Westinghouse Electric Corporation

60-160
433

Mellon Bank N.A.
Pittsburgh, Pennsylvania

VOID VOID

Pay To Order Of

	Date	Amount of Check
FL DEPT OF ENVIRONMENTAL REG 2600 BLAIRSTONE RD TALLAHASSEE FL 32301	03/22/84	$ ****2,000.00

Headquarters Disbursing Account - 9400

D C Kolb
VICE PRESIDENT & TREASURER

⑈061361⑈ ⑆043301601⑆ 000⑈9689⑈

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

№ 76020

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from Westinghouse Electric Corporation Date March 26, 1984

Address Box 10864, Pittsburgh, PA 15236-0884 Dollars $2,000.00

Applicant Name & Address Same as above

Source of Revenue

Revenue Code 001001 Application Number AC 03-84703, AC 03-84704

By Patricia H. Adams

TO: BILL THOMAS
FROM: JACK PREECE
MARCH 16 1984

MR MILTON E. KIRKPATRICK AND MR JOHN D PHILLIPS (CARDS ATTACHED) MET WITH TOM MOODY AND I TODAY AND REQUESTED OUR PRELIMINARY REVIEW OF AN INCOMPLETE APPLICATION (2 COPIES ATTACHED)

I ASSURED THEM THAT THIS WOULD BE PROCESSED BY CAPS. I DID AGREE TO SEND YOU THIS UNOFFICIAL APPLICATION AND I REQUEST YOU TO CALL ONE OF THESE GENTLEMEN AS SOON AS POSSIBLE TO HELP THEM PUT THE FINISHING TOUCHES TO THEIR SUBMITTAL. I TOLD THEM THE FEE WOULD BE 2 × $1000 = $2000.

I QUESTIONED THE APPLICABILITY OF NSPS SUBPART E VS CARBONACEOUS BURNER

WE CORRECTED ITEMS IN RED PAGES 4, 5

I DIDN'T TRY TO OUT GUESS YOU ON ANY OTHER COMPLETENESS ITEMS.

KEEP US INFORMED WHEN THEY MAKE IT OFFICIAL.

DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO.

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION) INITIAL / DATE
BILL THOMAS

2. INITIAL / DATE
BUR. OF AIR QUALITY MANAGEMENT
DER

3. INITIAL / DATE
TALLAHASSEE

4. INITIAL / DATE

REMARKS:

INFORMATION
- REVIEW & RETURN
- REVIEW & FILE
- INITIAL & FORWARD

DISPOSITION
- REVIEW & RESPOND
- PREPARE RESPONSE
- FOR MY SIGNATURE
- FOR YOUR SIGNATURE
- LET'S DISCUSS
- SET UP MEETING
- INVESTIGATE & REPORT
- INITIAL & FORWARD
- DISTRIBUTE
- CONCURRENCE
- FOR PROCESSING
- INITIAL & RETURN

FROM:

DATE:

PHONE:

John D Phillips
Engineer
Bay County Waste to Energy Project
Waste Technology Services Division
Westinghouse Electric Corporation
PO Box 10864
Pittsburgh PA 15236
(412) 892-5600 Ext 6743

Milton E Kirkpatrick
Project Advisor
Bay County Waste to Energy Project
Waste Technology Services Division
Westinghouse Electric Corporation
PO Box 10864
Pittsburgh PA 15236
(412) 892-5600

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

1st DRAFT

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Resource Recovery Facility comprising* 2 Carbonaceous Fuel Boilers fired Primarily by Municipal Solid Waste [x] New[1] [ ] Existing[1]

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

COMPANY NAME: ______ COUNTY: Bay

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) 2 MSW-fired boilers with Electrostatic Precipitators

SOURCE LOCATION: Street U.S. Highway 231 City Panama City

UTM: East ______ North ______

Latitude ___° ___' ___"N Longitude ___° ___' ___"W

APPLICANT NAME AND TITLE: ______

APPLICANT ADDRESS: ______

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of ______

I certify that the statements made in this application for a ______ permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to 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: ______

______
Name and Title (Please Type)

Date: ______ Telephone No. ______

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

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

[1] See Florida Administrative Code Rule 17-2.100(57) and (104)

* See definitions at 17-2.100(28) and (29), F.A.C.

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 ______________________________

____
Name (Please Type)

____
Company Name (Please Type)

____
Mailing Address (Please Type)

Florida Registration No. __________ Date: ______________ Telephone No. ______________

SECTION II: GENERAL PROJECT INFORMATION

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

See Attachment II.A.

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

Start of Construction 4th Quarter 1984 Completion of Construction 4th Quarter 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.)

Preliminary engineering estimates for two (2) electrostatic precipitators are $1,100,000. This figure includes the cost of precipitators, transformer-rectifier units, heated-insulated ash hoppers, and controls.

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

None

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

if power plant, hrs/yr 8760 ; if seasonal, describe: This facility is expected to be in continuous operation except for maintenance outages. Full capacity of 350 tons per day of MSW will not normally be realized except in the summer vacation season. Wood chips will be burned as supplemental fuel.

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

1. Is this source in a non-attainment area for a particular pollutant? No

   a. If yes, has "offset" been applied? ______

   b. If yes, has "Lowest Achievable Emission Rate" been applied? ______

   c. If yes, list non-attainment pollutants. ______

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. ~~No~~ Yes

3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. ~~No~~ Yes

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? ~~No~~ Yes

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? No

   a. If yes, for what pollutants? ______

   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

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

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

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

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): 29166.6 lbs/hr MSW and/or Wood Chips

2. Product Weight (lbs/hr): 78,000 lbs/hr Steam

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

For each of the two incinerator-boilers/stacks:

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual* T/yr			lbs/~~xx~~ hr	T/yr	
Particulate	3.64	14.986	30% Opacity 0.2 lb/MMBtu	13.1	255	1049.9	
CO	30.125	~~248.06~~ 124.03	per 17-2.600 (10)(b)2.b.	-	30.125 (1)	~~248.06~~	124.03
NO_x	16	67.21	-	-	16	67.21	
SO_2	10	42.16	-	-	10	42.16	
HC-(non-methane)	1.7	7.3	-	-	1.7	7.3	
Lead	0.0227	187 lb/Yr			0.0227	187 lb/Yr	

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard.

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

* Based on 94% Capacity factor.

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

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Electrostatic Precipitator	Particulate/Lead	Approximately 99%		Cooper & Clark Table 5-11

E. Fuels For each of the two units:

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Municipal Solid Waste	11458.3	14583.3	65.5
~~Wood Chip~~		Approx. 8000	
Natural Gas	Will be used only for startup and shutdown	60 MMCF/Hr.	

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis: For Standard MSW

Percent Sulfur: 0.16 Percent Ash: 27.58 (typical)

Density: N/A lbs/gal Typical Percent Nitrogen: None

Heat Capacity: 4500 BTU/lb N/A BTU/gal

Other Fuel Contaminants (which may cause air pollution): Primary fuel will be type III municipal solid waste. Small quantities of lead will be present. No hazardous wastes will be accepted for burning.

F. If applicable, indicate the percent of fuel used for space heating. Not applicable.

Annual Average ______ Maximum ______

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

Bottom ash and fly ash to be co-mingled and transported to Bay County Landfill

All liquid wastes (cooling tower blowdown, boiler blowdown, ash quench water overflow, excess cooling water, sanitary waste, plant washdown water) will be pretreated and discharged through ~~boiler quench~~ sanitary sewers to the Bay County sewage treatment plant.

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

Stack Height: 2 stacks each 125 ft. Stack Diameter: 4 ft.

Gas Flow Rate: 29,246 ACFM 15,245 DSCFM Gas Exit Temperature: 400 °F.

Water Vapor Content: 20 % Velocity: 2500 FPM ~~FPS~~

SECTION IV: INCINERATOR INFORMATION – Not Applicable

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.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste ______

Total Weight Incinerated (lbs/hr) ______ Design Capacity (lbs/hr) ______

Approximate Number of Hours of Operation per day ______ day/wk ______ wks/yr. ______

Manufacturer ______

Date Constructed ______ Model No. ______

	Volume (ft)^3	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: ______ ft. Stack Diamter: ______ Stack Temp. ______

Gas Flow Rate: ______ ACFM ______ DSCFM* Velocity: ______ FPS

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

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) ______

Brief description of operating characteristics of control devices: ______

______

______

______

______

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

______

______

______

______

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).
6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).
8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

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

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY N/A

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

[ ] Yes [ ] No

Contaminant	Rate or Concentration

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

[ ] Yes [ ] No

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration

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

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter: ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

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

1.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

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

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

F. Describe the control technology selected:

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION N/A

A. Company Monitored Data

1. ________ no. sites ________ TSP ________ ( ) SO^{2*} ________ Wind spd/dir

Period of Monitoring ____/____/____ to ____/____/____
month day year month day year

Other data recorded ________________________

Attach all data or statistical summaries to this application.

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

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [ ] Yes [ ] No

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from ____/____/____ to ____/____/____
month day year month day year

2. Surface data obtained from (location)______________________

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

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

C. Computer Models Used

1. ______________________ Modified? If yes, attach description.

2. ______________________ Modified? If yes, attach description.

3. ______________________ Modified? If yes, attach description.

4. ______________________ Modified? If yes, attach description.

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

D. Applicants Maximum Allowable Emission Data

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

E. Emission Data Used in Modeling

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

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

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

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

ATTACHMENT II.A.

This project involves the construction of a resource recovery facility that will generate steam-electric power by burning the combustible fraction of municipal solid waste from Bay County. The project represents the Bay County Commission's response to solid waste management planning for the future. The facility will consist of two (2) O'Connor RC 100 combustor units with provision for future addition of a third unit. Initial capacity of the facility will be 350 tons per day of municipal solid waste. Wood chips will be available as a supplemental fuel to maximize plant capacity factor and revenues. Steam produced in the two incinerator-boilers will be used to produce electrical energy by turbine generators, which will be sold to Gulf Power Company. Design of the facility will provide for future steam sales for manufacturing or other uses in the adjacent industrial park.

Electrostatic precipitators are proposed for control of particulate emissions from the incinerator-boilers. This choice is based upon successful operating experience with this control technology in resource recovery facilities utilizing waterwell boilers for the incineration of municipal solid waste in Nashville, Tennessee; Saugus, Massachusetts, Hampton, Virginia; and Pinellas County, Florida. The design criteria for particulate emissions from the precipitators will be 0.02 grains per standard cubic foot, corrected to 12% CO_2. This represents a particulate removal efficiency of approximately 99%.

The use of baghouse technology has been rejected for this project in view of the baghouse failure at Gallatin, Tennessee and the lack of experience with baghouses on existing municipal solid waste incinerator-boilers. The early failure involving the use of a wet scrubber at the Nashville facility, and the lack of successful operating experience on waterwall boilers equipped with dry scrubbers in the U.S.A., form the basis of the decision not to utilize scrubber technology for this project.

As proposed, this project will result in full compliance with all applicable requirements of Florida Administrative Code Chapter 17-2.

BASIC DATA
RESOURCE RECOVERY PLANT
BAY COUNTY, FLORIDA

Introduction

This document presents design criteria on the proposed Bay County project. Plant capacity will be 350 tons per day of municipal solid waste. Data from scales at the Majette Tower Landfill indicate a maximum of 350 TPD, a minimum of 250 TPD, and an annual 100,000 tons of MSW. Supplemental wood chip fuel will be available to maximize plant capacity and revenues. The plant will be designed with two O'Connor RC 100 Combustor units with provision for future addition of one additional unit. Energy produced by turbine generators will be sold to Gulf Power Company. Future steam sales will be provided for in plant design.

Site

The plant site will be in an Industrial Park approximately eight miles from the center of Panama City on U.S. Highway 231. Gulf Power has a 115 kV line adjacent to the site.

Architectural and Civil

The plant will be designed to present an aesthetically attractive grouping of buildings and equipment. MSW is to be weighed on automatic scales and tipped on a reinforced concrete the building, away from all walls, will accommodate over 1000 tons of MSW and still leave room for truck traffic. An additional reclaiming with a knuckle boom loader will be provided in the center of the building. The building will be designed for access by 18 wheel semi-trailers now in service from the two transfer stations in Panama City. Provision for individuals in small vehicles is to be provided. Elevation is to be compatible with conveyor runs to the power train and power train elevation. Center line of the conveyors to the combustor hoppers is 35 feet. A building extension over the conveyors is to be provided, along with walkways by each conveyor. A gravity roof ventilator is to be provided. In addition, combustion air is to be ducted from the building extension to the forced draft fans.

No additional equipment is proposed for acceptance of wood chips. They will be stored as is MSW and mixed by the operator in the storage building.

All equipment foundations will be on piling. Designers will provide soil borings as required.

An office building will be designed for four day personnel, a conference room, and a change room for plant operating and maintenance personnel. Visual access from the office building to the scale is required. Parking is required. Roads will be provided. Property is to be fenced with chain link galvanized fencing.

A building to enclose the power train is to match the refuse storage building.

Sewer and water to the site are to be provided by others.

Chute-to-Stack

The power train from the hopper on the combustor to the stack will be designed by Westinghouse. It is intended to have a left hand and a right hand boiler with soot blowers offset and in the center between the units. The stack will be four feet in diameter, self supporting, with a ladder to an E.P.A. test platform. Copper bearing steel is to be used to minimize corrosion. Stack height is to be a nominal 125 feet. No taper or high velocity nozzles are to be on the stacks.

Mechanical

Equipment design for plant is to include:

- Turbine Generators
- Condensers - with Appurtenances
- Cooling Tower
- Circulating Water Pumps
- Boiler Feed Pumps
- Deaerating Heater and Storage Tank
- Condenser Water Pumps
- Switchgear
- Ash Hopper - Boiler
- Ash Hopper - Siftings
- Ash Conveyors
- Instrument and Control System
- Air Compressor(s)
- Boiler Blowdown Flash Tank

Support Facilities for air emission equipment. It is intended to use an electrostatic precipitator for control of particulate emissions.

Boiler water treatment facilities are to be designed for 100% makeup.

All support facilities for the power plant are to be provided. Items such as P.A. systems, CCTV, sump pumps and any item not listed but required in the proper operation of the plant is to be a part of this scope.

Pretreatment of quench water prior to discharge to sewer is required.

Air compressors should be designed for air puff sootblowers. This is an interface item with Westinghouse.

<u>Electrical</u>

Maximum energy efficiency in the plant is to be provided. Energy efficient electric motors are to be designed into the plant. Lighting is to be high pressure sodium vapor.

The four fan drive motors are to be AFAC (adjustable frequency/alternating current).

Interface with Gulf Power and Southern Services will be required. Possible subcontract to Southern Services for generator terminals to switchyard is pending.

Maximum usage of cable trays for all electrical and instrument lines is required. Minimum conduit.

Southern Services will design 115/12 kV substation on a one acre site between the plant and their 115 kV line. Their substation will be sized for future growth in the Industrial Park.

Particulate Emissions
(Controlled)

Bay County, Florida
Resource Recovery Plant

Particulate Emission Factors
Kure City, Japan
Electrostatic Precipitator

.5#/Ton MSW Input

$$\frac{.5 \times 350}{2 \times 24} = 3.64 \text{ \#/Hr/Stack}$$

$$3.64 \times 24 \times 365 \times .94 = 29{,}973 \text{ \#/Yr/Stack}$$

$$\frac{29{,}973}{2000} = 14.986 \text{ Tons/Yr/Stack}$$

Ref.: Table 5-11

Cooper & Clark Report
Kure City, Japan
1981

TABLE 5-11
PARTICULATE EMISSION FACTORS AND ESP EFFICIENCY

Feed Rate		Unabated Emissions		Abated Emissions		ESP Efficiency	
% Design	Tm/PH	EPA BAAQMD Lbs./T	Other Calif. Lbs./T	EPA BAAQMD Lbs./T	Other Calif. Lbs./T.	EPA BAAQMD %	Other Calif. %
88	5.5	37.85	•	0.307	0.473	99.19	98.83
89	5.56	28.29	30.25	..	..	..	..
101	6.33	25.99	•	0.405	0.564	98.44	97.90
109	6.8	32.75	33.82	..	..	..	..
Average of all tests		31.22	32.04	0.356	0.518	98.82	98.35
U.S. EPA Method 5-8 Average		30.52	32.04	0.356	0.518		
Average Lbs./10^6 Btu of all tests		5.58	5.72	0.064	0.092		
U.S. EPA Method 5-8 Lbs./10^6 Btu Average		5.45	5.72	0.064	0.092		

	lb/ton	lb/hr
PM	42.5	620
NO_x	2.2	32.1
SO_2	2.8	40.8
NMHC	0.232	3.4
CO	4.5	65.6
Hg	0.00171	0.025
Pb	0.274	4.0
Be	<0.000048	<0.0007

CO Emissions

Bay County, Florida
Resource Recovery Plant

CO per million Btu input =

Emission Factor		Tons/Day		10^6 BTU	=	
.459	x	350	x	9		1446 #/Day 60.25 #/Hr. 30.125 #/Hr/Stack

#/Day		Days		Plant Availability

$$\frac{1446 \times 365 \times .94}{2000} = 248.06 \text{ tons/year}$$

Reference: Table 5-37
Cooper Engineers Report
Gallatin, Tennessee
December 1983

Assumptions: Typical MSW - 4500 Btu/#
Plant Availability - 94%

TABLE 5-37

CO EMISSIONS FACTORS USING EPA F-FACTOR
CALCULATED FROM CEM DATA TAKEN DURING SAMPLING

$$E = Cd\ Fd \left(\frac{20.9}{20.9 - \%O_2} \right)$$

E = Pollutant Emission Rate, lb/10^6 Btu

Cd = Pollutant Concentration (dry) lb/scf
= ppm CO x 0.7276×10^{-7}

% O_2 = 7% O_2 dry

Date	CO Conc. at 7% O_2	Cd x 10^{-7} (lb/scf)	Fd (scf/10^6 Btu)	E (lb/10^6 Btu)
2/7/83 1050 to 1437	254	184.81	8,875	0.247
2/8/83 0855 to 1150	928	675.21	9,019	0.916
2/8/83 1320 to 1500	150	109.14	9,973	0.164
2/8/83 1647 to 1825	222	161.53	9,168	0.223
2/9/83 0940 to 1215	482	350.70	7,803	0.411
2/11/83 1552 to 1735	650	472.94	11,395	0.810
AVERAGE	448	325.96	9,372	0.459

Lead Emissions

Bay County, Florida
Resource Recovery Plant

Lead as Wt. % of Particulate

Kure City, Japan	0.754%
Gallatin, Tenn.	0.626%

Particulate

$$\frac{3.64 \text{ \#/Hr/Stack} \times .626}{100} = 0.227 \text{ \#/Hr/Stack}$$

$$\frac{14.986 \text{ Tns/Yr} \times .626}{100} = 0.938 \text{ Tons/Yr/Stack}$$

$$.0938 \times 2000 = 187 \text{ \#/Yr/Stack}$$

Particulate - Unabated

Bay County, Florida
Resource Recovery Plant

Particulate - Potential Emission Uncontrolled

Particulate Emission Factors
Kure City, Japan
ESP

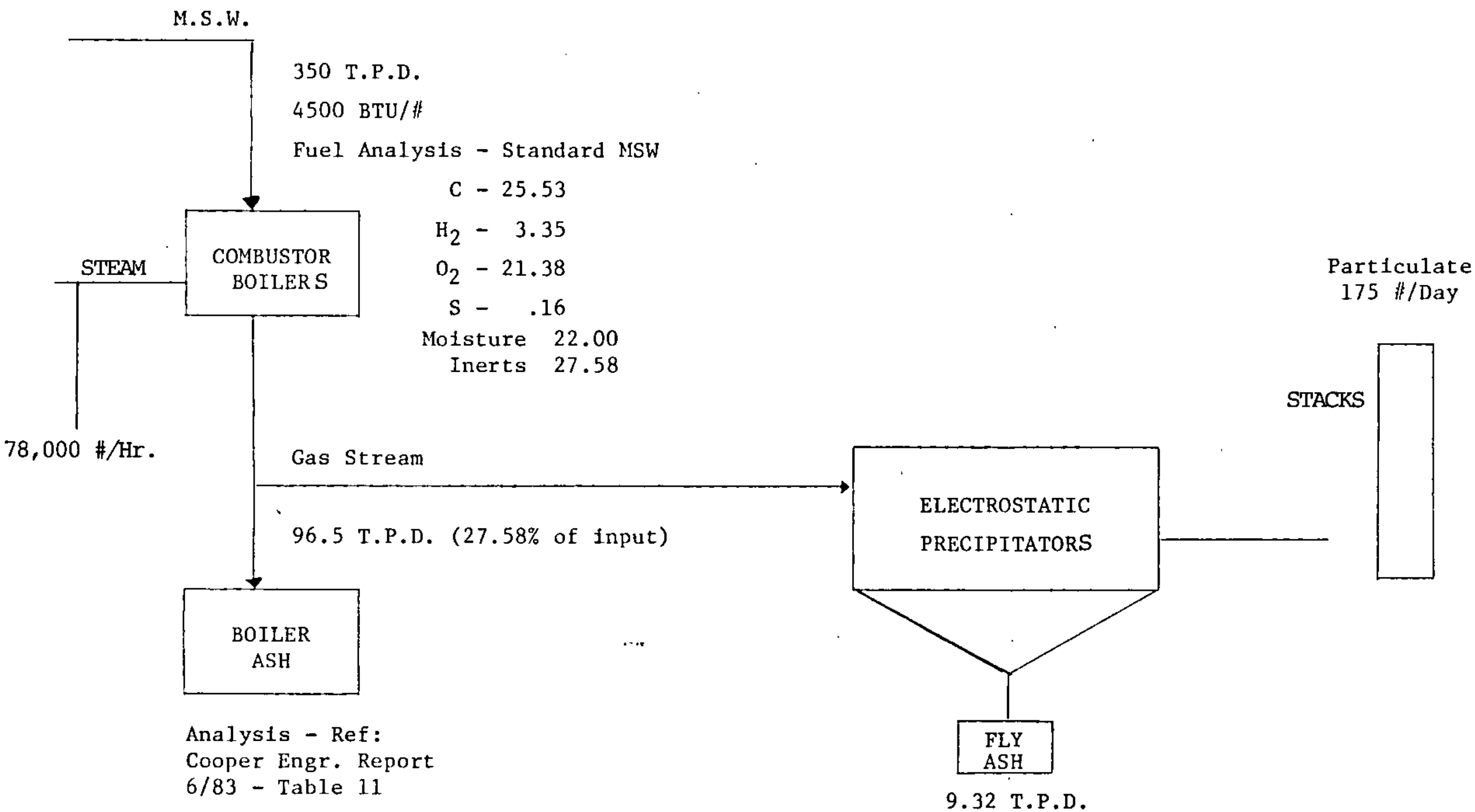
35#/Ton MSW input

$$\frac{35 \times 350}{2 \times 24} = 255 \quad \#/\text{Hr/Stack}$$

$$255 \times 24 \times 365 \times .94 = 2{,}099{,}772 \quad \#/\text{yr/stack}$$

$$\frac{2{,}099{,}772}{2000} = 1049.9 \quad \text{tons/yr/stack}$$

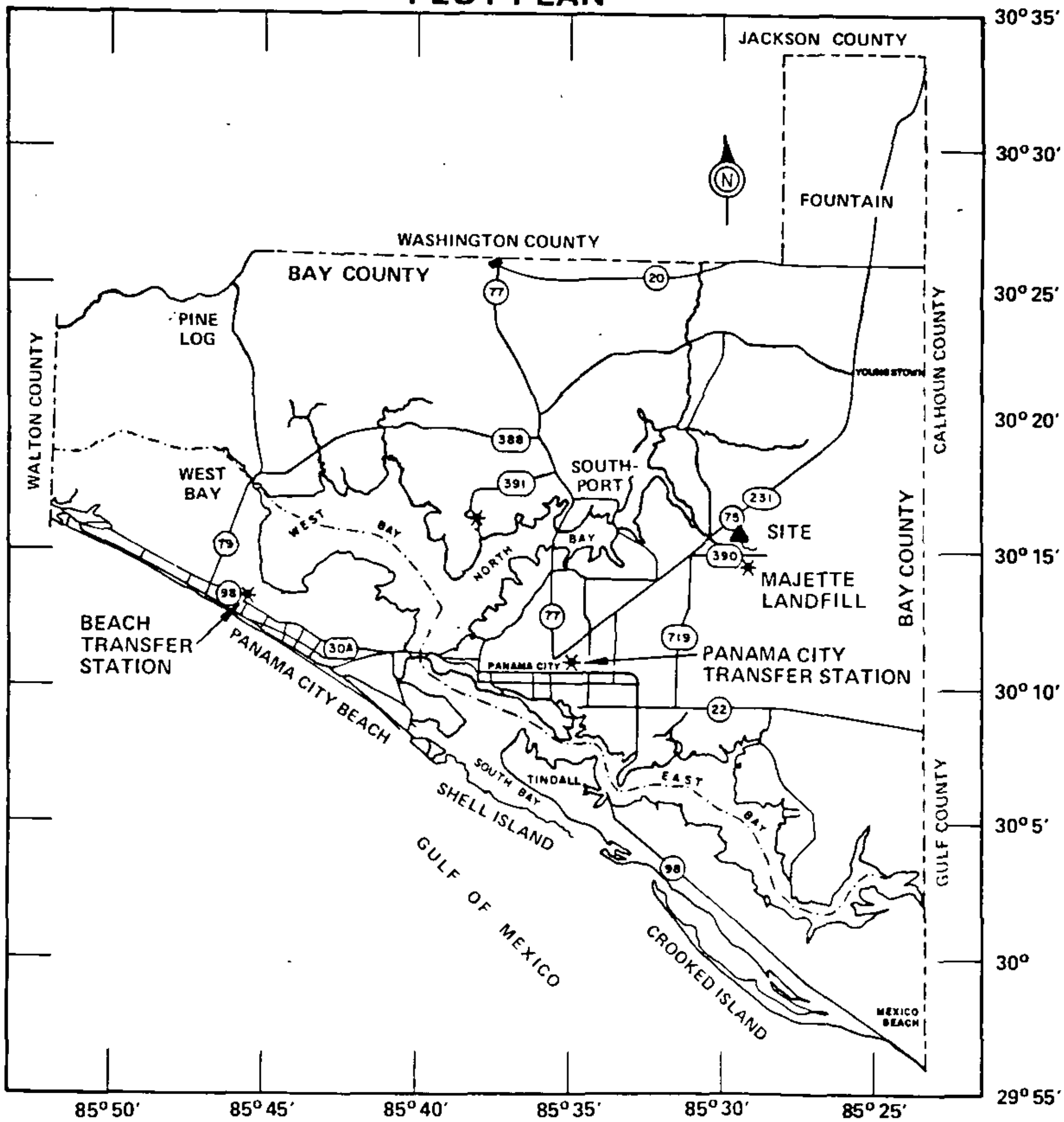
FLOW DIAGRAM



Westinghouse

Bay County Waste to Energy Project

PLOT PLAN



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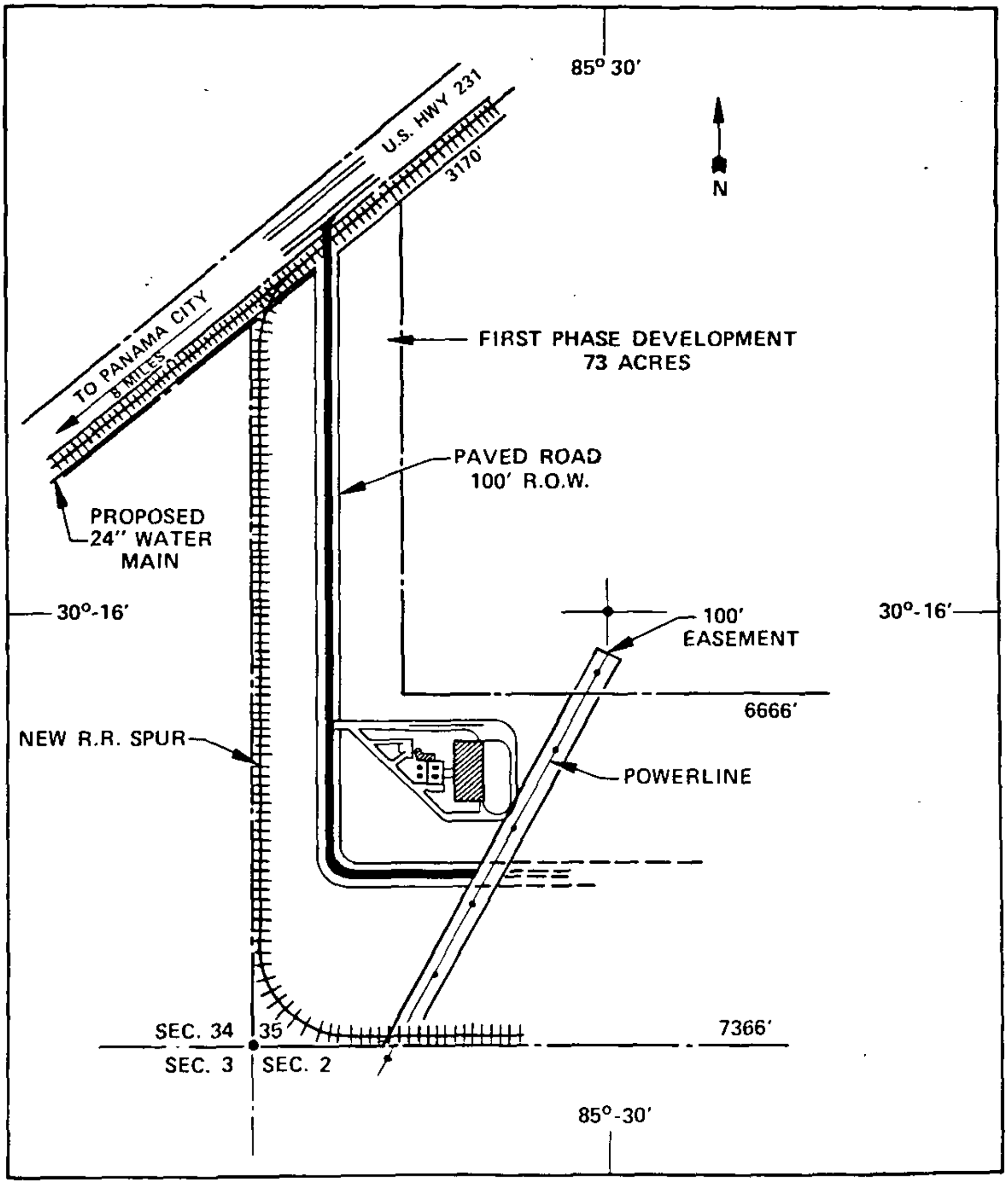
Westinghouse

Bay County Waste to Energy Project

SITE PLAN



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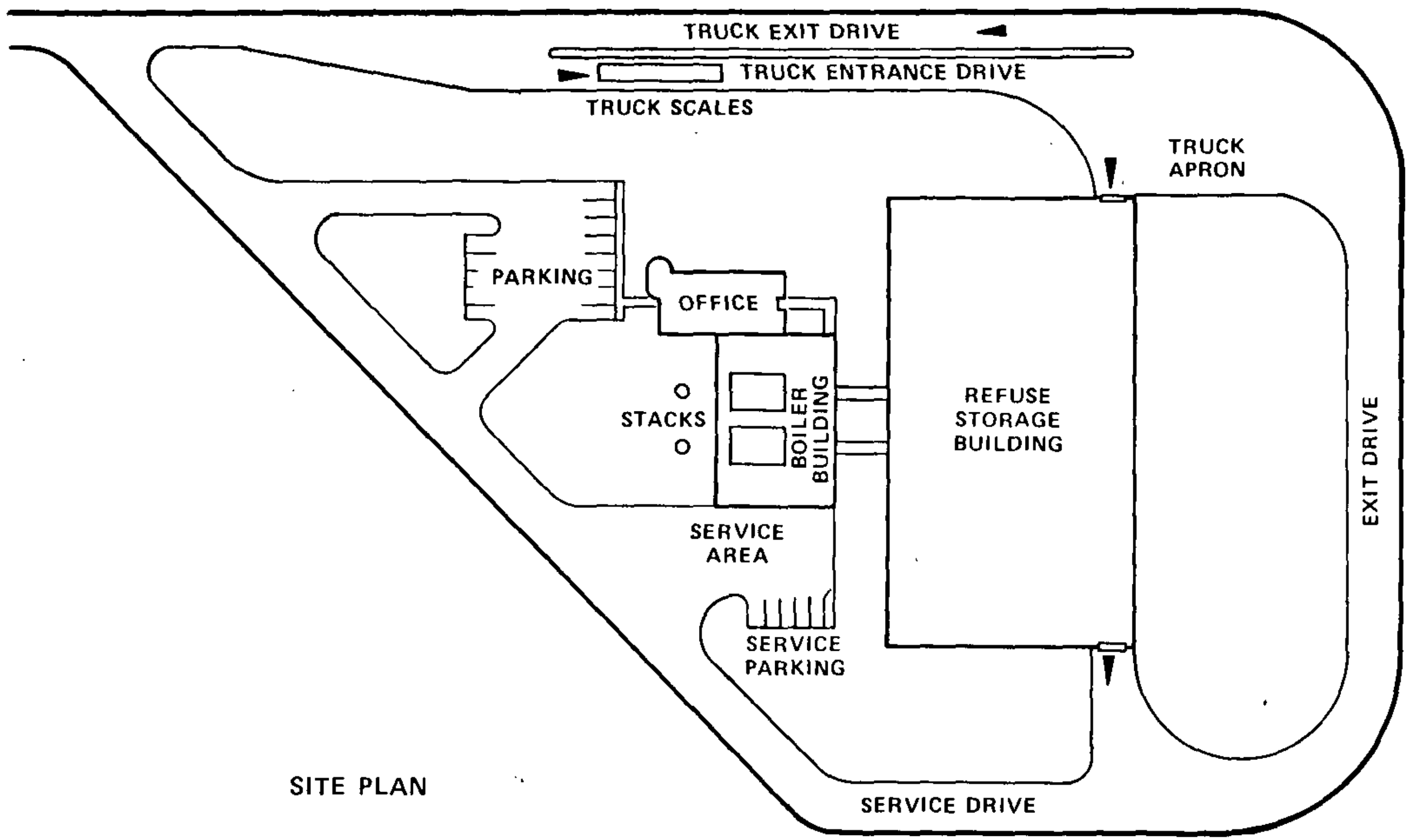
Westinghouse

Bay County Waste to Energy Project

MUNICIPAL SOLID WASTE FACILITIES



SITE PLAN

766245-3A

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Global Power Company

POWER PLANT CONSTRUCTION • MAINTENANCE • ENGINEERING • CONVENTIONAL BOILER LAGGING • PRE-FABRICATED PANEL INSULATION SYSTEMS
Trace Creek Road Route 4 Box 632 Waverly, Tennessee 37185

MILTON E. KIRKPATRICK, P.E.
Executive Engineer

Waste To Energy
OFFICE (615) 296-7641

January 13, 1984

MEMO TO: Jim Bohlig

COPY TO: Ray Harry - Gulf Power
\George Layman - Gulf Power
George Levin
Paul Miskimin
John Phillips

FROM: Milton Kirkpatrick

SUBJECT: Bay County Florida Environmental

The county is now weighing garbage at the Majette Landfill, and has accumulated data since April, 1983. Maximum tonnage has been 350 tons per day, minimum 250, with 100,000 tons per year indicated at this time.

Data from the Cooper Engineers air emissions test at Gallatin provide some emission factors in #/ton of various components.

If we design for .02 grains outlet, Gallatin being about .03, the particulate factor would be 0.5 #/ton. Annualized this is 50,000 pounds. → Kure City .356 - .575

The following factors for CO, NOX, and SO_2 are from the same report:

		K.C.
CO 4.5 #/ton	450,000 #/yr	5.08
NOX 2.2 #/ton	220,000 #/yr	1.99
SO_2 2.8 #/ton (Gallatin)	280,000 #/yr	✓
1.38 #/ton (Kure City) CHECK ✓	138,000 #/yr	

TABLE 5-23

K.C. [illegible]

The SO_2 emissions at Gallatin are high for a municipal solid waste burning plant. The analyses of MSW indicate an average of 1.21% sulfur in the ultimate analysis. This is high by a factor of four to six over other analyses of MSW. For example, the report on Kure City, Japan shows 0.20% sulfur, and analyses of 10 cities, attached to this memo, show sulfur in the rangeof 0.10 to 0.35 percent.

Non-methane hydrocarbons averaged .232 #/ton, postulated to 23,200 #/yr.

This summarizes data from two complete reports, both of which are available.

MEK

attachment

California ... Nov 15, 1983

Copy in O'Connor Offices Nashville

Table 7

Concentrations of Nitrogen, Sulfur, and Chlorine in Refuse

Location of Wasteshed	Components, Percent (by dry weight) Nitrogen	Sulfur	Chlorine
California Cities			
Richmond *(372)*	0.83	0.16	0.46
San Francisco *(30)*	NR	0.21	0.73
Berkeley *(29)*	0.74	0.21	0.74
San Diego *(31)*	0.69	0.21	0.79
Other Locations			
Ames, Iowa *(385)*	0.73	0.35	0.43
Braintree, Mass. *(374)*	0.34	0.35	NR
Tampa, Fla. *(384)*	NR	0.3	0.3
Tulsa, Okla. *(384)*	NR	0.1	0.3
Harrisburg, PA *(384)*	NR	0.2	0.7
Johnstown, PA *(384)*	NR	0.1	0.4

NR = not reported

To Bob King
D.E.R. Tallahassee
2/28/84

Bob:

As promised in our Discussions on 2/22/84, enclosed is some literature on the O'Connor Combustion technology. The O'Connor Combustor Corp. is now wholly owned by Westinghouse. The Bay County Fla. project will be the first Westinghouse "waste-to-energy" project and will utilize the O'Connor equipment. We will keep you informed as the project progresses.

John D Phillips
PROJECT ENGINEER
BAY COUNTY

Milton Elder Kirkpatrick Jr.
3713 West End Avenue · Nashville, Tennessee 37205

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 JUDGEMENT, 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.

Milton E. Kirkpatrick

MILTON E. KIRKPATRICK
WESTINGHOUSE ELECTRIC COMPANY
P.O. BOX 10864
PITTSBURGH PA 15236
412 892 5600

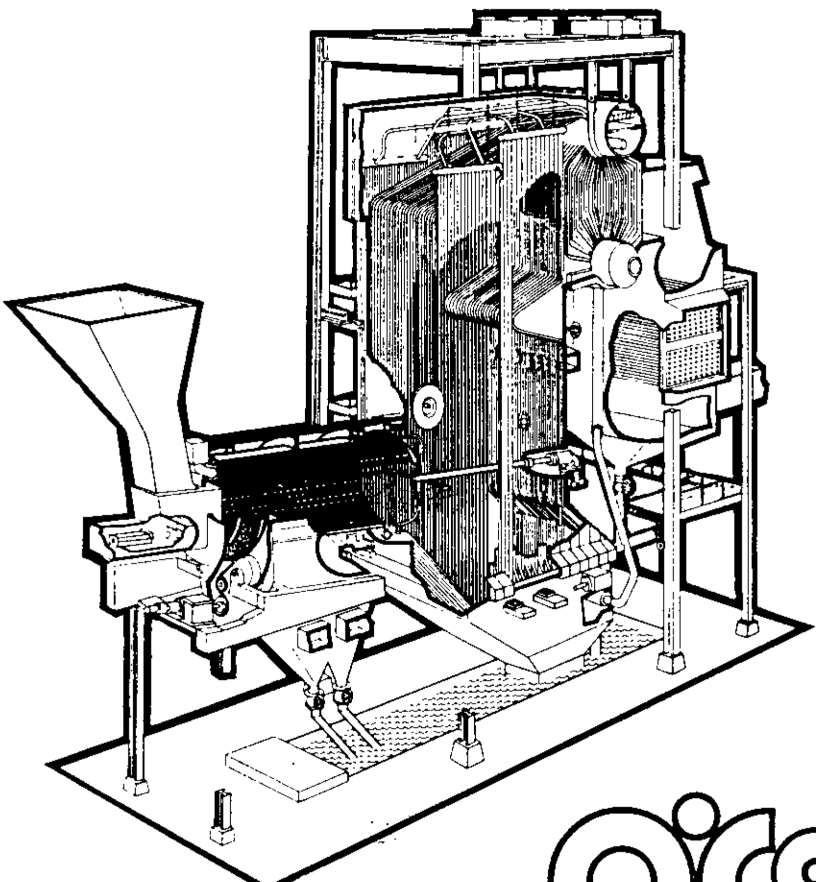
TENN #10268
LOUISIANA #1431
ALABAMA #1901
MARYLAND #13040

MEK

Efficient Conversion of Waste to Energy

O'Connor Water-Cooled Rotary Combustor

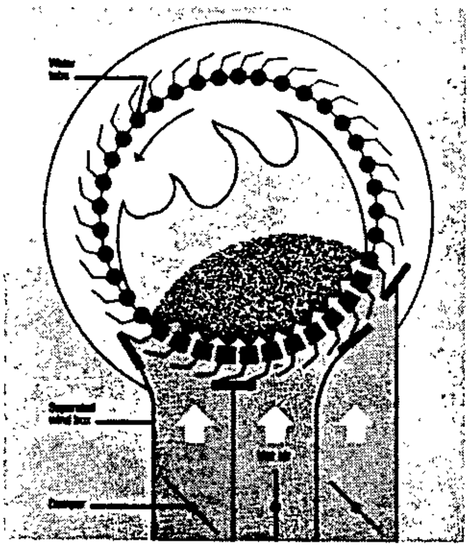
THE PROVEN SYSTEM



O'Connor COMBUSTOR CORP.

The O'Connor Water-Cooled Combustor

In a world where solid waste is both plentiful and hard to eliminate, and where energy is increasingly scarce and expensive, the integrated O'Connor™ Water-Cooled Rotary Combustor* and boiler system provides a practical solution for waste disposal and the generation of valuable energy.



Sectional view displays combustion air flow.

FEATURES OF THE SYSTEM

□ **A simple, rotating cylinder** stirs and mixes the burning material. This continuous overturning and stirring completes combustion and eliminates clinker formation.

□ **Heated forced air** promotes drying and burning of solid waste.

□ **Water cooling** the combustor is provided by pumping boiler water through the combustor tubes. Refractories are not required.

□ **High thermal efficiency** between 70 and 80 percent provides maximum energy recovery in the form of high pressure steam.

□ **Simplified moving parts** assure ease of operation, maintenance and servicing, as well as minimal down time.

*U S Patent No. 3822651

THE COMBUSTOR / BOILER:

The O'Connor combustor is a hollow, water-cooled, steel cylinder made of alternating water tubes and fins welded between the tubes. The cylindrical combustor rotates on a slightly tilted axis at approximately 1/6 RPM. Fins are perforated to admit preheated combustion air. While solid waste burns, the combustor/boiler system recovers energy in the form of steam.

COMBUSTION:

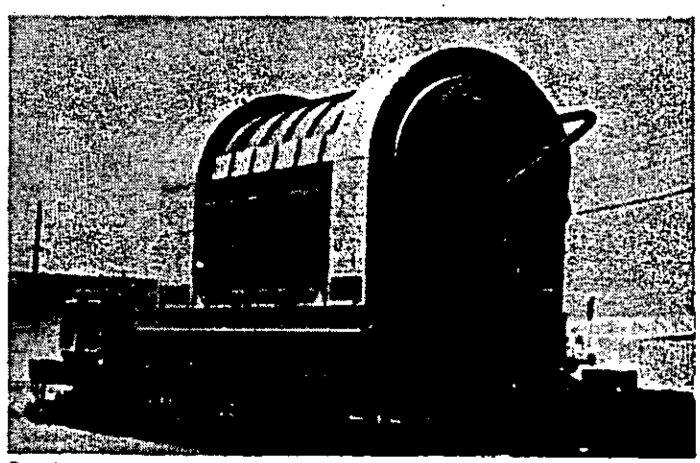
Under forced draft, all air for combustion is preheated and fed through holes in the fins at sufficient velocity to penetrate the burning material. Solid waste is fed into the inlet at the upper end by a hydraulically-actuated feed system.

Dry material burns first, furnishing heat necessary to complete combustion. Wastes containing moisture are dried as they tumble down the inclined cylinder.

Ninety-five percent of combustible material is incinerated in the combustor. Remaining combustibles are consumed on a special water-cooled grate in the boiler where the ash collects. Air passing through holes in the grate penetrates the ash to complete combustion. Ash and inorganic materials, such as metals and glass, are intermittently steam-blown into the ash discharge section. Hot gasses enter the boiler.

STEAM GENERATION:

The closed-circuit, forced circulation system within the combustor generates approximately 30 percent of the steam. The remaining steam generation takes place in the boiler. Water from the boiler drum is pumped to the combustor's pressurized water circuit. The steam generated, mixed with the circulated water, returns to the steam drum. This circulation maintains combustor / boiler metal temperature at about 450 degrees Fahrenheit, depending on the pressure.



Combustor barrel assembly leaving factory for Sumner County, Tenn.

Advantages of The System

WEAR, EROSION AND CORROSION MINIMIZED:

The combustor's pressurized inlet water and saturated steam output remain at a constant temperature, minimizing thermal stress and reducing wear and erosion common to conventional incineration equipment. Forced draft, pre-heated combustion air distributed uniformly along the full length of the burning area provides maximum protection of the combustor walls.

LESS AIR REQUIRED:

Complete combustion is achieved using approximately one-third less air than conventional systems. Lower air requirements increase thermal efficiency, decrease power needed for operation, and permit use of smaller boilers, precipitators, fans and stacks.

EFFICIENT COMBUSTION & CONTROL ASSURED:

Since the combustor is water-cooled (not dependent on air for cooling grates) air flow can be controlled to optimize combustion at various waste feed rates.

ODORS ELIMINATED:

Waste odors are incinerated by channeling raw combustion air from covered trash pits and tipping floors.

DOWN-TIME & MAINTENANCE REDUCED:

The combustor offers lower maintenance costs by eliminating moving grates and refractories required by other incinerator systems.

WASTE PRE-TREATMENT ELIMINATED:

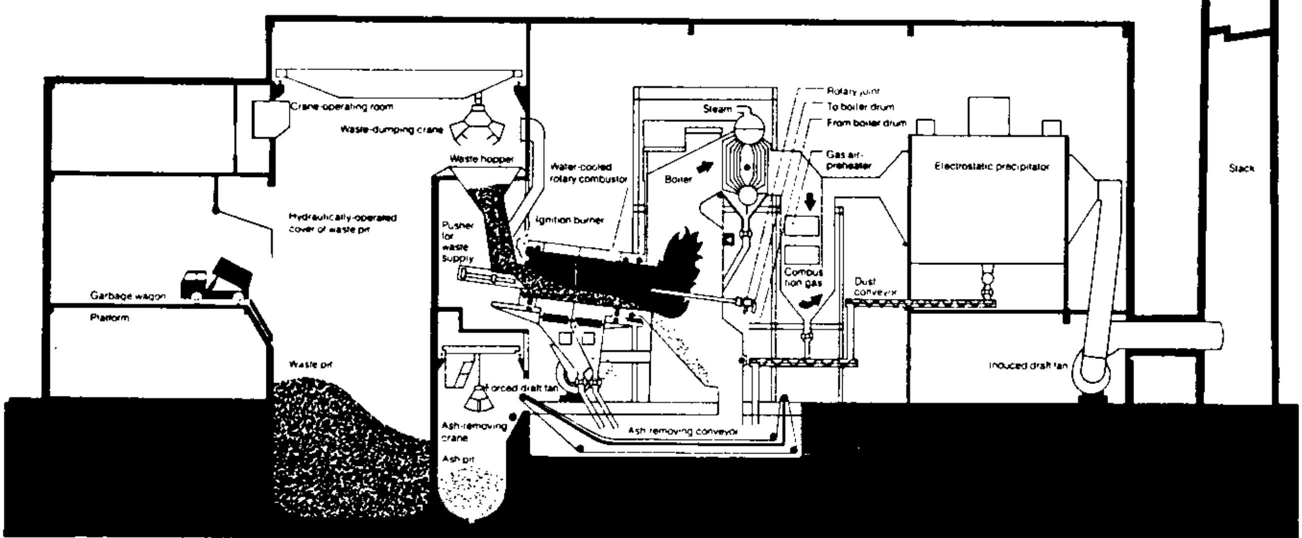
The combustor makes waste separation or predrying of refuse (with moisture content of up to 50%) unnecessary.

NO_x EMISSIONS REDUCED:

The combustor's lower incineration temperatures generate considerably less NO_x (oxides of nitrogen) than conventional incinerators.

GAS TEMPERATURE CONTROLS ELIMINATED:

Unlike conventional refractory incinerators, gas temperature controls are not required. Steel tubes in the combustor wall are water-cooled, protecting the entire wall from corrosion even in the presence of P.V.C.



Cutaway of typical O'Connor Combustor plant.

Waste to Energy Applications

The O'Connor Combustor is available in sizes ranging from 50 tons per day to 300 tons per day. Multiple units may be installed for all applications.

MUNICIPAL AND COMMERCIAL:

Municipal refuse and commercial solid waste are growing problems, with common methods of disposal being landfill, ocean dumping or incineration. Landfill near populated areas is becoming increasingly expensive. New laws, in many cases, now prohibit ocean dumping. Ordinary incineration reduces waste volume but reclaims little if any, energy and often cannot meet air pollution control standards.

The United States throws away 90 percent of waste that could be used to produce energy. This is no longer necessary, as solid waste incinerated in the O'Connor Combustor recovers energy, reducing the need to burn other forms of diminishing fuels.

INDUSTRIAL:

The final residues of petroleum refining — sludge, residual oil, or refinery bottoms — are hard to dispose and ecologically dangerous. By burning this material in the combustor, energy content of the petroleum residue can be readily reclaimed.

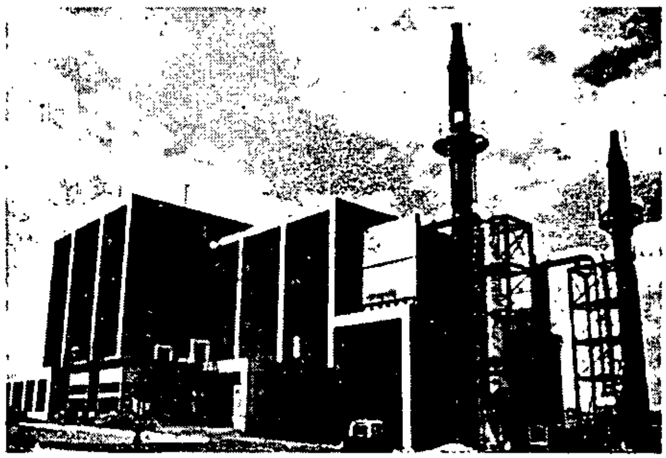
Many liquid or semi-solid process wastes as well as sewage sludge, can also be burned in the combustor.

FOOD PROCESSING AND AGRICULTURAL WASTES:

Many food / agricultural wastes can be burned in their primary residual form; others can be mixed with drier wastes to promote burning and energy recovery. Examples include nut shells, chicken processing refuse, feed lot garbage and manure, and bagasse (the waste left from sugar refining). Steam produced by the combustor can be used onsite in food processing plants, with electric power produced as an end product.

USE OF GENERATED STEAM:

The combustor's steam can be piped to users within any reasonable distance. Typically, high-pressure steam produced in the O'Connor system is utilized for process applications, to power turbine-driven electrical generators or to heat buildings, to power chillers for central cooling plants, or to heat water for distribution.



Rear view of 200 TPD plant at Gallatin, Sumner County, Tennessee

HISTORY OF THE O'CONNOR COMBUSTOR:

Chadwell O'Connor, president of O'Connor Combustor Corporation and founder of the parent company O'Connor Engineering Laboratories is the inventor of the patented O'Connor combustor. He has spent over 30 years specializing in design, engineering, and construction supervision of power-generating stations, large central heating and refinery equipment, refrigeration plants, water and waste treatment, and chemical plants.

During his two decades with the Pasadena Light & Power Department, a city-owned utility in California, Mr. O'Connor was responsible for design and construction of Broadway No. 3, a 75,000 KW, 2,000 PSI unit with 1,000 degrees fahrenheit steam and 1,000 degrees fahrenheit reheat capacity. That station was judged the most efficient steam-electric plant of its size in the United States.

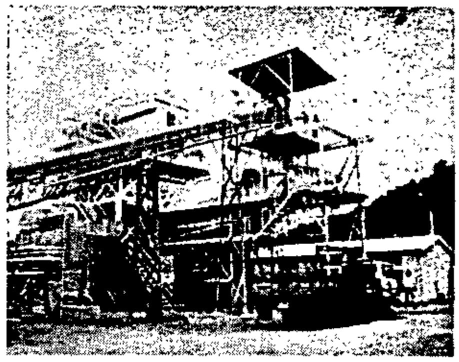
He was also in charge of converting Pasadena's incinerator plant to steam energy recovery. This involved piping steam to generating stations to supplement their own steam production.

It was in this plant that Mr. O'Connor conceptualized many of the innovations which eventually led to his development of the O'Connor Water-Cooled Rotary Combustor and its associated systems.

World Wide Operating O'Connor Combustor Plants

The first O'Connor Rotary Combustor was built in 1975 by Ishikawajima Harima Heavy Industries (IHI) under license from O'Connor Combustor Corporation. This 30 ton per day pilot plant unit was utilized for extensive systems evaluation and for testing the combustion of various types of municipal, industrial and agricultural solid waste products.

Following completion of this successful two-year "shake-down" and test evaluation program, the O'Connor Combustor technology was released for commercial availability in 1977. Since that time, a total of eight O'Connor Combustors have been built and are operating in five different plants in the U.S.A. and abroad.

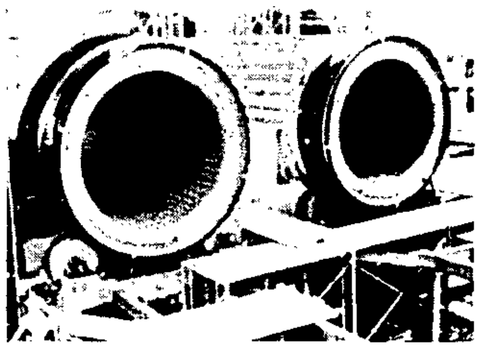


1 UNIT
SO2 SCRUBBER

Industrial Waste to Energy - The Kanbara Tank Cleaning Service Company, Ltd. of Fukuyama, Japan has logged over 40,000 hours of operation on this 55 TPD, high BTU oil sludge to steam energy plant, since its start-up in 1977.

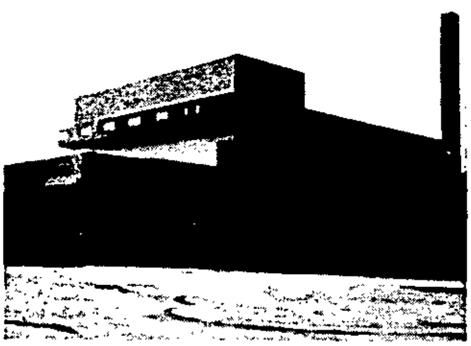
1 UNIT
INTO EXISTING E.S.P.

In the spring of 1978, IHI resized the pilot plant in Yokohama to 55 tons per day (TPD) to meet the growing needs of their Yokohama facility for the disposal of their industrial wastes and to support their ongoing evaluation and fuel testing programs.



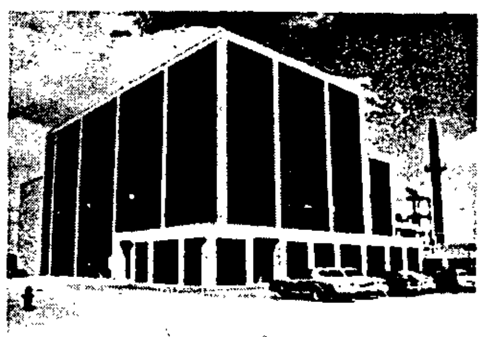
2 - ESP's

Agricultural Waste to Energy - These two combustors, shown under construction, were placed in service in July 1977 in a 135 TPD plant owned by the Siam Kraft Paper Company, Ltd. in Ban Pong, Thailand. The plant consumes bagasse (sugar cane residue), pith, rice hulls and paper waste to produce steam for the paper making process.



2 ESP's
FOLLOWED BY
SCRUBBERS

Municipal Waste to Energy - This 330 TPD municipal solid waste to energy facility is owned and operated by Kure City, Hiroshima Prefecture, Japan. The ultra-modern plant was placed in service in May 1980 and has achieved over 90% operational availability during its first year of commercial service.



2 ESP's
4/84
5/84

Municipal Waste to Energy - This 200 TPD municipal solid waste to energy plant is owned and operated by the Resource Authority in Sumner County, Tennessee. This facility, which began operation in January 1982, delivers 50,000 pounds of steam per hour to three local industries and generates electricity for the Tennessee Valley Authority.

TYPICAL ROTARY COMBUSTOR/BOILER ESTIMATED PERFORMANCE

BASIS FOR PERFORMANCE

STEAM OUTLET PRESSURE	600 PSIG
STEAM OUTLET TEMPERATURE	600°F
FEEDWATER TEMPERATURE	250°F
AMBIENT AIR TEMPERATURE	70°F
A.H. EXIT GAS TEMPERATURE	400°F
EXCESS AIR	50%
RC-BLR EFFICIENCY	70%
ADIABATIC COMBUSTION TEMPERATURE	2940°F
FLUE GAS ENTERING BLR TEMPERATURE	2200°F
AIR SIDE Δp "W_c (O.C.C. EQUIP.)	8.5 "W_c
GAS SIDE Δp "W_c O.C.C. EQUIP.	5.0 "W_c

FUEL TYPE: MUNICIPAL SOLID WASTE

FUEL ANALYSIS - O.C.C. "STD." MSW LBS/100 LBS FUEL AS FIRED

C	25.53
H_2	3.35
O_2	21.38
S	.16
MOISTURE	22.00
INERTS	27.58
	100 LBS.

BTU / LB HHV 4500

MODEL NUMBER	RC 60	RC 70	RC 80	RC 90	RC100	RC 110	RC 120	RC 130
CAPACITY 10^6 BTU/HR INPUT	22	32	42	52	65	80	95	110
CAPACITY FEED RATE, TPD	60	87	115	140	175	215	255	300
OUTLET STEAM FLOW, LBS/HR	14400	20900	27400	34000	42500	52300	62000	71900
COMBUSTION FLOW, SCFM	5160	7505	9850	12195	15245	18765	22280	25800
FLUE GAS FLOW ACFM, (400°F)	9900	14400	18895	23397	29246	35995	42744	49493
ASH, LBS/HR	1350	1960	2575	3190	3985	4900	5820	6750
FLUID FLOW THRU R.C., GPM	250	365	480	595	745	915	1085	1255

- ☐ ALL PERFORMANCE DATA IS BASED ON THE CAPACITY IN 10^6 BTU/HR INPUT.
- ☐ NO ALLOWANCE MADE IN AIR OR GAS FLOWS FOR LEAKAGE OR INFILTRATION.
- ☐ DO NOT USE THIS DATA AS FINAL FOR A SPECIFIC APPLICATION - REFER TO APPLICABLE CONTRACT DOCUMENTS FOR GUARANTEED AND EXPECTED PERFORMANCE.

O'Connor Combustor Corporation

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