125,000 population Bay Co
2.6 million o/n fee to Wash
tipping fee ~$30/ton
to bring ash

HISTORY OF PERMIT SUBMISSION

- **MARCH 1984**
  ORIGINAL APPLICATION SUBMITTED

provisional

- **APRIL 1984**
  LETTER FROM DER TO BAY COUNTY
  ASKING QUESTIONS

- **MAY 1984**
  RESPONSE TO QUESTIONS AND APPLICATION
  RESUBMITTED

- **SEPTEMBER 1984**
  CONSTRUCTION PERMIT ISSUED

CEM AV
24 hr/d 123

149 highest daily average 250-40 PPM for 1 hr.

max SO_2 : 200
170

80 PPM

100-150 ppm for SO_2

HCl 800 highest $\bar{x}$ = 467 ppm
150 lowest

plant cost $38,000,000
been operating for 1 year

6 mos downtown
Newstrok $800,000
more precip $500,000

WE ash 5000 Btu/lb

PC waste 4450 Btu/lb

20 tons/day SO_2
From paper plant 15 miles away
in rural area.

PERMIT SUBMISSION PROGRAM

- Submit PSD Permit for Actual Waste Committed 350 TPD MSW and 178 TPD Wood Waste

- Plant Designed to Burn 510 TPD MSW

- Facility Designed to Handle Bay County Waste in the year 2000

- Resubmit Permit Application after Startup to obtain 510 TPD Permit.

PERMIT APPLICATION TO BURN 510 TPD MSW

- 1984 Construction Permit -
  350 TPD Maximum

- June 1987 - Verify Emission Estimates
  and Prepare Application to Obtain
  520 TPD Permit

- Fall 1987 - Discussions with DER

- January 1988 - Permit Submittal

EMISSION ESTIMATES USED IN PERMIT APPLICATIONS

- Original Emission Estimates Based on Limited Data
  - Gallatin, TN Facility
  - Kure City, Japan
- Bay County Emission Estimates to be Verified at Start-up
- Plug Actual Measurements into DER Construction Permit Application -- Permit to Burn at Design Rated Capacity of 510 TPD

ATTACHMENT D

BAY COUNTY RESOURCE MANAGEMENT CENTER REVISED EMISSION ESTIMATES

EMISSION ESTIMATES

Emission factors and estimated annual emission rates for various pollutants were prepared and submitted to the Florida DER in the facility's permit application in 1984. Table 1 contains the emission estimates for particulate matter, CO, NO_X, SO_2, HC and lead. These estimates were based on worst case air pollution conditions for each pollutant; i.e. for SO_2 350 TPD MSW and 135 TPD woodchips; for NO_X, CO, and HC, 250 TPD MSW and 220 TPD wood chips.

TABLE 1

PERMITTED EMISSION RATES

BURNING MSW AND WOOD WASTE

Pollutant	Annual Emissions (tons/year per train)	Total Annual Emissions (tons/year - 2 trains)
Particulate Matter	25	50
CO	505	1010
NO_X	107	214
SO_2	96	192
Pb	0.15	0.3
HC	39	78
Hg(1)	0.64	1.28

(1) - This was permitted for burning sewage sludge.
Note: No sewage sludge will be incinerated.

Emission factors for burning 510 TPD of MSW with a heating value of 4500 Btu/lb are given in Table 2. These emission factors are based, in part, on the recent test results at Bay County, as well as previous emission test data and/or emission factors proposed at other waste-to-energy facilities.

TABLE 3

ESTIMATED ANNUAL EMISSIONS USING 1987 DEVELOPED EMISSION FACTORS

Pollutant	Emission Factor (Wood Chips)	Emission Factor (MSW)	Annual Emissions (tons/year) Based on 350 TPD MSW 135 TPD Wood	Annual Emissions (tons/year) Based on 510 TPD MSW	Difference (tons/year)
Particulate Matter	0.03 gr/dscf	0.03 gr/dscf	50[1]	59[2]	9
CO	20 lb/ton	3.58 lb/ton	722	333	-389
NO_x	2.8 lb/ton	2.41 lb/ton	223	224	1
SO_2	0.3 lb/ton	3.36 lb/ton	223	313	90
HC	1.7 lb/ton	0.196 lb/ton	54	18	-36
Pb	0	0.0039 lb/ton	0.25	0.36	0.11
Hg	0	0.0017 lb/ton	0.11	0.16	0.05
Be	0	4.8×10^{-7} lb/ton	3.1×10^{-5}	4.5×10^{-5}	1.36×10^{-5}

1 - Based on a gas flow rate of 22,280 dscf/min per train (from the 1984 permit application).

2 - Based on a gas flow rate of 26,300 dscf/min per train (Bay County Test Data).

TABLE 4

HCl Emission Factors For The Bay County W-T-E Plant Burning 510 TPD of MSW
That has a Heating Value of 4500 Btu/lb (365 days per year)

Pollutant	Emission Test Results 4/87-6/87 per train corrected to 12% CO_2	Typical Emission Factors Concentration Corrected to 12% CO_2	lb/10^6Btu (500 ppm)	lb/ton (500 ppm)
HCl	467 ppm	500 ppm	0.64	5.8

TABLE 5

Estimated Annual HCl Emissions Using 1987 Developed Emission Factor

Pollutant	Emission Factor (wood chips)	Emission Factor (MSW)	Annual Emissions (tons/year) Based on 350 TPD (MSW) 135 TPD Wood	Annual Emissions (tons/year) Based on 510 TPD MSW	Difference tons/year
HCl	0	5.8 lb/ton	370	540	170

ATTACHMENT E
BEST AVAILABLE CONTROL TECHNOLOGY

The basic control technology requirement for new and modified major sources is the application and evaluation of BACT. BACT is defined as "an emission limitation based on the maximum degree of reduction for any regulated contaminant emitted from or which results from any regulated facility which the Department on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through an application of control of production processes and available methods, systems, and techniques for each such contaminant."

A major stationary source must apply BACT for all regulated pollutants emitted in significant quantities, as defined by de minimis emission rates (see Table 1).

TABLE 1
ESTIMATED EMISSION RATES (WHEN INCREASING TO 510 TPD MSW FROM 350 TPD)
COMPARED TO DE MINIMIS LEVELS

Pollutant	Annual Increase TPY	De Minimis Rate TPY
Particulate Matter	9	25
Carbon Monoxide	0	100
Nitrogen Oxide	0	40.0
Sulfur Dioxide	90	40.0
Hydrocarbons (Ozone)	0	40.0
Lead	0.11	0.6
Mercury	0.05	0.1
Beryllium	1.36×10^{-5}	4.0×10^{-4}

BACT ACID GAS CONTROL
COST ESTIMATES

20-40% reduction

	SPRAY DRYER	DRY INJECTION (FLUE GAS)	DRY INJECTION (COMBUSTOR)
CAPITAL COST	$2,338,000	$1,275,000	$875,000
OPERATING AND MAINTENANCE COSTS	$283,773	$510,980	$510,980
LOST REVENUE	$501,200	$501,200	$250,600
EQUIVALENT UNIFORM ANNUAL COST	$617,379	$719,684	$643,238

10% for 20 yrs

TABLE 6
ADD-ON SPRAY DRYER CAPITAL COST ESTIMATE

Capital Cost:	$1,863,000	- Spray Dryers
	$ 475,000	- Drag Conveyors
TOTAL	$2,338,000	

Cost Breakdown Includes:

Engineering
Foundations and Supports
2 Spray Dryers
3 Rotary Atomizers (1 spare for two trains)
2 Drag Conveyors
Lime Storage Bins and Slaker
Piping
Ductwork
Insulation
Shipping to the Site
Installation
Start-up Services

TABLE 7
ANNUAL OPERATING AND MAINTENANCE COST

	Each Train	Cost	Cost per Year For Both Trains
Lime	115 lb/hr	$75/ton	$ 75,555
Power for Spray Dryer	30 kw	$0.05/kwh	$ 26,280
Power for Delta P (fan cost)	Delta P=3.5 in H_2O Gas Flow-55,000 acfm for each unit	(see below)	$ 30,438

$$\text{Fan Power} = Q \times \frac{0.7456}{6356 \times E} \times \text{Delta P} \times H$$

where: P = fan power (kwh)
Q = gas volume (acfm)
E = fan efficiency (assumed 0.65)
Delta P = pressure drop
H = annual operating rate (8760 hr/yr)

Water Cost	$ 5,440
Routine Maintenance 880 hr per spray dryer @ $20/hr	$ 35,200
SPARE PARTS Atomizer-bearings, inserts, packing, oil pump, seals washers, etc.	$ 50,140
Lime slaking system	$ 28,140
INCREASE DISPOSAL Costs 1629 tpy Residue @ $20/ton	$ 32,580
TOTAL	$283,773

Table 8 shows the revenues that would be lost during a 4-week shutdown (for each combustor/boiler train) because of the retrofit of the spray dryer and the mechanical drag conveyors.

TABLE 8
Lost Revenues Because of Plant Shutdown
During Scrubber Installation

Assume: 4 weeks shutdown per train

Lost Electrical Revenue	$ 403,200
By-Pass Waste Costs (350 TPD x 28 days x $10/ton)	$ 98,000
	$ 501,200

Table 9 illustrates that the equivalent uniform annual cost (EUAC) for retrofitting acid gas controls is $617,379.

TABLE 9
Equivalent Uniform Annual Cost (EUAC) for
Addition of Acid Gas Controls
(i=10%, N=20 yrs)

Capital Cost	$2,338,000	(Table 6)
Lost Revenue	$ 501,200	(Table 8)
Total Cost	$2,839,200	

Operation & Maintenance - $283,773 (Table 7)

EUAC = $2,839,200 (A/P, 10%, 20) + $283,773
EUAC = $ 617,379

TABLE 1

ADD-ON DRY INJECTION SYSTEM CAPITAL COST ESTIMATE

Capital Cost:	$ 800,000	-	Spray Dryers
	$ 475,000	-	Drag Conveyors
TOTAL:	$1,275,000		

Cost Breakdown Includes:

- Engineering
- Foundations and Supports
- 2 Rotary Screw Feeders
- Mixing Vanes
- 2 Drag Conveyors
- Lime Storage Silo
- Shipping to the Site
- Installation
- Start-up Services

TABLE 2

ANNUAL OPERATING AND MAINTENANCE COST

	Each Train	Cost	Cost per Year For Both Trains
Lime	500 lb/hr	$75/ton	$328,500
Power for Rotary Feeder	30 kw	$0.05/kwh	$ 26,280
Power for Delta P (fan cost)	Delta P=2.0 in H_2O (see below) Gas Flow-55,000 acfm for each unit (@ 0.05/kwh)		$ 17,400

$$\text{Fan Power} = Q \times \frac{0.7456}{6356 \times E} \times \text{Delta P} \times H$$

where: P = fan power (kwh)
Q = gas volume (acfm)
E = fan efficiency (assumed 0.65)
Delta P = pressure drop
H = annual operating rate (8760 hr/yr)

Water Cost	$ - 0 -
Routine Maintenance 220 hr per injection system @ $20/hr	$ 8,800
Spare Parts	$ 10,000
Increase Disposal Costs 6000 tpy Residue @ $20/ton	$120,000
TOTAL:	$510,980

TABLE 3

LOST REVENUES BECAUSE OF PLANT SHUTDOWN
DURING DRY INJECTION SYSTEM INSTALLATION

Assume: 4 weeks shutdown per train

Lost Electrical Revenue:	$ 403,200
By-Pass Waste Costs: (350 TPD x 28 days x $10/ton)	$ 98,000
	$ 501,200

TABLE 4

EQUIVALENT UNIFORM ANNUAL COST (EUAC) FOR
ADDITION OF A DRY INJECTION SYSTEM
(i=10%, N=20 yrs)

Capital Cost:	$1,275,000	(Table 1)
Lost Revenue:	$ 501,200	(Table 8)
Total Cost:	$1,776,200	
Operation & Maintenance:	$ 510,890	(Table 2)

EUAC = $1,776,200 (A/P, 10%, 20) + $510,980

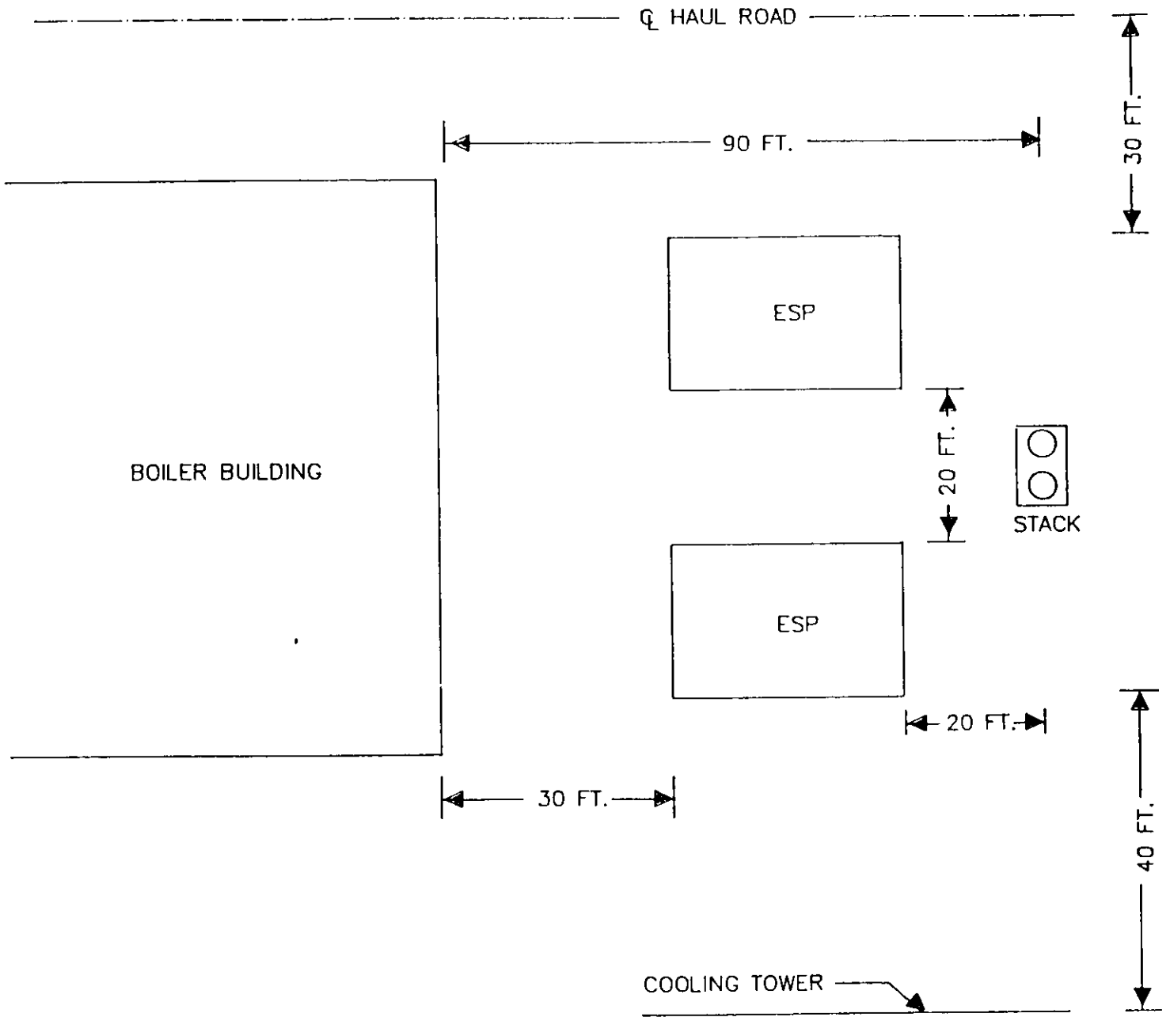
EUAC = $ 719,684

BACT COSTS PER TON OF POLLUTANT REMOVED

	Spray Dryer	Dry Injection (Flue Gas)	Dry Injection (Combustor)
SO_2 - $/TON REMOVED	$7000	$12,000 - $8000	$11,000 - $7200
(TONS REMOVED)	90 TPY	60-90 TPY	60-90 TPY
HCL - $/TON REMOVED	$3700	$4300	$3800
(TONS REMOVED)	170 TPY	170 TPY	170 TPY

2000/ton SO_2

$2400/ton


℄ HAUL ROAD
90 FT.
30 FT.
ESP
BOILER BUILDING
20 FT.
STACK
ESP
20 FT.
30 FT.
40 FT.
COOLING TOWER

SUMMARY

- Bay County Facility Designed to Burn 510 TPD
- Approximately 110 W-T-E Facilities in U.S. that do NOT have Acid Gas Scrubbers
- EPA or State Agencies have NOT required Acid Gas Scrubbers to be Retrofitted