.2×10^{-3}
Arsenic	160.7	9.6×10^{-5}	-	9.6×10^{-5}
Barium	876	5.3×10^{-4}	-	5.3×10^{-4}
Beryllium	2.1	1.3×10^{-6}	-	1.3×10^{-6}
Cadmium	1,305	7.8×10^{-4}	0.9×10^{-4}	8.7×10^{-4}
Chromium	439.3	2.6×10^{-4}	-	2.6×10^{-4}
Cobalt	14.1	8.5×10^{-6}	-	8.5×10^{-6}
Copper	1,529	9.2×10^{-4}	-	9.2×10^{-4}
Manganese	778	4.7×10^{-4}	-	4.7×10^{-4}
Mercury	632	3.8×10^{-4}	2.2×10^{-3}	2.6×10^{-3}
Lead	47,100	2.8×10^{-2}	0.1×10^{-2}	2.9×10^{-2}
Lithium	100	6.0×10^{-5}	-	6.0×10^{-5}
Nickel	260.4	1.6×10^{-4}	-	1.6×10^{-4}
Silver	276.2	1.7×10^{-4}	-	1.7×10^{-4}
Tin	7,158	4.3×10^{-3}	0.2×10^{-3}	4.5×10^{-3}
Tungsten	14	8.4×10^{-6}	-	8.4×10^{-6}
Vanadium	52.6	3.2×10^{-5}	-	3.2×10^{-5}
Zinc	82,200	4.9×10^{-2}	-	4.9×10^{-2}
Zirconium	24.5	1.5×10^{-5}	-	1.5×10^{-5}

Note: * Based on a particulate loading of 0.6 lb/ton of solid waste fired.

** Percentages assumed to be in the gaseous state: mercury, 85%; antimony, 30%; cadmium, less than 10%; and lead and tin, less than 5% each.

4. Organic Compounds

Emission factors for certain organic compounds which have been identified as being of concern from a potential adverse health effect viewpoint, have been calculated based on test results on fly ash and stack particulates from unspecified European plants burning solid waste (22). Table 3 lists emission rates for these compounds based on a controlled particulate emission of 0.6 pounds per ton of solid waste. These compounds are absorbed on particulates and the potential emissions of these compounds is therefore dependent on the degree of particulate removal. Actual emissions of these compounds from a new mass burn resource recovery facility are expected to be minimal.

Research conducted by EPA indicates that at temperature of 1830F and higher in the combustion chamber, organic compounds are almost completely destroyed (more than 99%) if this temperature is maintained for at least two seconds (23, 24).

TABLE 3. ESTIMATED TRACE ORGANIC EMISSION FACTORS

Organic Compound	Emission Rate (10^{-6} lb/ton)
Total Polynuclear Aromatic Hydrocarbons (PAH)	240
Pyrene	6
Perylene	0.8
Ideno (1,2,3cd) pyrene	0.8
Fluoranthene	5
Coronene	0.8
Benzo(a)pyrene/benzo(e)pyrene	0.8
Benzo(ghi)perylene	2
Benzo(b)flouranthene	1.5
Benzo(a)anthracene	3
Chlorinated Dibenzodioxins	
2, 3, 7, 8 - TCDD	0.02
TCDD	0.2
P5CDD	0.5
HCDD	0.8
H7CDD	0.8
OCDD	0.2
Chlorinated Dibenzofurans	
TCDF	0.3
P5CDF	0.6
HCDF	1.0
H7CDF	0.7
OCDF	0.08

Notes: * Based on a particulate loading of 0.6 lb/ton of solid waste.

Source: Arthur D. Little, Inc., March 1981

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9. Gaughan, W. June 1978. Draft Environmental Impact Statement on Northeastern Massachusetts Resource Recovery Project. Prepared for Commonwealth of Massachusetts. Metrex Division of Mitre Corp. (Harrisburg data)

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