

State of Florida  
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
From: _____	Date: _____	
Reply Optional [ ]	Reply Required [ ]	Info. Only [ ]
Date Due: _____	Date Due: _____	

TO: John C. Brown, Jr., Northeast District office  
FROM: Bill Thomas, Bureau of Air Quality Management  
DATE: March 7, 1985 *BT*  
SUBJ: Application Packages to install ESP's on No. 4  
Combination Boiler and No. 5 Power Boiler at  
Georgia-Pacific Corporation

On February 28, 1985, the bureau received the above referenced application packages. Since each of the referenced sources was not permitted via a construction permit, their requests would not be considered a modification, pursuant to FAC Rule 17-2.100(105), which is also attached. Therefore, the bureau is transmitting the application packages to the district office for processing as a revision to their existing operating permits.

A fee per source should be appropriate. The applicant is awaiting a response from the department on fees and any additional information that might be necessary for processing their requests.

If there are any questions, please call me or Bruce Mitchell at SunCom 278-1344.

BT/BM/rw

Attachments



**Georgia-Pacific Corporation**

Hudson Pulp & Paper Corp.  
A wholly-owned subsidiary

P.O. Box 919  
Palatka, Florida 32077  
Telephone (904) 325-2001

February 27, 1985

Mr. Bruce Mitchell  
State of Florida  
Department of Environmental Regulation  
Bureau of Air Quality  
Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32301

Dear Bruce:

Enclosed are 3 copies each of permit applications for adding particulate control devices to our No. 4 Combination Boiler and the No. 5 Oil Fired Power Boiler.

If there are any questions please contact me.

Sincerely,

W. R. Wilson  
Environmental Supt.

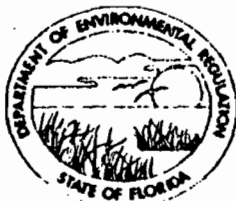
mg  
enclosures

cc W. L. Baxter  
John Brown, FDER, Jacksonville

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL REGULATION

NORTHEAST DISTRICT

3426 BILLS ROAD  
JACKSONVILLE, FLORIDA 32207



BOB GRAHAM  
GOVERNOR  
VICTORIA J. TSCHINKEL  
SECRETARY  
G. DOUG DUTTON  
DISTRICT MANAGER

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: STEAM POWER BOILER OIL-FIRED [ ] New<sup>1</sup> [X] Existing<sup>1</sup>  
APPLICATION TYPE: [ ] Construction [X] Operation [ ] Modification (TO A054-45320)  
COMPANY NAME: GEORGIA-PACIFIC CORPORATION COUNTY: PUTNAM  
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) NO. 5 POWER BOILER STACK  
SOURCE LOCATION: Street STATE ROAD 216 (NORTH SIDE) City PALATKA  
UTM: East 434.0 North 3283.4  
Latitude 29° 41' 00"N Longitude 81° 40' 45"W  
APPLICANT NAME AND TITLE: GEORGIA-PACIFIC CORPORATION  
APPLICANT ADDRESS: P.O. BOX 919, PALATKA, FLORIDA 32077

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative\* of GEORGIA-PACIFIC CORP.

I certify that the statements made in this application for a AIR EMISSION 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

<sup>1</sup> See Florida Administrative Code Rule 17-2.100(57) and (104)

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 Harold L. Culp

Harold L. Culp, PE  
Name (Please Type)

Ford, Bacon & Davis, Inc.  
Company Name (Please Type)

P.O. Box 1894, Monroe, LA 71210  
Mailing Address (Please Type)

Florida Registration No. 29275 Date: March 21, 1980 Telephone No. (318) 323-9000

**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 Attached Supplementary Report)

B. Schedule of project covered in this application (~~Construction Permit Application Only~~)  
~~Start of Construction~~ February 28, 1986 ~~Completion of Construction~~ November 28, 1986  
 Modification-Addition of Control Equipment

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.)

Estimated cost of multi-cell electrostatic precipitator, ducting, ash removal and vertical stack with all installed appurtenances = \$2,000,000

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

Permit No. A054-45320 dated January 22, 1982, expires September 30, 1986.

Consent Order OGC File No. 83-0803 - Florida Dept. of Environmental Regulation dated January 7, 1985.

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;  
if power plant, hrs/yr 8760; if seasonal, describe: N/A

F. If this is a new source or major modification, answer the following questions.  
(Yes or No) 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
  3. Does the State "Prevention of Significant Deterioration" (PSD)  
requirement apply to this source? If yes, see Sections VI and VII. NO
  4. Do "Standards of Performance for New Stationary Sources" (NSPS)  
apply to this source? NO
  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 justifi-  
cation 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:

Not Applicable Per Definition - Rule 17-2.100 (127), Process Weight

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

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

- Total Process Input Rate (lbs/hr): To 31,550 lbs/hr No. 6 Oil plus Combustion Air
- Product Weight (lbs/hr): 475,000 lbs/hr, 1275 psig, 900 F Superheated Steam Maximum

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

Name of Contaminant	Emission <sup>1</sup>		Allowed <sup>2</sup> Emission Rate per Rule 17-2	Requested Allowable <sup>3</sup> Emission lbs/hr	Potential <sup>4</sup> Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr *			lbs/yr	T/yr *	
Particulates	56.8	248.8	0.1 lbs/MBTU	56.8	497,568	248.8	Stack
SO <sub>2</sub>	1564	6850	2.75 lbs/MBTU	1564	13,814,520	6907	Stack
Fuel NO(As NO	200	876	N/A	N/A	1,752,000	876	Stack
CO	0.15	0.66	N/A	N/A	1314	0.66	Stack
Methane Hydrocarbons	7.6	33.3	N/A	N/A	66,751	33.3	Stack

Opacity 20%, 40% 2M 20%, 40% 2M 20%, 40% 2M 30% Stack

<sup>1</sup>See Section V, Item 2. \*At 8760 hrs/yr <sup>3</sup>No Sampling data - factored from AP-42 Chap. 1

<sup>2</sup>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)

<sup>3</sup>Calculated from operating rate and applicable standard.

<sup>4</sup>Emission, if source operated without control (See Section V, Item 3).

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 Pre- cipitator (Not Selected From Vendor Yet. Equipment Bids - Guaranteed Performance Data Not Yet Received)	Particulates	Up to 90%	1-100	Cost Effective Design Basis

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
No. 6 Fuel Oil	2750 +	3810	568.9

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

Fuel Analysis: (See Attached Report)

Percent Sulfur: 2 1/2 Percent Ash: 0.15+

Density: 8.28 (10.9°API) lbs/gal Typical Percent Nitrogen: 0.54

Heat Capacity: 18,350 BTU/lb 151,938 BTU/gal

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

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average -- Maximum --

Unknown-Paper and  
Pulp Mill

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

35-50 lbs/hr ash to be collected and disposed of in a controlled landfill.

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

Stack Height: 232 Above Grade ft. Stack Diameter: 9 ft.  
 Gas Flow Rate: 231,500 ACFM 118,500 DSCFM Gas Exit Temperature: 445 °F.  
 Water Vapor Content: 10-12 % Velocity: 60.6 FPS

SECTION IV: INCINERATOR INFORMATION

N/A

Type of Waste	Type 0 (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 (lb/hr)							

Description of Waste N/A

Total Weight Incinerated (lb/hr) \_\_\_\_\_ Design Capacity (lb/hr) \_\_\_\_\_

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

Manufacturer \_\_\_\_\_

Date Constructed \_\_\_\_\_ Model No. \_\_\_\_\_

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

Stack Height: \_\_\_\_\_ ft. Stack Diameter: \_\_\_\_\_ 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: \_\_\_\_\_

N/A

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

N/A

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**

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
N/A	

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:<sup>1</sup> d. Capital Cost:
- e. Useful Life: f. Operating Cost:
- g. Energy:<sup>2</sup> 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:<sup>1</sup> d. Capital Cost:
- e. Useful Life: f. Operating Cost:
- g. Energy:<sup>2</sup> h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:

<sup>1</sup>Explain method of determining efficiency.

<sup>2</sup>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:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:<sup>1</sup>

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:<sup>2</sup>

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

<sup>1</sup>Explain method of determining efficiency.

<sup>2</sup>Energy to be reported in units of electrical power - KWH design rate.

SCALE	NONE
DRAWN	R.E.B.
CHECKED	<i>EJS</i>
APPROVED	
APPROVED	
DATE	DATE
DATE	DATE
DATE	DATE

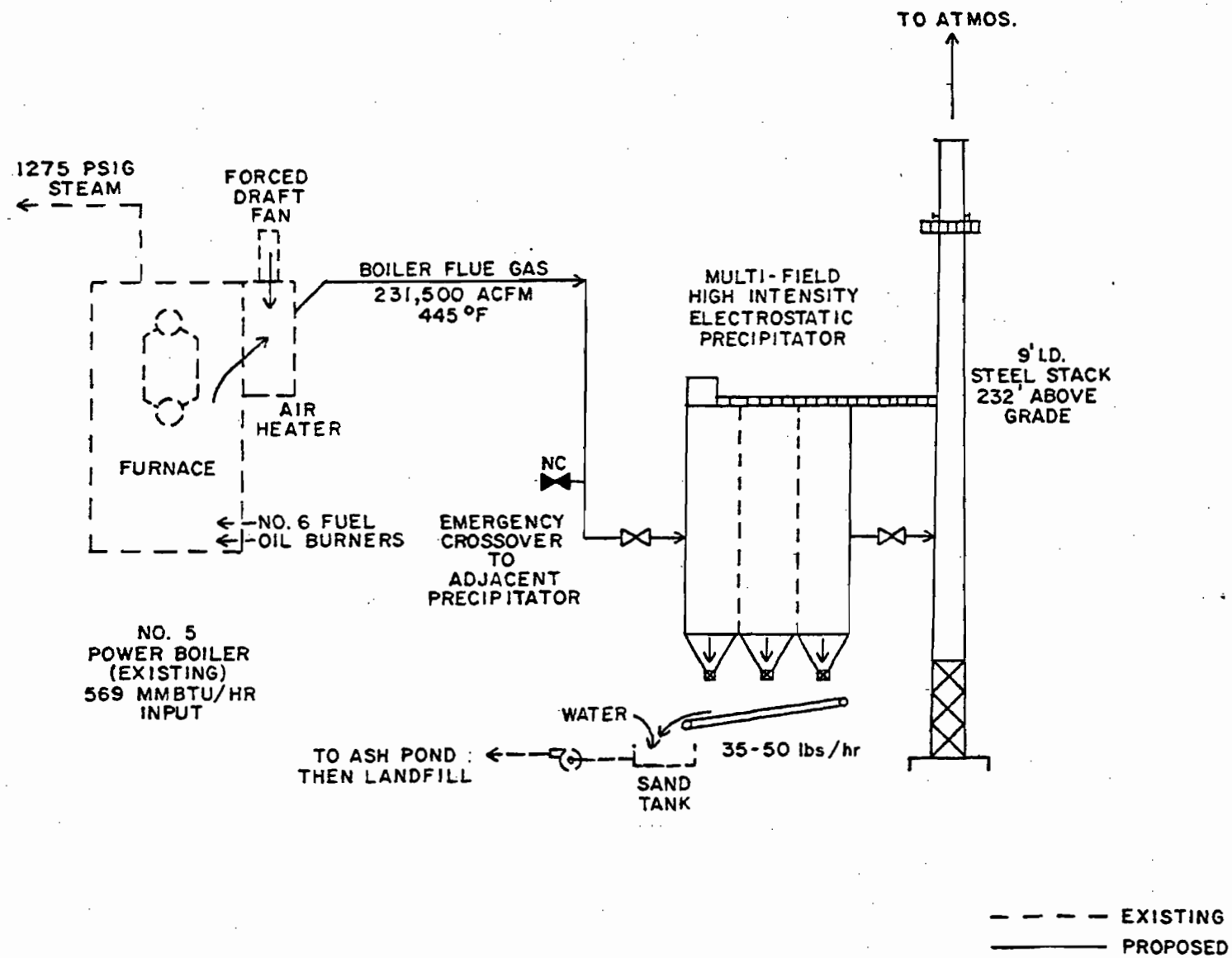
**Jord, Bacon & Davis**  
 Incorporated  
 MONROE, LOUISIANA

**GEORGIA - PACIFIC CORPORATION**  
 PALATKA, FLORIDA

DRAWING TITLE

**NO. 5 POWER BOILER FLUE GAS PRECIPITATOR - PROPOSED**

DWG. NO. **SK-C-1712-1**



(5) Environmental Managers:

(6) Telephone No.:

(7) Emissions:<sup>1</sup>

Contaminant	Rate or Concentration

(8) Process Rate:<sup>1</sup>

b. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:<sup>1</sup>

Contaminant	Rate or Concentration

(8) Process Rate:<sup>1</sup>

10. Reason for selection and description of systems:

<sup>1</sup>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**

A. Company Monitored Data

1. \_\_\_\_\_ no. sites \_\_\_\_\_ TSP \_\_\_\_\_ ( ) SO<sub>2</sub>\* \_\_\_\_\_ 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).

## SUPPLEMENTAL REPORT

### INSTALLATION OF AN ELECTROSTATIC PRECIPITATOR ON THE NUMBER 5 POWER BOILER AT THE PALATKA, FLORIDA MILL OF GEORGIA-PACIFIC CORPORATION.

#### Background

The Number 5 boiler was erected in 1965 and is certified by an existing Operating Permit. The boiler fires Number 6 residual fuel oil exclusively and to date is not equipped with any emission control equipment. Permit-wise (A054-45320) the boiler has been rated at a maximum heat input rate of 465 MM BTU/Hr, thus its current emission rate is limited by this value.

The boiler has essentially met necessary emission criteria over the years but it's been found difficult to meet existing requirements using standard grades of Bunker C oils. Specific lower ash-sulfur oils have been purchased lately for the boiler enabling it to meet requirements on a more consistent basis.

Due to stack sampling difficulties and some alleged violations, various mutually acceptable solutions were arrived at recently by the Company and the Florida Department of Environmental Regulation which were contained in a January 1985 Consent Order. The Company has submitted a schedule for installing new emission control equipment on the boiler along with various intervals of stack monitoring and reportings of performance.

#### Proposed Project

Despite the knowledge that particulate removal equipment for oil based boiler flue gas streams is not always required to meet current emission standards (0.1 lbs/MM BTU/hr input) the Company has unilaterally decided to employ the best available control technology on this boiler at this time. This will allow the Company greater latitude in the selection of available, commercially plentiful and economic oil supplies without concern for random firing conditions that could encroach on current emission limits.

The Company has initiated the necessary engineering, planning, bid selection and procurement work necessary to install a high intensity, multi-field, rigid frame electrostatic precipitator on this boiler per a schedule previously approved by the Department of Environmental Regulation.

#### Facility Details

A study of the present steaming facilities is underway including a computerized analysis of combustion conditions (see Exhibit I). With

TABLE I

TYPICAL FUEL OIL ANALYSIS OF

SUPPLIES USED BY GEORGIA-PACIFIC

PALATKA MILL\*

Degrees API at 60°F	10.9
Specific Gravity at 60°F	0.99
Flash Point, °F	178
BS & W, %	1.65
Viscosity, SFS at 122°F	275
Asphaltene, %	9.9
Ash, %	0.15
Carbon, %	85.7
Hydrogen, %	10.6
Nitrogen, %	0.54
Sulfur, %	2.5
Oxygen, %	0.6
Vanadium, ppm	550
BTUs per pound	18,350

\*Analyzed by Fuel Engineering Company of New York in Thornwood, New York in 1984.



fuel oil, the unit has been found to demonstrate the following combustion design related characteristics:

$$\begin{aligned} 1275 \text{ psig steam at } 900^{\circ}\text{F} &= 1437.4 \text{ BTU/lb} \\ \text{Feedwater at } 445^{\circ}\text{F saturated} &= -424.1 \text{ BTU/lb} \end{aligned}$$

---


$$1013.3 \text{ BTU/lb}$$

$$\text{Heat Input } \frac{1013.3 \times 475,000 \text{ lbs/hr maximum firing capacity}}{84.6\% \text{ efficiency}}$$

$$= 568,933,220 \text{ BTU/hr heat input with gross fuel requirement of } 31,550 \text{ lbs/hr.}$$

As noted in Section III (p.4) of the attached Application, under current Florida Regulations, the boiler particulate emission allowable is 56.8 lbs/hr rather than the 46.5 lbs/hr cited in the original permit.

Similarly SO<sub>2</sub> allowables (2.75 lbs/MM BTU/hr input) are 1564 lbs/hr contrasted to the former 1279 lbs/hr allowed. NO, CO and methane hydrocarbon values are also listed in Section III for Departmental purposes.

Despite these more applicable allowables, the Company is requiring that precipitator suppliers-bidders meet a particulate requirement of 0.08 lbs/MM BTU/hr at a flue gas flow of 267,000 acfm or about 15 percent over that derived from the combustion evaluation.

A simplified schematic of the proposed installation is depicted by Sketch C-1712-1 attached. The general plot plan of the entire mill is shown in Sketch C-1712-2 and the immediate boiler area layout is illustrated by Sketch C-1712-3.

An adjacent, similarly sized modern precipitator will be ducted together with this boiler (serving Number 4 combination fuel boiler certified by a separate Permit) for standby treatment purposes. The precipitator serving this boiler will be equipped with isolation dampers, a complete ash removal system and a separate 232 foot (above grade) stack outfitted with the necessary platforms, sampling ports, monorails, etc. required for monitoring purposes.

A typical analysis of the fuel oil expected to be used in this service is listed in Table I. This and similar grades of oil will be purchased and should fall within the ranges shown.





Per attached Exhibit I the Company requests the appropriate heat input rating (BTU/hr) be established for this boiler and the related, allowable emission rates per Rule 17-2 be authorized as contained within the submitted Application Form 17-1,202(1).

cs/D985/A

## Air Emissions

Although hydrocarbon-based particulate capture is more rigorous than inorganic ash removal using charged electrode technology, it is expected this technical application will ensure complete compliance with present particulate emission limits. Up to 90% removals under this low loading regime is expected.

Some minor SO<sub>2</sub> removals will also be experienced as some 5% of the carbonaceous sulfur based residue will be removed along with the captured ash agglomerates. Visual opacity levels will also be positively affected.

Derivation of various values used to develop the Table in Section III (C) of the Application are as follows:

### Particulates

$$568.9 \text{ MM BTU/hr input at } 0.1 \text{ lbs/MM BTU} = 56.8 \text{ lbs/hr}$$

$$\text{Ash} = 31,550 \text{ lbs/hr oil} \times \frac{0.15\% \text{ ash}}{100} = 47.3 \text{ lbs/hr plus soot blows}$$

Precipitator to remove up to 90%

$$\text{Potential emission, uncontrolled} = 56.8 \text{ lbs./hr} \times 8760 \text{ hrs/yr}$$

$$= 497.568 \text{ lbs/yr or}$$

$$248.8 \text{ tons/yr}$$

### SO<sub>2</sub>

$$568.9 \text{ MM BTU/hr input at } 2.75 \text{ lbs/MM BTU} = 1564 \text{ lbs/hr}$$

$$\text{SO}_2 = \frac{31,550 \text{ t/hr oil} \times 2.5\% \text{ S} \times 2 \times .95}{2,000} \quad (\text{S} \rightarrow \text{SO}_2) \text{ (5\% in ash dropout)}$$

$$= \frac{74.9}{100} = 0.749 \text{ tons/hr SO}_2$$

$$= 1498 \text{ lbs/hr SO}_2$$

and 1577 lbs/hr SO<sub>2</sub> with no ash dropout.

$$\text{Potential emission, uncontrolled} = 1577 \text{ lbs/hr} \times 8760 \text{ hrs/yr}$$

$$= 13,814,520 \text{ lbs/yr or}$$

$$6907 \text{ tons/yr of SO}_2$$

### Fuel NO (excludes thermal NO)

$$\text{Federal Criteria } 0.3 \text{ lbs/MM BTU} = 170.6 \text{ lbs/hr}$$

$$\text{as NO}_x$$

$$(\text{NO} + \text{NO}_2)$$

\*\*\*\*\*  
 \* FAN SIZING \*  
 \*\*\*\*\*

TOTAL HEAD FOR FD FAN (INCHES H <sub>2</sub> O) -----	19.2000
PERCENT EFFICIENCY OF FD FAN -----	81.6000
PERCENT LEAKAGE FOR FD FAN -----	0.5000
PERCENT SAFETY FACTOR FOR FD FAN -----	10.0000

TOTAL VOLUME OF COMBUSTION AIR (CFM) -----	134102.0625
HORSEPOWER FOR FORCED DRAFT FAN -----	496.3350

TOTAL HEAD FOR ID FAN (INCHES H <sub>2</sub> O) -----	10.0000
PERCENT EFFICIENCY OF ID FAN -----	71.5000
PERCENT LEAKAGE FOR ID FAN -----	0.5000
PERCENT SAFETY FACTOR FOR ID FAN -----	10.0000

- NO ID FAN  
 REQUIRED

TOTAL VOLUME OF FLUE GAS (CFM) -----	<i>ACTUAL</i> 231439.8125
HORSEPOWER FOR INDUCED DRAFT FAN -----	509.1677



\*\*\*\*\*  
 \* BOILER EFFICIENCY \*  
 \*\*\*\*\*

PERCENT COMBUSTIBLE IN ASH -----	2.0000
EXIT GAS TEMPERATURE (FAHRENHEIT) -----	425.0000
COMBUSTION AIR TEMPERATURE (FAHRENHEIT) -----	80.0000
PERCENT RADIATION LOSSES -----	0.3800
PERCENT MANUFACTURER'S OR UNMEASURED LOSSES -----	1.0000

ENTHALPY OF WATER VAPOR AT 1 PSIA AND EXIT TEMP -----	1292.5073
ENTHALPY OF LIQUID WATER AT COMBUSTION GAS TEMP -----	148.0000

HEAT LOSS DUE TO DRY GAS -----	7.5049%
HEAT LOSS DUE TO H <sub>2</sub> AND FUEL H <sub>2</sub> O -----	6.3184%
HEAT LOSS DUE TO AIR MOISTURE -----	0.1866%
HEAT LOSS DUE TO COMBUSTIBLE IN REFUSE -----	0.0023%
HEAT LOSS DUE TO RADIATION -----	0.3800%
HEAT LOSS DUE TO UNMEASURED LOSSES -----	1.0000%

TOTAL HEAT LOSSES -----	15.3922%
-------------------------	----------

BOILER EFFICIENCY -----	84.6078%
-------------------------	----------

\*\*\*\*\*  
\* COMBUSTION CALCULATIONS \*  
\*\*\*\*\*

\*\*\*\*\*  
\* TOTALS FOR ALL FUELS \*  
\*\*\*\*\*

TOTAL FUEL RATE (LBS PER HOUR) ----- *OIL* ----- 31554.0000  
THEORETICAL COMBUSTION AIR ----- 432676.8125

TOTAL (THEORETICAL PLUS EXCESS) COMBUSTION AIR ----- 525267.0000

AT TOTAL COMBUSTION AIR -----  
TOTAL FLUE DRY GAS ----- 526240.5625  
TOTAL FLUE PRODUCT H2O ----- 37284.2539  
TOTAL FLUE PRODUCT CO2 ----- 100830.5000  
TOTAL FLUE PRODUCT NITROGEN ----- 403993.5625

TOTAL FUEL HYDROGEN ----- 340783.1299  
TOTAL FUEL SULFUR ----- 78884.9854  
TOTAL FUEL OXYGEN ----- 0.0  
TOTAL FUEL CARBON ----- 2708910.1563



\*\*\*\*\*  
 \* COMBUSTION CALCULATIONS \*  
 \*\*\*\*\*

FUEL NAME: AA FUEL OIL

FUEL USE RATE AS A WEIGHT PERCENTAGE ----- 100.0000  
 BTU'S PER POUND OF FUEL ----- 18400.0000

CONSTITUENT	FUEL PERCENT
32 SULFUR	2.50%
33 CARBON	85.85%
30 HYDROGEN	10.80%
29 NITROGEN	0.70%
34 ASH	0.15%

TOTAL PERCENTAGE 100.00%

PERCENT EXCESS AIR ----- 21.6000%

TOTAL AIR (LBS PER POUND FUEL) ----- 18.6486  
 THEORETICAL AIR (LBS PER POUND FUEL) ----- 13.7897

AT 121.40% THEORETICAL AIR:

TOTAL DRY GAS (LBS PER POUND FUEL) ----- 16.6775  
 FLUE PRODUCT H<sub>2</sub>O (LBS PER POUND FUEL) ----- 1.1816  
 PRODUCT CO<sub>2</sub> (LBS PER POUND FUEL) ----- 3.1935  
 FLUE PRODUCT NITROGEN (LBS PER POUND FUEL) ----- 1.2201

PERCENT FUEL HYDROGEN ----- 10.8000  
 PERCENT FUEL SULFUR ----- 2.5000  
 PERCENT FUEL OXYGEN ----- 0.00  
 PERCENT FUEL CARBON ----- 85.8500

\*\*\*\*\*  
\* COMBUSTION CALCULATIONS \*  
\* BOILER EFFICIENCY \*  
\* FAN SIZING \*  
\*\*\*\*\*

JOB NUMBER ----- 01712  
CLIENT NAME ----- GEORGIA PACIFIC PALMKA, FL  
USER INITIALS ----- AJF  
DATE OF RUN ----- 02/20/85  
TIME OF RUN ----- 11:29:30



\*\*\*\*\*

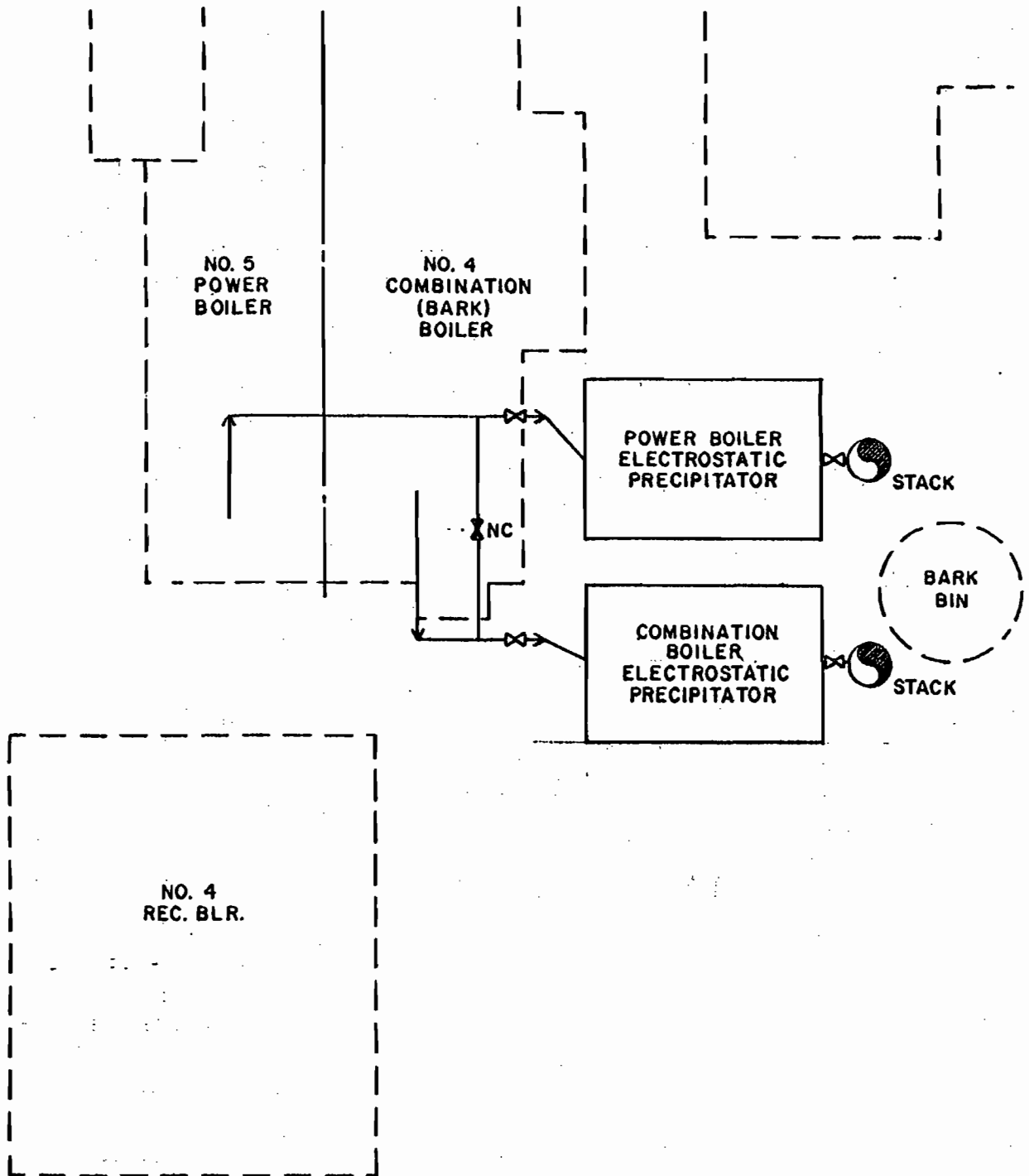
NO. 5 POWER BOILER

USING NO. 6 FUEL OIL AT  
MAXIMUM LOAD RATING  
OF 475,000 lbs/hr

EXHIBIT T

MONROE, LA.

\*\*\*\*\*



--- EXISTING  
 — PROPOSED

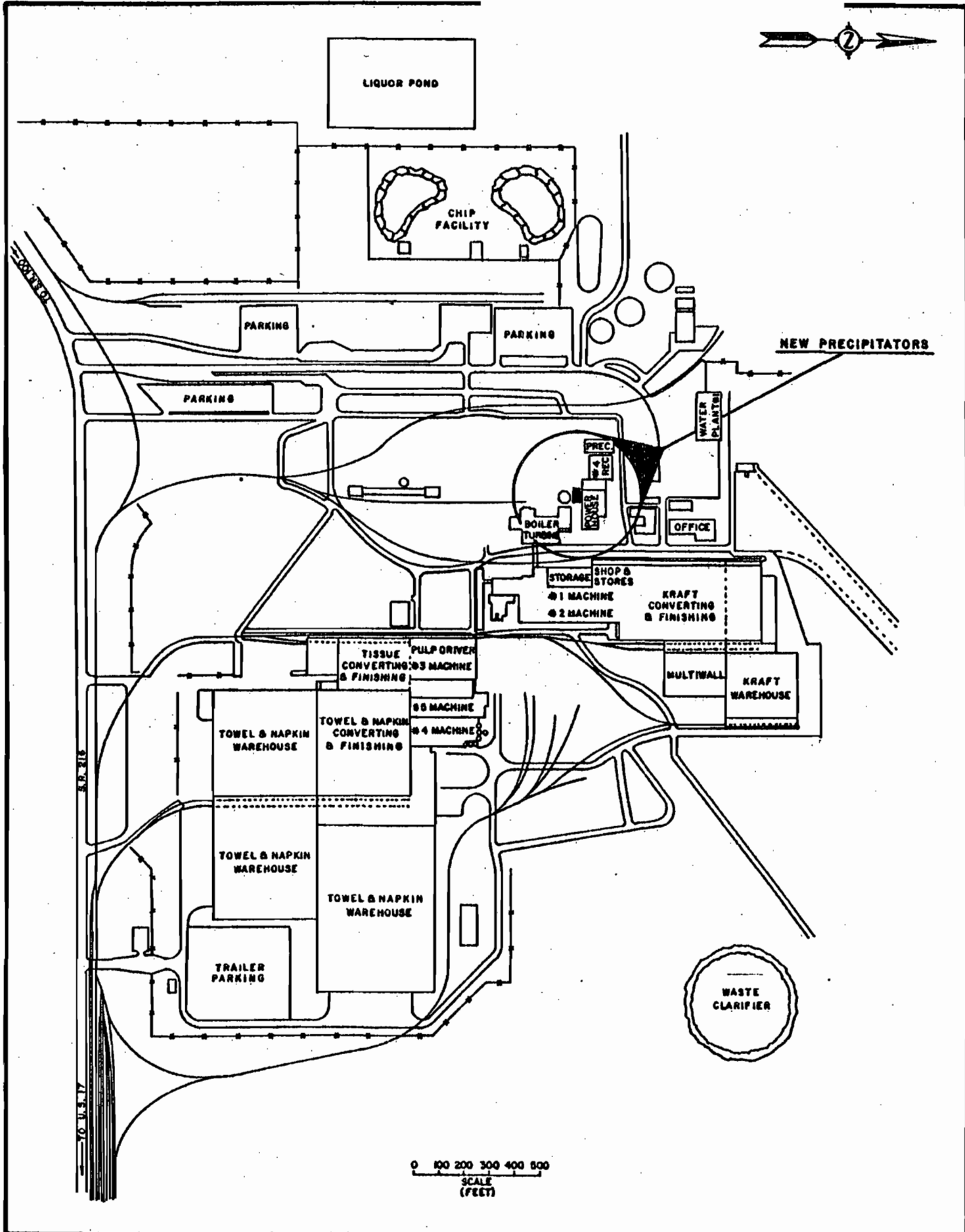
SCALE	NONE	
DRAWN	R. E. B.	DATE 2 - 11 - 85
CHECKED	RAS	DATE
APPROVED		DATE
APPROVED		DATE

**Ford, Bacon & Davis**  
 Incorporated  
 MONROE, LOUISIANA

**GEORGIA - PACIFIC CORPORATION**  
 PALATKA, FLORIDA

DRAWING TITLE  
**PLOT PLAN OF EQUIPMENT LAYOUT**

DWG. NO. **SK-C-1712-3**

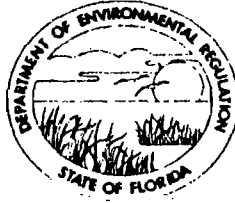


SCALE NOTED		<b>Ford, Bacon &amp; Davis</b> Incorporated MONROE, LOUISIANA	DRAWING TITLE <b>OVERALL PLOT PLAN          OF          MILL LOCATION</b>
DRAWN R.E.B.	DATE 2 - 7 - 85		
CHECKED <i>RPS</i>	DATE		
APPROVED	DATE		
APPROVED	DATE		

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL REGULATION

NORTHEAST DISTRICT

3426 BILLS ROAD  
JACKSONVILLE, FLORIDA 32207



BOB GRAHAM  
GOVERNOR  
VICTORIA J. TSCHINKEL  
SECRETARY  
G. DOUG DUTTON  
DISTRICT MANAGER

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Combination Fuel  
Steam Power Boiler [ ] New<sup>1</sup> [X] Existing<sup>1</sup>  
APPLICATION TYPE: [ ] Construction [X] Operation [ ] Modification (To A054-58340)  
COMPANY NAME: Georgia-Pacific Corporation COUNTY: Putnam

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) No. 4 Combination Power  
Boiler Stack  
SOURCE LOCATION: Street State Road 216 (North Side) City Palatka

UTM: East 434.0 North 3283.4  
Latitude 29° 41' 00"N Longitude 81° 40' 45"W

APPLICANT NAME AND TITLE: Georgia-Pacific Corporation  
APPLICANT ADDRESS: P.O. Box 919 Palatka, Florida 32077

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative\* of Georgia-Pacific Corp.

I certify that the statements made in this application for a Air Emission  
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

<sup>1</sup> See Florida Administrative Code Rule 17-2.100(57) and (104)

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 Harold L. Culp

Harold L. Culp, PE  
Name (Please Type)

Ford, Bacon & Davis, Inc.  
Company Name (Please Type)

P.O. Box 1894, Monroe, LA 71210  
Mailing Address (Please Type)

Florida Registration No. 29275 Date: March 21, 1980 Telephone No. (318) 323-9000

**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 Attached Supplementary Report)

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

Start of Construction February 28, 1986 Completion of Construction November 28, 1986  
Modification-Addition of Control Equipment

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.)

Estimated cost of multi-cell electrostatic precipitator, ducting, ash removal and vertical stack with all installed appurtenances = \$2,150,000

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

Permit No. A054-58340 Dated December 8, 1982, expires September 30, 1987.

Consent Order OGC File No. 83-0803 - Florida Dept. of Environmental

Regulation dated January 7, 1985

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;  
if power plant, hrs/yr 8760; if seasonal, describe: N/A

F. If this is a new source or major modification, answer the following questions.  
(Yes or No) 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
3. Does the State "Prevention of Significant Deterioration" (PSD)  
requirement apply to this source? If yes, see Sections VI and VII. No
4. Do "Standards of Performance for New Stationary Sources" (NSPS)  
apply to this source? No
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:**

Not Applicable Per Definition - Rule 17-2.100 (127), Process Weight

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

**B. Process Rate, if applicable: (See Section V, Item 1) For Information Only**

To 97,900 lbs/hr Bark and/or 26,426 lbs/hr

1. Total Process Input Rate (lbs/hr): No. 6 Oil Plus Combustion Air

2. Product Weight (lbs/hr): 360,000 lbs/hr, 1275 psig, 900°F Superheated Steam

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

Name of Contaminant	Emission <sup>1</sup>		Allowed Emission Rate per Rule 17-2	Requested Allowable <sup>3</sup> Emission lbs/hr	Potential <sup>4</sup> Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual I/yr *			lbs/yr	I/yr *	
Particulates	(Oil) 43.3	190	0.1 lbs/M BTU	43.3	379,308	190	Stack
Particulates	(Bark) 130.1	570	0.3 lbs/M BTU	130.1	1,314,000	657	Stack
SO <sub>2</sub> (Oil)	1254	5492	2.75 lbs/M BTU	1254	11,571,960	5786	Stack
Fuel NO(As NO)	168	736	N/A	N/A	1,471,680	736	Stack
CO (Bark)	97.9	429	N/A	N/A	857,604	429	Stack
Methane	97.9	429	N/A	N/A	857,604	429	Stack
Hydrocarbons	97.9	429	N/A	N/A	857,604	429	Stack
Opacity	30%, 40% 2m	30%, 40% 2m	30%, 40% 2m	30%, 40% 2m	40%	40%	Stack

<sup>1</sup>See Section V, Item 2. \*At 8760 hrs/hr      <sup>3</sup>No Sampling Data - factored from AP-42 Chap. 1 Tables

<sup>2</sup>Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table 11, E. (1) - 0.1 pounds per million BTU heat input)

• SO<sub>2</sub>-From oil only - used very infrequently, no SO<sub>2</sub> from bark.

<sup>3</sup>Calculated from operating rate and applicable standard.

<sup>4</sup>Emission, if source operated without control (See Section V, Item 3).

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	Particulates	Up to 95%	1/2 - 60	Cost Effective
(Not Selected Yet, Bids-Guaranteed Performance Data Not Yet Received)				Design Basis

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
No. 6 Fuel Oil	Supplemental - Varies	3192	433.8
Bark (Wood)	80,000 ±	97,900	433.7

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

Fuel Analysis: (See Attached Report)

Percent Sulfur: 2 1/2 (oil) 0 (Bark) Percent Ash: 0.15±(oil), 2.0±(Bark)

Density: 8.28 (oil), 21 lbs/cf (Bark) lbs/gal Typical Percent Nitrogen: 0.54 (oil), 0.1 (Bark)

Heat Capacity: 18,350(oil), 4500(Bark) BTU/lb 151,938 (oil) BTU/gal

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

F. If applicable, indicate the percent of fuel used for space heating. Unknown Paper and Pulp Mill  
 Annual Average --- Maximum ---

G. Indicate liquid or solid wastes generated and method of disposal.  
100-900 lbs/hr ash to be collected from the precipitator (excluding mechanical dust collectors) and disposed of in a controlled landfill.

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

Stack Height: 232 Above Grade ft. Stack Diameter: 9 ft.  
 Gas Flow Rate: 198,000 ACFM 87,000 DSCFM Gas Exit Temperature: 440 °F.  
 Water Vapor Contents: 18-21 % Velocity: 51.9 FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type 0 (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 N/A

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) <sup>3</sup>	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: \_\_\_\_\_ ft. Stack Diameter: \_\_\_\_\_ 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: \_\_\_\_\_

N/A

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

N/A

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**

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
N/A	

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

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:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

<sup>1</sup>Explain method of determining efficiency.

<sup>2</sup>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:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:<sup>1</sup>

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:<sup>1</sup>

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:<sup>2</sup>

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

<sup>1</sup>Explain method of determining efficiency.

<sup>2</sup>Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:<sup>1</sup>

Contaminant

Rate or Concentration


(8) Process Rate:<sup>1</sup>

b. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:<sup>1</sup>

Contaminant

Rate or Concentration


(8) Process Rate:<sup>1</sup>

10. Reason for selection and description of systems:

<sup>1</sup>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**

A. Company Monitored Data

N/A

1. \_\_\_\_\_ no. sites \_\_\_\_\_ TSP \_\_\_\_\_ ( ) SO<sub>2</sub>\* \_\_\_\_\_ 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 <sup>2</sup>	_____	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.

## SUPPLEMENTAL REPORT

### INSTALLATION OF AN ELECTROSTATIC PRECIPITATOR ON THE NUMBER 4 COMBINATION POWER BOILER AT THE PALATKA, FLORIDA MILL OF GEORGIA-PACIFIC CORPORATION.

#### Background

The Number 4 boiler was erected in 1965 and is certified by an existing operating permit. The boiler fires a combination of Number 6 residual fuel oil and bark (wood). The major fuel used in this boiler is bark due to its economic availability. The flue gas is treated for particulate removal at the present time through the use of three sets of mechanical collectors in series. Despite their pressure drops these have been found to be effective devices. Permit-wise (A054-58340) the boiler has been rated at a maximum heat input rate of 425 MM BTU/hr on bark (per original permit of December 8, 1982) and 360 MM BTU/hr on oil thus its current emission rate is limited by these values.

The boiler has essentially met necessary emission criteria over the years but it's been found difficult to meet existing requirements when operating at maximum capacity on bark, despite its multiple set of mechanical collectors.

Due to stack sampling difficulties and some alleged violations, various mutually acceptable solutions were arrived at recently by the Company and the Florida Department of Environmental Regulation which were contained in a January 1985 Consent Order. The Company has submitted a schedule for installing additional emission control equipment on the boiler along with various intervals of stack monitoring and reportings of performance.

#### Proposed Project

To ensure reliable, continuous removals of bark related sands and char the Company has decided to employ the best available control technology on this boiler at this time. This will allow the Company greater latitude in the selection of available bark and commercially plentiful oil supplies without concern for random firing conditions that could encroach on current emission limits.

The Company has initiated the necessary engineering, planning, bid selection and procurement work necessary to install a high intensity, multi-field, rigid frame electrostatic precipitator on this boiler per a schedule previously approved by the Department of Environmental Regulation.

### Facility Details

A study of the present steaming facilities is underway including a computerized analysis of combustion conditions (see Exhibit I and II). With bark and fuel oil, the unit has been found to demonstrate the following combustion design related characteristics:

$$\begin{aligned} 1275 \text{ psig steam at } 900^{\circ}\text{F} &= 1437.4 \text{ BTU/lb} \\ \text{Feedwater at } 445^{\circ}\text{F saturated} &= -424.1 \text{ BTU/lb} \end{aligned}$$

---


$$1013.3 \text{ BTU/lb}$$

$$\text{Bark Heat Input } \frac{1013.3 \times 300,000 \text{ lbs/hr capacity on bark only}}{70.09\% \text{ efficiency}}$$

$$= 433,713,000 \text{ BTU/hr heat input with gross fuel requirement of } 97,900 \text{ lbs/hr.}$$

$$\text{Fuel Oil Heat Input } \frac{1013.3 \times 360,000 \text{ lbs/hr capacity on oil only}}{84.08\% \text{ efficiency}}$$

$$= 433,858,230 \text{ BTU/hr heat input with gross fuel requirement of } 26,426 \text{ lbs/hr}$$

As noted in Section III (p.4) of the attached Application, under current Florida regulations, the boiler particulate emission allowable firing bark is 130.1 lbs/hr rather than the maximum 114 lbs/hr cited in the present permit.

Similarly SO<sub>2</sub> allowables from oil (2.75 lbs/MM BTU/hr input) are 1192.9 lbs/hr contrasted to the 962.5 lbs/hr permit limit. NO, CO and methane hydrocarbon values are also listed in Section III for Departmental purposes.

Despite these more applicable allowables, the Company is requiring that precipitator suppliers-bidders meet a particulate requirement of 0.25 lbs/MM BTU/hr at a flue gas flow of 30 percent over the base flow of 198,000 acfm derived from the combustion evaluation. However to allow appropriate standby capacity for the adjacent power boiler a peak design flow of 267,000 acfm is being used.

A simplified schematic of the proposed installation is depicted by Sketch C-1712-1 attached. The general plot plan of the entire mill is shown in Sketch C-1712-2 and the immediate boiler area layout is illustrated by Sketch C-1712-3.

An adjacent, similarly sized modern precipitator will be ducted together with this boiler (serving Number 5 power boiler certified by a separate Permit) for standby treatment purposes. The precipitator serving this

boiler will be equipped with isolation dampers, a complete ash removal system and a separate 232 foot (above grade) stack outfitted with the necessary platforms, sampling ports, monorails, etc. required for monitoring purposes.

A typical analysis of the wood waste (bark) and fuel oil expected to be used in this service is listed in Table I. These and similar grades of fuel will be purchased and should fall within the ranges shown.

TABLE I  
TYPICAL FUEL OIL ANALYSIS OF  
SUPPLIES USED BY GEORGIA-PACIFIC  
PALATKA MILL\*

Degrees API at 60°F	10.9
Specific Gravity at 60°F	0.99
Flash Point, °F	178
BS & W, %	1.65
Viscosity, SFS at 122°F	275
Asphaltene, %	9.9
Ash, %	0.15
Carbon, %	85.7
Hydrogen, %	10.6
Nitrogen, %	0.54
Sulfur, %	2.5
Oxygen, %	0.6
Vanadium, ppm	550
BTUs per pound	18,350

\*Analyzed by Fuel Engineering Company of New York in Thornwood, New York in 1984.

TABLE I (CONTINUED)TYPICAL WOOD (HOGGED BARK) ANALYSIS OF  
SUPPLIES RECEIVED BY GEORGIA-PACIFIC  
PALATKA MILL\*

Weight, lbs/cf	21 ±
Dry Ash, %	2 +
Fixed Carbon, %	25.2
Hydrogen, %	3.1
Moisture, %	50.0
Oxygen, %	21.5
Volatile Matter, %	79
Nitrogen, %	0.1
Sulfur, %	0
Heating Value As Fired, BTU/lb	4500

\* Analyzed By Georgia-Pacific Corporation

### Air Emissions

With the main particulate loading comprised of inorganic sand and carbonaceous char, it is expected this technical application will ensure complete compliance with present particulate emission limits. Up to 95% removals under this loading regime are expected.

Some minor SO<sub>2</sub> removals (when oil is burned) will also be experienced as about 5% of the carbonaceous sulfur based residue will be removed along with the captured ash agglomerates. Visual opacity levels will also be positively affected.

Derivation of various values used to develop the Table in Section III (C) of the Application are as follows:

#### Particulates (Using Bark)

433.7 MM BTU/hr input at 0.3 lbs/MM BTU = 130.1 lbs/hr  
 Ash = 97,900 lbs/hr bark X  $\frac{2\% \text{ ash}}{100}$  = 1958 lbs/hr plus soot blows

Precipitator to remove up to 95% leaving 98-124 lbs/hr  
 Potential emission, uncontrolled = 150 lbs./hr X 8760 hrs/yr  
 (Using existing triple set = 1,314,000 lbs/yr or  
 of installed mechanical 657 tons/yr  
 collectors.

Without collectors = 8760 tons/yr)  
 Ash = 26,426 lbs/hr oil X  $\frac{0.15\% \text{ ash}}{100}$  = 39.6 lbs/hr < 43.3 lbs/hr  
 allowed.

#### SO<sub>2</sub> (Using No. 6 Fuel Oil)

433.8 MM BTU/hr input at 2.75 lbs/MM BTU = 1192.9 lbs/hr  
 SO<sub>2</sub> =  $\frac{26,426 \text{ t/hr oil}}{2,000}$  X 2.5% S X 2 x .95  
 (S → SO<sub>2</sub>) (5% in ash dropout)

=  $\frac{62.7}{100\%}$  = 0.627 tons/hr SO<sub>2</sub>  
 = 1254 lbs/hr SO<sub>2</sub>

and 1321 lbs/hr SO<sub>2</sub> with no ash dropout.

Potential emission, uncontrolled = 1321 lbs/hr X 8760 hrs/yr  
 = 11,571,960 lbs/yr or  
 5786 tons/yr of SO<sub>2</sub>

#### Fuel NO (excludes thermal NO using oil)

Federal Criteria 0.3 lbs/MM BTU = 130.1 lbs/hr  
 as NO<sub>x</sub> (NO + NO<sub>2</sub>)

$$\begin{aligned}
 \text{NO} &= 13.21 \text{ t/hr oil} \times 0.54\% \text{ N} \times 2.14 \times 0.55 \\
 & \quad (\text{NO}_x \text{ is } 95\% \text{ NO}) \qquad \qquad \qquad (\text{N} \rightarrow \text{NO}) \text{ (Conversion)} \\
 & \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \text{(CE4-34)} \\
 &= \frac{8.39}{100} = 0.084 \text{ tons/hr NO} \\
 & \qquad \qquad \qquad = 168 \text{ lbs/hr NO} \\
 \text{Potential emission, uncontrolled} &= 168 \text{ lbs/hr} \times 8760 \text{ hr/yr} \\
 &= 1,471,680 \text{ lbs/yr or} \\
 &= 736 \text{ tons/yr of fuel derived NO.}
 \end{aligned}$$

#### CO, Methane Hydrocarbons (Using Bark)

As taken from EPA AP-42 Chap. 1 data. Same factor for both emissions.

$$\begin{aligned}
 \frac{97,900 \text{ tons/hr (2 lbs/ton)}}{2,000} &= 97.9 \text{ lbs/hr} \\
 &= 857,604 \text{ lbs/yr or} \\
 &= 429 \text{ tons/yr of CO and} \\
 & \quad 429 \text{ tons/yr of Methane Hydrocarbons}
 \end{aligned}$$

#### Opacity

Per current State of Florida Regulations.

Other elements in the fuel will be converted through combustion to their basic oxidative status.

During operations stack emissions will be analyzed per Permit requirements. EPA Standard Reference Methods (Method 1, 2, 3, 4, 5, 6, 7, 9, 10, 17, etc) would be utilized as may be required and applicable.

#### Closure

Georgia-Pacific Corporation intends to employ the best available control technology at this time to reduce particulate and related emissions from their Number 4 Combination Boiler. A field erected, rigid frame electrostatic precipitator will be used. Internal collector (gas) velocities, specific (plate) collection area, wire length, rapper parameters and power inputs will be selected for the equipment to ensure appropriate design sizing. Full compliance with current State emission requirements will be ensured.

Per attached Exhibit I and II the Company requests the appropriate heat input rating (BTU/hr) be established for this boiler and the related, allowable emission rates per Rule 17-2 be authorized as contained within the submitted Application Form 17-1.202(1).



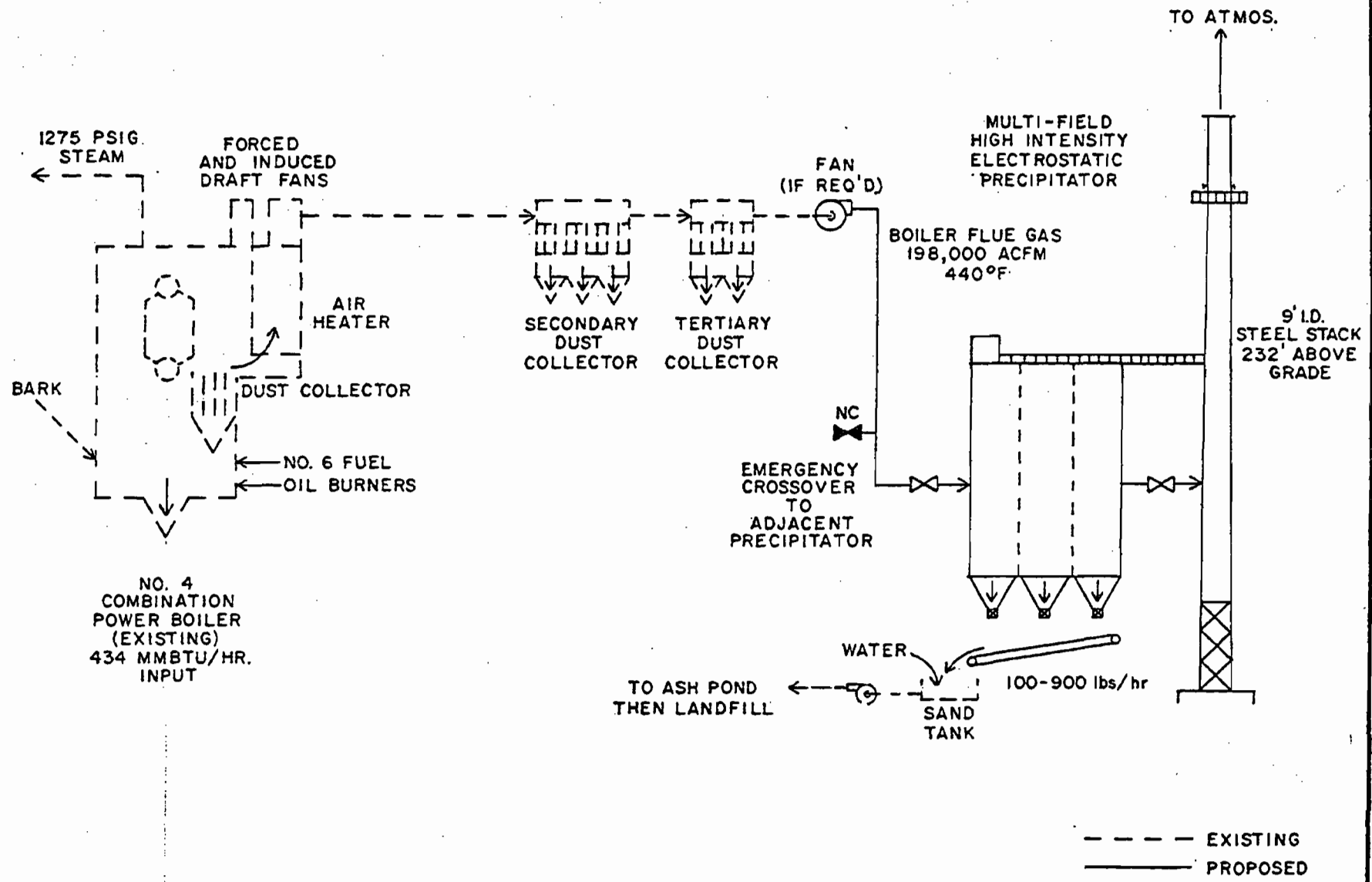
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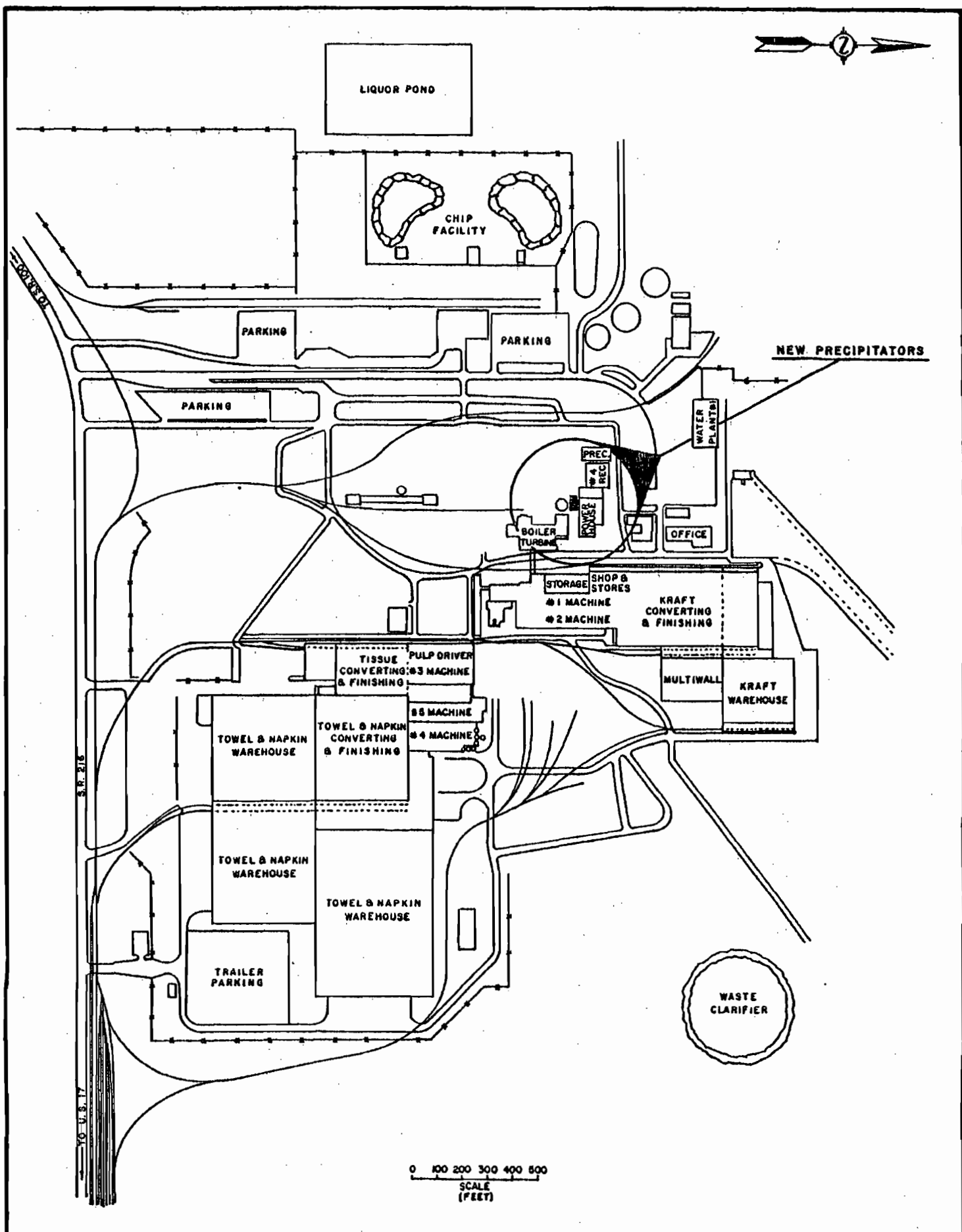
**Fort, Bacon & Davis**  
 Incorporated  
 MONROE, LOUISIANA

**GEORGIA - PACIFIC CORPORATION**  
 PALATKA, FLORIDA

DRAWING TITLE  
**NO. 4 COMBINATION POWER BOILER FLUE GAS PRECIPITATOR - PROPOSED**

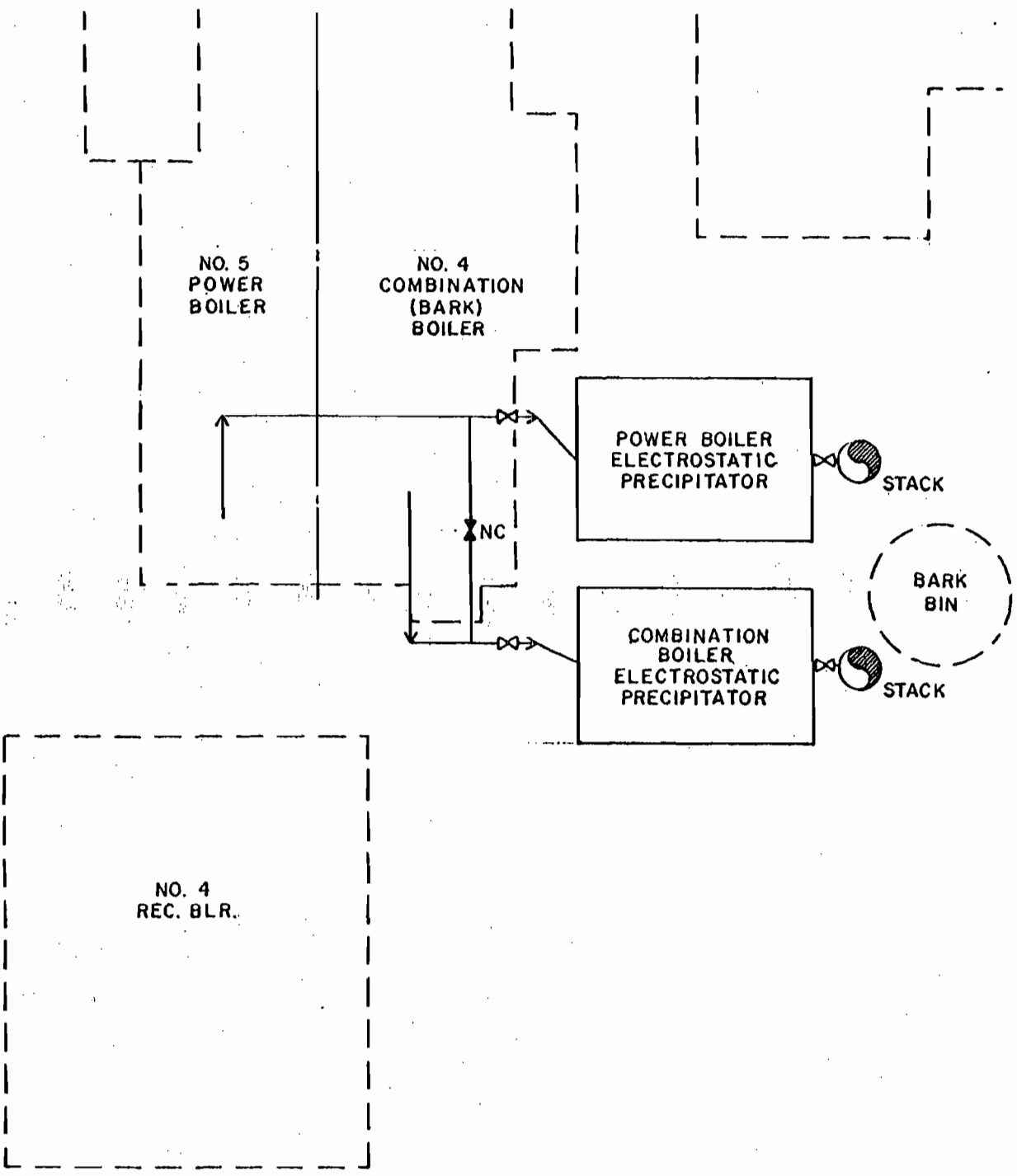
DWG. NO.  
**SK - C - 1712 - 1**





0 100 200 300 400 500  
SCALE  
(FEET)

SCALE NOTED		<b>Ford, Bacon &amp; Davis</b> Incorporated MONROE, LOUISIANA	DRAWING TITLE <b>OVERALL PLOT PLAN          OF          MILL LOCATION</b>
DRAWN R.E.B.	DATE 2 - 7 - 85		
CHECKED	DATE		
APPROVED	DATE		
APPROVED	DATE		

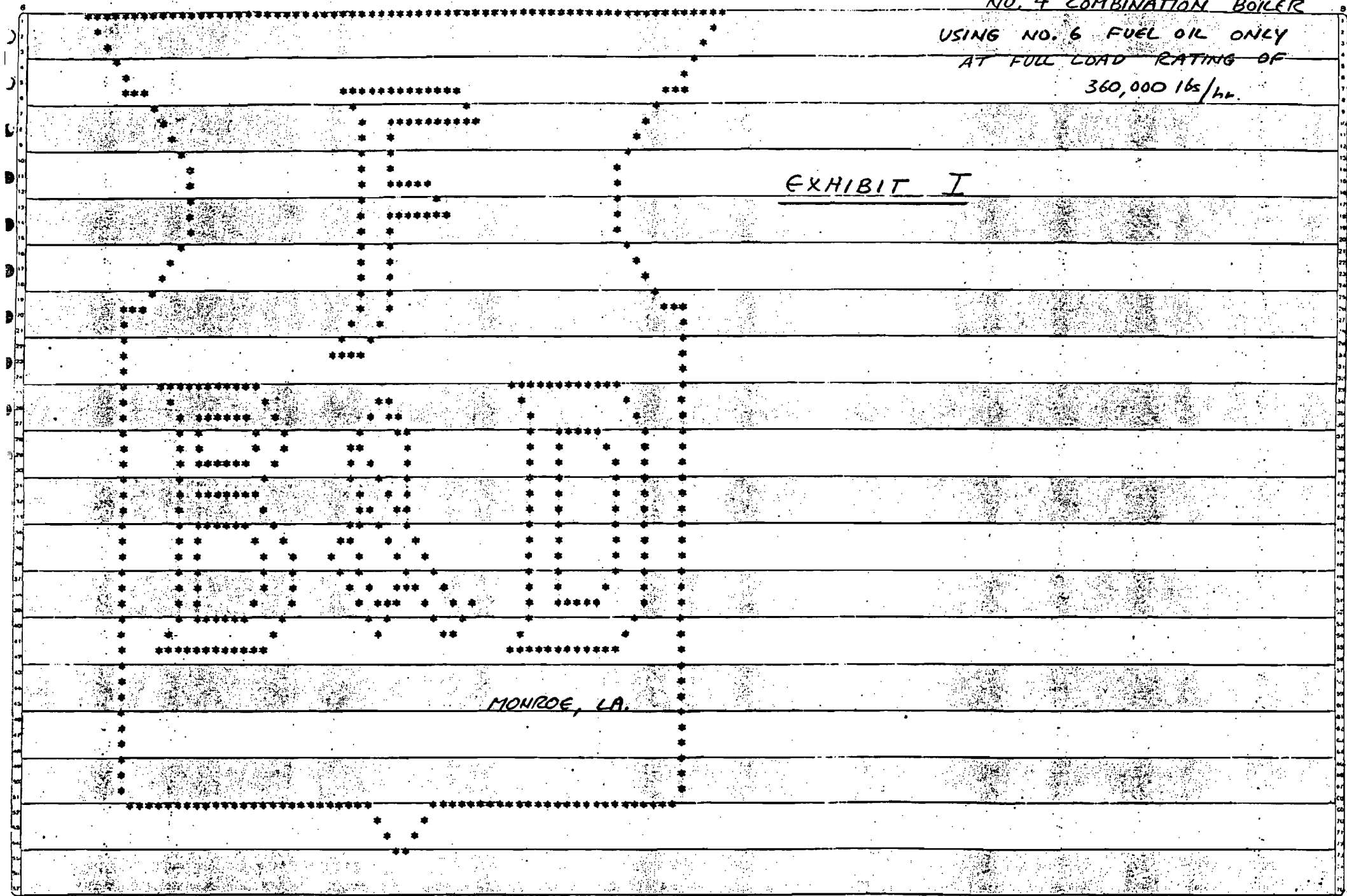


SCALE NONE		<b>Ford, Bacon &amp; Davis</b> Incorporated MONROE, LOUISIANA	DRAWING TITLE <b>PLOT PLAN          OF          EQUIPMENT LAYOUT</b>
DRAWN R.E. B.	DATE 2 - 11 - 85		
CHECKED <i>RDS</i>	DATE		
APPROVED	DATE		
APPROVED	DATE		

NO. 4 COMBINATION BOILER  
USING NO. 6 FUEL OIL ONLY  
AT FULL LOAD RATING OF  
360,000 lbs/hr.

EXHIBIT I

MONROE, LA.



\*\*\*\*\*  
\* COMBUSTION CALCULATIONS \*  
\* BOILER EFFICIENCY \*  
\* FAN SIZING \*  
\*\*\*\*\*

JOB NUMBER ----- C1712  
CLIENT NAME ----- GEORGIA PACIFIC *PALATKA, FL*  
USER INITIALS ----- ADS  
DATE OF RUN ----- 02/06/85  
TIME OF RUN ----- 09:38:05

\*\*\*\*\*  
 \* COMBUSTION CALCULATIONS \*  
 \*\*\*\*\*

FUEL NAME: OIL #6

FUEL USE RATE AS A WEIGHT PERCENTAGE ----- 100.0000  
 BTU'S PER POUND OF FUEL ----- 18400.0000

CONSTITUENT	FUEL PERCENT
32 SULFUR	2.50%
33 CARBON	85.85%
30 HYDROGEN	10.80%
29 NITROGEN	0.70%
34 ASH	0.15%
<b>TOTAL PERCENTAGE</b>	<b>100.00%</b>

PERCENT EXCESS AIR ----- 21.4000%

TOTAL AIR (LBS PER POUND FUEL) ----- 16.6466  
 THEORETICAL AIR (LBS PER POUND FUEL) ----- 13.7122

AT 121.40% THEORETICAL AIR:  
 TOTAL DRY GAS (LBS PER POUND FUEL) ----- 16.6775  
 FLUE PRODUCT H2O (LBS PER POUND FUEL) ----- 1.1816  
 PRODUCT CO2 (LBS PER POUND FUEL) ----- 3.1955  
 FLUE PRODUCT NITROGEN (LBS PER POUND FUEL) ----- 12.8032

PERCENT FUEL HYDROGEN ----- 10.8000  
 PERCENT FUEL SULFUR ----- 2.5000  
 PERCENT FUEL OXYGEN ----- 0.0  
 PERCENT FUEL CARBON ----- 85.8500

\*\*\*\*\*  
\* COMBUSTION CALCULATIONS \*  
\*\*\*\*\*

\*\*\*\*\*  
\* TOTALS FOR ALL FUELS \*  
\*\*\*\*\*

TOTAL FUEL RATE (LBS PER HOUR) ----- 28426.0000  
THEORETICAL COMBUSTION AIR ----- 362358.6250

TOTAL (THEORETICAL PLUS EXCESS) COMBUSTION AIR ----- 439903.1875

AT TOTAL COMBUSTION AIR:

TOTAL FLUE DRY GAS ----- 440718.5000  
TOTAL FLUE PRODUCT H2O ----- 31225.0000  
TOTAL FLUE PRODUCT CO2 ----- 84444.0000  
TOTAL FLUE PRODUCT NITROGEN ----- 338338.5000

TOTAL FUEL HYDROGEN ----- 285400.7324  
TOTAL FUEL SULFUR ----- 60064.9902  
TOTAL FUEL OXYGEN ----- 0.0  
TOTAL FUEL CARBON ----- 2268671.4844

\*\*\*\*\*  
\* BOILER EFFICIENCY \*  
\*\*\*\*\*

PERCENT COMBUSTIBLE IN ASH -----	2.0000
EXIT GAS TEMPERATURE (FAHRENHEIT) -----	425.0000
COMBUSTION AIR TEMPERATURE (FAHRENHEIT) -----	80.0000
PERCENT RADIATION LOSSES -----	0.4000
PERCENT MANUFACTURER'S OR UNMEASURED LOSSES -----	1.5000

ENTHALPY OF WATER VAPOR AT 1 PSIA AND EXIT TEMP -----	1252.5073
ENTHALPY OF LIQUID WATER AT COMBUSTION GAS TEMP -----	48.0000

HEAT LOSS DUE TO DRY GAS -----	7.5049%
HEAT LOSS DUE TO H2 AND FUEL H2O -----	6.3184%
HEAT LOSS DUE TO AIR MOISTURE -----	0.1866%
HEAT LOSS DUE TO COMBUSTIBLE IN REFUSE -----	0.0023%
HEAT LOSS DUE TO RADIATION -----	0.4000%
HEAT LOSS DUE TO UNMEASURED LOSSES -----	1.5000%

TOTAL HEAT LOSSES -----	15.9122%
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BOILER EFFICIENCY -----	84.0878% /
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\* F A N S I Z I N G \*  
\*\*\*\*\*

TOTAL HEAD FOR FD FAN (INCHES H<sub>2</sub>O) ----- 7.5000  
PERCENT EFFICIENCY OF FD FAN ----- 81.6000  
PERCENT LEAKAGE FOR FD FAN ----- 0.5000  
PERCENT SAFETY FACTOR FOR FD FAN ----- 10.0000

TOTAL VOLUME OF COMBUSTION AIR (CFM) ----- 112532.1875  
HORSEPOWER FOR FORCED DRAFT FAN ----- 162.4067

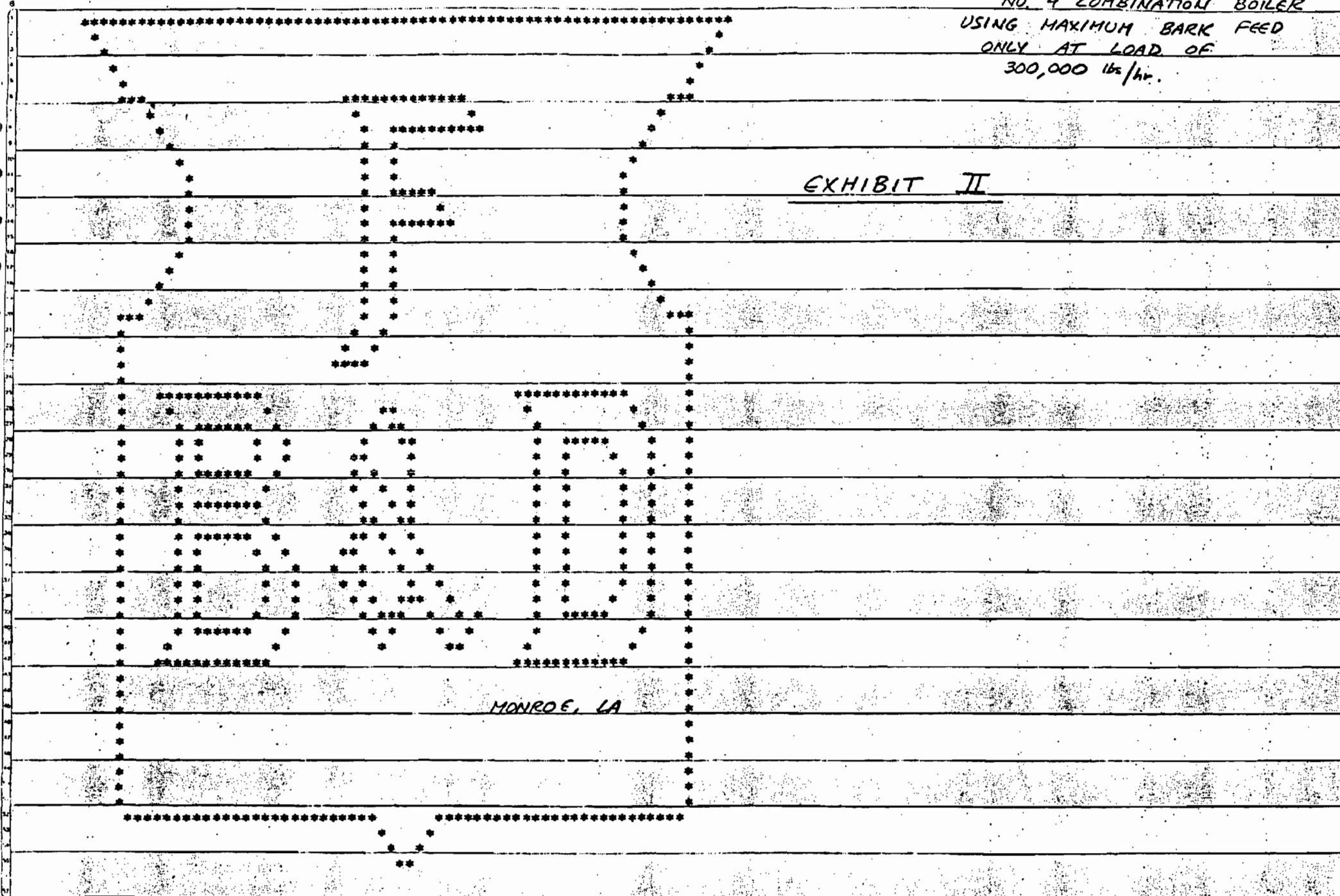
TOTAL HEAD FOR ID FAN (INCHES H<sub>2</sub>O) ----- 10.0000  
PERCENT EFFICIENCY OF ID FAN ----- 71.5000  
PERCENT LEAKAGE FOR ID FAN ----- 0.5000  
PERCENT SAFETY FACTOR FOR ID FAN ----- 10.0000

TOTAL VOLUME OF FLUE GAS (CFM) ----- <sup>ACTUAL</sup> 193827.1875  
HORSEPOWER FOR INDUCED DRAFT FAN ----- 426.4197  
(NEGLECTING 3 STAGE COLLECTORS)

NO. 4 COMBINATION BOILER  
USING MAXIMUM BARK FEED  
ONLY AT LOAD OF  
300,000 lbs/hr.

EXHIBIT II

MONROE, LA



\*\*\*\*\*  
\* COMBUSTION CALCULATIONS \*  
\* BOILER EFFICIENCY \*  
\* FAN SIZING \*  
\*\*\*\*\*

JOB NUMBER ----- C1712

CLIENT NAME ----- GEORGIA PACIFIC  
PALATKA, FL

USER INITIALS ----- ADS

DATE OF RUN ----- 02/05/85

TIME OF RUN ----- 09:28:01

\*\*\*\*\*  
 \* COMBUSTION CALCULATIONS \*  
 \*\*\*\*\*

FUEL NAME: BARK (WOOD)

FUEL USE RATE AS A WEIGHT PERCENTAGE ----- 100.0000  
 BTU'S PER POUND OF FUEL ----- 4500.0000

CONSTITUENT	FUEL PERCENT
28 WATER VAPOR	50.00%
33 CARBON	23.40%
30 HYDROGEN	3.10%
31 OXYGEN	21.50%
34 ASH	2.00%
TOTAL PERCENTAGE	100.00%

PERCENT EXCESS AIR ----- 28.1000%

TOTAL AIR (LBS PER POUND FUEL) ----- 3.6321  
 THEORETICAL AIR (LBS PER POUND FUEL) ----- 2.8353

AT 128.10% THEORETICAL AIR:  
 TOTAL DRY GAS (LBS PER POUND FUEL) ----- 3.8336  
 FLUE PRODUCT H2O (LBS PER POUND FUEL) ----- 0.8253  
 PRODUCT CO2 (LBS PER POUND FUEL) ----- 0.8574  
 FLUE PRODUCT NITROGEN (LBS PER POUND FUEL) ----- 2.7920

PERCENT FUEL HYDROGEN ----- 3.1000  
 PERCENT FUEL SULFUR ----- 0.0  
 PERCENT FUEL OXYGEN ----- 21.5000  
 PERCENT FUEL CARBON ----- 23.4000

\*\*\*\*\*  
\* COMBUSTION CALCULATIONS \*  
\*\*\*\*\*

\*\*\*\*\*  
\* TOTALS FOR ALL FUELS \*  
\*\*\*\*\*

TOTAL FUEL RATE (LBS PER HOUR) -----	97900.0000
THEORETICAL COMBUSTION AIR -----	277578.6875
TOTAL (THEORETICAL PLUS EXCESS) COMBUSTION AIR -----	355578.0000
AT TOTAL COMBUSTION AIR:	
TOTAL FLUE DRY GAS -----	375311.0000
TOTAL FLUE PRODUCT H2O -----	80695.3750
TOTAL FLUE PRODUCT CO2 -----	83937.0625
TOTAL FLUE PRODUCT NITROGEN -----	273332.7500
TOTAL FUEL HYDROGEN -----	303489.9170
TOTAL FUEL SULFUR -----	0.0
TOTAL FUEL OXYGEN -----	2104849.6094
TOTAL FUEL CARBON -----	2290858.9844

\*\*\*\*\*  
\* BOILER EFFICIENCY \*  
\*\*\*\*\*

PERCENT COMBUSTIBLE IN ASH -----	2.0000
EXIT GAS TEMPERATURE (FAHRENHEIT) -----	420.0000
COMBUSTION AIR TEMPERATURE (FAHRENHEIT) -----	80.0000
PERCENT RADIATION LOSSES -----	0.4000
PERCENT MANUFACTURER'S OR UNMEASURED LOSSES -----	1.5000

ENTHALPY OF WATER VAPOR AT 1 PSIA AND EXIT TEMP -----	1250.1526
ENTHALPY OF LIQUID WATER AT COMBUSTION GAS TEMP -----	48.0000

HEAT LOSS DUE TO DRY GAS -----	6.9516%
HEAT LOSS DUE TO H2 AND FUEL H2O -----	20.7582%
HEAT LOSS DUE TO AIR MOISTURE -----	0.1641%
HEAT LOSS DUE TO COMBUSTIBLE IN REFUSE -----	0.1278%
HEAT LOSS DUE TO RADIATION -----	0.4000%
HEAT LOSS DUE TO UNMEASURED LOSSES -----	1.5000%
TOTAL HEAT LOSSES -----	29.9017%
BOILER EFFICIENCY -----	70.0983%

\*\*\*\*\*  
\* F A N S I Z I N G \*  
\*\*\*\*\*

TOTAL HEAD FOR FD FAN (INCHES H2O) -----	6.4000
PERCENT EFFICIENCY OF FD FAN -----	81.6000
PERCENT LEAKAGE FOR FD FAN -----	0.5000
PERCENT SAFETY FACTOR FOR FD FAN -----	10.0000

TOTAL VOLUME OF COMBUSTION AIR (CFM) -----	90562.4375
HORSEPOWER FOR FORCED DRAFT FAN -----	111.7292

TOTAL HEAD FOR ID FAN (INCHES H2O) -----	12.0000
PERCENT EFFICIENCY OF ID FAN -----	71.5000
PERCENT LEAKAGE FOR ID FAN -----	0.5000
PERCENT SAFETY FACTOR FOR ID FAN -----	10.0000

TOTAL VOLUME OF FLUE GAS (CFM) -----	<i>ACTUAL</i> 197681.0000
HORSEPOWER FOR INDUCED DRAFT FAN -----	521.8777

(NEGLECTING 3 STAGE COLLECTORS)