SEPTEMBER 1980

PSD PERMIT
APPLICATION

FOR

THE PROPOSED FUEL CONVERSION PROJECT

PREPARED FOR

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

BUREAU OF AIR QUALITY MANAGEMENT

BY

CCA

Container Corporation of America

FERNANDINA BEACH, FLORIDA

WESTON
DESIGNERS CONSULTANTS

Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

October 1, 1980

Mr. Steve Smallwood, Chief
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Smallwood:

On behalf of Container Corporation of America, we herewith file three copies of our Application to Construct for the Proposed Fuel Conversion Project relating to facilities to be constructed at our Fernandina Beach, Florida mill. The Application consists of this transmittal letter, a similar transmittal letter of even date from Roy F. Weston, Inc., our consultants for preparation of the Application, and the Application with supporting documentation.

We would appreciate your earliest consideration of this Application, and we assume that the completeness of this Application will be determined within the specified thirty days from the date of filing. For everyone's records, we would appreciate a copy of this letter duly dated and signed, confirming receipt of this Application.

We will be pleased to answer any questions related to this Application at any time.

Very truly yours,

CONTAINER CORPORATION OF AMERICA
Fernandina Beach Mill Division

Walter M Kendrick /for

R. W. Galphin,
General Manager

Enclosures
/ji

Receipt of the foregoing is acknowledged this __________ day of October, 1980.

____
(Name)
(Title)

WESTON
ENVIRONMENTAL CONSULTANTS-DESIGNERS

4329 MEMORIAL DR.
SUITE C
DECATUR, GA. 30032
PHONE: (404) 294-7575

October 1, 1980

Mr. Steve Smallwood, Chief
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Smallwood:

Enclosed please find a copy of the Application to Construct Air Pollution Sources and supporting documentation for Container Corporation of America's proposed fuel conversion project at the Fernandina Beach mill. Three copies are being submitted to the Florida Department of Environmental Regulations (FDER) for review and approval. The permit application has been prepared by Roy F. Weston, Inc., Environmental Consultants and Designers, on behalf of CCA.

Should you have any questions about the permit application or supporting documentation, please call me in Atlanta (404) 294-7575, or Mr. Dick Galphin, Jr., General Manager at Container Corporation (904) 261-5551.

We sincerely appreciate the assistance and advice provided by the FDER in the preparation of this application and look forward to an expeditious review and approval of the permit.

Sincerely,

Alan H. Epstein, Manager
Resources Engineering

AHE:ji

Enclosure

PSD PERMIT APPLICATION

FOR

CONTAINER CORPORATION OF AMERICA'S

PROPOSED FUEL CONVERSION PROJECT

OCTOBER 3, 1980

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SECTION 1

INTRODUCTION, SUMMARY AND PERMIT APPLICATION FORM

1.1 INTRODUCTION

Container Corporation of America (CCA) proposes to implement a fuel conversion project at its Fernandina Beach pulp and paper mill. The objectives of the proposed project are to:

- Re-establish the mill's economic viability;
- Reduce the mill's dependency on oil by using as much wood waste as possible;
- Allow more economic operation in terms of energy costs by increasing the mill's flexibility in terms of fuel mix; and
- Increase the mill's self-sufficiency by generating more on-site electrical power.

The proposed project will effectively change the existing mill's fuel mix from a combination of oil and wood waste to a combination of coal, oil and wood waste. This shift in fuel mix is consistent with national energy policy relative to coal conversion, and promotes the national goal of reducing the nation's dependence on foreign oil.

This report provides the permit application and all necessary supportive documentation to fully satisfy the information requirements of the the State of Florida, Department of Environmental Regulation (DER) for obtaining a New Source Permit under Prevention of Significant Deterioration (PSD) review procedures. The approach taken in demonstrating compliance with all applicable state and Federal emission and ambient air quality limitations is extremely conservative. In virtually every instance where engineering judgement was exercised, the environment, rather than the mill, was given the benefit of the doubt. More specifically, the values selected for coal characteristics, emission rates, assumptions used in the computer modeling analysis, and interpretation of model results are all deliberately prejudiced on the side of demonstrating the maximum possible worst case conditions.

It must be noted that engineering and design for the proposed project has not yet been completed, nor have vendor contracts been let. Therefore, the information contained in this report should not be considered as final. However, CCA is committed to at least achieving those emission limitations and control efficiencies identified in this report as Best Available Control Technology (BACT). In the final analysis, the actual operating emission rates, as well as actual impacts of the proposed project on ambient air quality, are expected to be lower than those presented.

This report has been organized as follows:

- o <u>Section 2 - The Proposed Project</u> presents site information, plans and specifications for the proposed project, scheduling of construction and start-up, anticipated fuel slate and composition, emission source characteristics, and emission control equipment.

- Section 3 - Determination of Source Emissions for the Baseline and Modified Mill presents worst case emission inventories for the baseline and modified mill conditions, and compares the net change in emissions from the baseline to the modified mill configuration.

- Section 4 - Determination of Best Available Control Technology presents a discussion of the proposed control systems for particulate matter, SO_2, nitrogen oxides, carbon monoxide, and non-reactive hydrocarbons, alternative control systems considered, and a comparison of the proposed BACT systems with alternative control systems, including an analysis of comparative economic, energy and environmental impacts.

- Section 5 - Existing Conditions presents a summary of emissions for the baseline mill and other souces in the project area, together with an analysis of ambient air qualtiy.

- Section 6 - Air Quality Impact Analysis presents an analysis of the incremental increases in ambient pollutant concentrations anticipated from the proposed project, presents a comparison of total ambient concentration levels with applicable Federal and State of Florida ambient air quality standards, and presents a discussion of the effects that the incremental increases in ambient pollution concentrations are anticipated to have on air quality related values, including visibility, acidification of rainfall, soils, aquatic and terrestrial ecology, and associated growth.

1.2 SUMMARY

From the standpoint of the principal pollutants regulated under the currently effective PSD regulations, and assuming worst case conditions which are unlikely to actually occur, the proposed mill modifications will result in the following changes in emissions:

- Particulates: an increase of approximately 28.0% on an annual average basis over the baseline mill; on a 24-hour maximum basis, the net change ranges from an increase of approximately 8.7% in the "maximum normal" operating condition, to an increase of approximately 35.3% on a maximum worst case basis.

- SO_2: an increase in emissions of approximately 35% on a worst case annual average basis; on a 24-hour maximum worst case basis, an increase of 88% to a nominal worst case decrease of approximately 18.4%.

From the same standpoint, and with the same assumptions, the proposed mill modifications will have the following impacts on ambient air quality:

- Particulates: a net decrease or improvement in ambient TSP concentrations, even assuming that the worst (maximum) emissions occur during the worst case meteorological conditions.

- SO_2: slight increase in ambient SO_2 concentrations in the project area; when compared with the allowable increases (increments) established for Class II areas, the increase in ambient concentrations attributable to the proposed mill modifications represent the following portions of the allowable SO_2 increments:

Annual Average	4.9%
24 Hour Maximum	16.3%
3 Hour Maximum	4.6%

Again, it must be stressed that this assumes the worst case (maximum) SO_2 emissions occur during the worst case meteorological conditions.

With regard to the control of pollutant emissions, BACT proposed for this project represents control technology which is technically feasible from the standpoint of offering control efficiencies which can be achieved on a reliable, continuous basis.

The attached Application to Operate/Construct Air Pollution Sources has been prepared to be fully responsive to the requirements of the Florida DER. Because of limited space on the form, detailed presentation of the material requested is made within the body of this report and is so referenced in the appropriate space on the application.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Power Boiler [X] New[1] [ ] Existing[1]

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

COMPANY NAME: Container Corporation of America COUNTY: Nassau

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) Power Boiler #7

SOURCE LOCATION: Street North 8th Street City Fernandina Beach

UTM: East 456.213 E North 3394.186 N.

Latitude 30 o 45 ' ____ "N Longitude 81 o 30 ' ____ 'W

APPLICANT NAME AND TITLE: Container Corporation of America

APPLICANT ADDRESS: North 8th Street, Fernandina Beach, Florida

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: R. W.

General Manager
Name and Title (Please Type)

Date: 10-1-80 Telephone No. 904-261-5551

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

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

Signed: J Ronald Lawson

J. Ronald Lawson, P.E.
Name (Please Type)

Roy F. Weston, Inc.
Company Name (Please Type)

4329 Memorial Drive, Suite C, Decatur, GA 30032
Mailing Address (Please Type)

(Affix Seal)

J. RONALD LAWSON
No. 21819

Florida Registration No. ____

Date: 10/1/80 Telephone No. (404) 294-7575

---

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

SECTION II: GENERAL PROJECT INFORMATION

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

See Section 2 of Report - The Proposed Project

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

Start of Construction January, 1981 (approx.) Completion of Construction July, 1982 (approx.)

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.)

See Section 4 of Report

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

None - New Source

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

F. Normal equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 50 ; if power plant, hrs/yr ____ ;

if seasonal, describe:

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

1. Is this source in a non-attainment area for a particular pollutant? 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. Yes
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirements apply to this source? If yes, see Sections VI and VII. Yes
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? Yes
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

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

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

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

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
		See Section 2 of Report		

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

1. Total Process Input Rate (lbs/hr): See Section 2 of Report

2. Product Weight (lbs/hr): See Section 2 of Report

C. Airborne Contaminants Emitted:

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

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

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It5
	See Section 4 of Report			

[1] See Section V, Item 2.

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

[3] Calculated from operating rate and applicable standard

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

[5] If Applicable

E. Fuels See Section 2 of Report

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

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

Fuel Analysis:

Percent Sulfur: ______ Percent Ash: ______

Density: ______ lbs/gal Typical Percent Nitrogen: ______

Heat Capacity: ______ BTU/lb ______ BTU/gal

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

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

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

See Section 2 of Report

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack): See Section 5 of Report

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

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

Water Vapor Content: ______ % Velocity: ______ FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs/hr Incinerated							

Description of Waste ______

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

Approximate Number of Hours of Operation per day ______ days/week ______

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 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: ______________

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

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight — show derivation. See Section 2
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. See Section 3
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test). See Section 3
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, etc.). See Sections 2 and 4
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). See Sections 2, 3, and 4
6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained. See Section 2
7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map). See Sections 2 and 6
8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram. See Section 2

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

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

See Section 3 of Report

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:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

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

c. Flow Rate: ACFM d. Temperature: °F

e. Velocity: FPS

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

1.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

*Explain method of determining efficiency.

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

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

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*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

F. Describe the control technology selected:

1. Control Device:

2. Efficiency*:

3. Capital Cost:

4. Life:

5. Operating Cost:

6. Energy:

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

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

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

*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 See Section 5 of Report

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

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

Other data recorded ____

Attach all data or statistical summaries to this application.

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 See Section 6 of Report

1. ______ Year(s) of data from ____/____/____ (month day year) to ____/____/____ (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 See Sections 5 and 6 of Report

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 See Section 3 of the Report

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

E. Emission Data Used in Modeling See Sections 5 and 6 of Report

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

F. Attach all other information supportive to the PSD review. See Section 6 of Report

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

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

See Sections 4 and 6 of Report

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.

See Section 4 of Report

The Proposed Project

SECTION 2

THE PROPOSED PROJECT

2.1 PHYSICAL SETTING

The Fernandina Beach mill is located on the inland side of Amelia Island, Florida in the northwest sector of the city of Fernandina Beach (see Figures 2-1 and 2-2). Serving as the Nassau County seat, Fernandina Beach is the largest city in the county with a 1978 population numbering approximately 8,500 persons. The major urban center in the region is the city of Jacksonville, approximately 40 kilometers southwest of CCA's mill. Other development areas near the mill include the Military Ocean Terminal at Kings Bay, Georgia (sixteen kilometers north of the mill site) and St. Marys, Georgia which is 10 kilometers northwest of the mill.

The Okefenokee Wildlife Wilderness Sanctuary, and the Wolf Island National Wildlife Refuge and Wilderness Area, Class I PSD areas, are located approximately 64 kilometers west and 74 kilometers north of the mill complex, respectively. A northern section of urban Jacksonville has been classified as a TSP non-attainment area and, as shown in Figure 2-2, is located approximately 40 kilometers southwest of the Fernandina Beach mill. Two industrial sources of air pollutants are in close proximity to the Fernandina Beach mill (see Figure 2-1); ITT Rayonier is 3 kilometers southwest and Gilman Paper Company is 10 kilometers west and north.

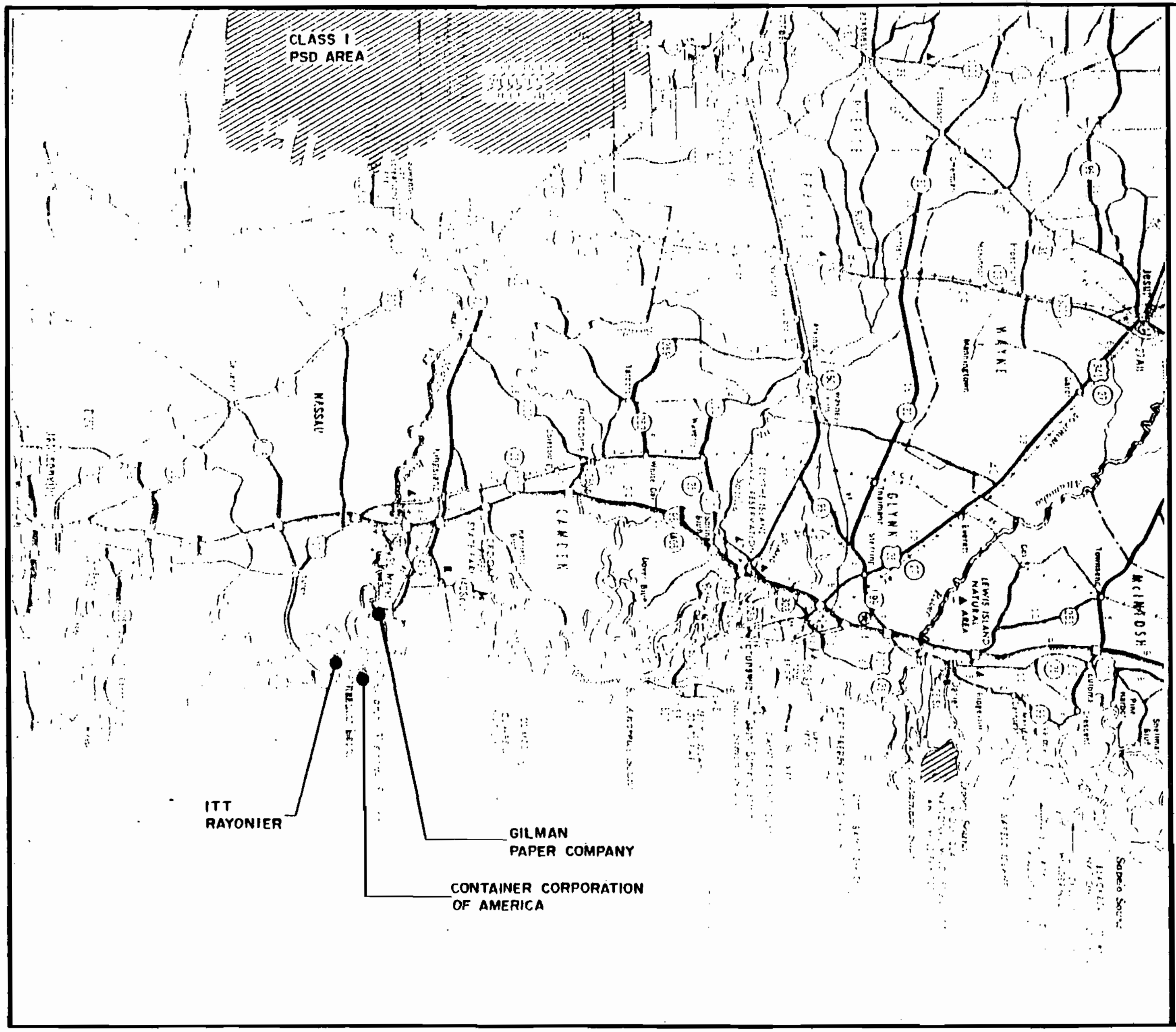
The major transportation facilities servicing Fernandina Beach are shown in Figure 2-3. The mill complex is accessible by Highway A1A (The Buccaneer Trail), Highway 105A (Amelia Road), the Seaboard Coast Line railroad, and the Amelia River. As shown in Figure 2-4, the mill complex is bounded by the Amelia River to the west, Franklin Street to the south, 14th Street to the east, and Bosquebello Cemetery to the north.

Amelia Island displays land form characteristics typical of a barrier island. Sand dunes adjacent to the Atlantic Ocean are approximately 40 feet above mean sea level. The terrain inland from the dunes slopes gently downward and is relatively flat. The west side of Amelia Island is interspersed with marshes which serve as the border of a large marsh and swamp system covering numerous acres west of Amelia Island on the Florida mainland.

2.2 DESCRIPTION OF EXISTING MILL

Major equipment and facilities which are currently in operation at the mill are shown in Figure 2-4. The mill utilizes the Kraft and neutral sulfite pulping process with cross recovery of spent pulping liquors, and has a daily production capacity of 2,000 tons.

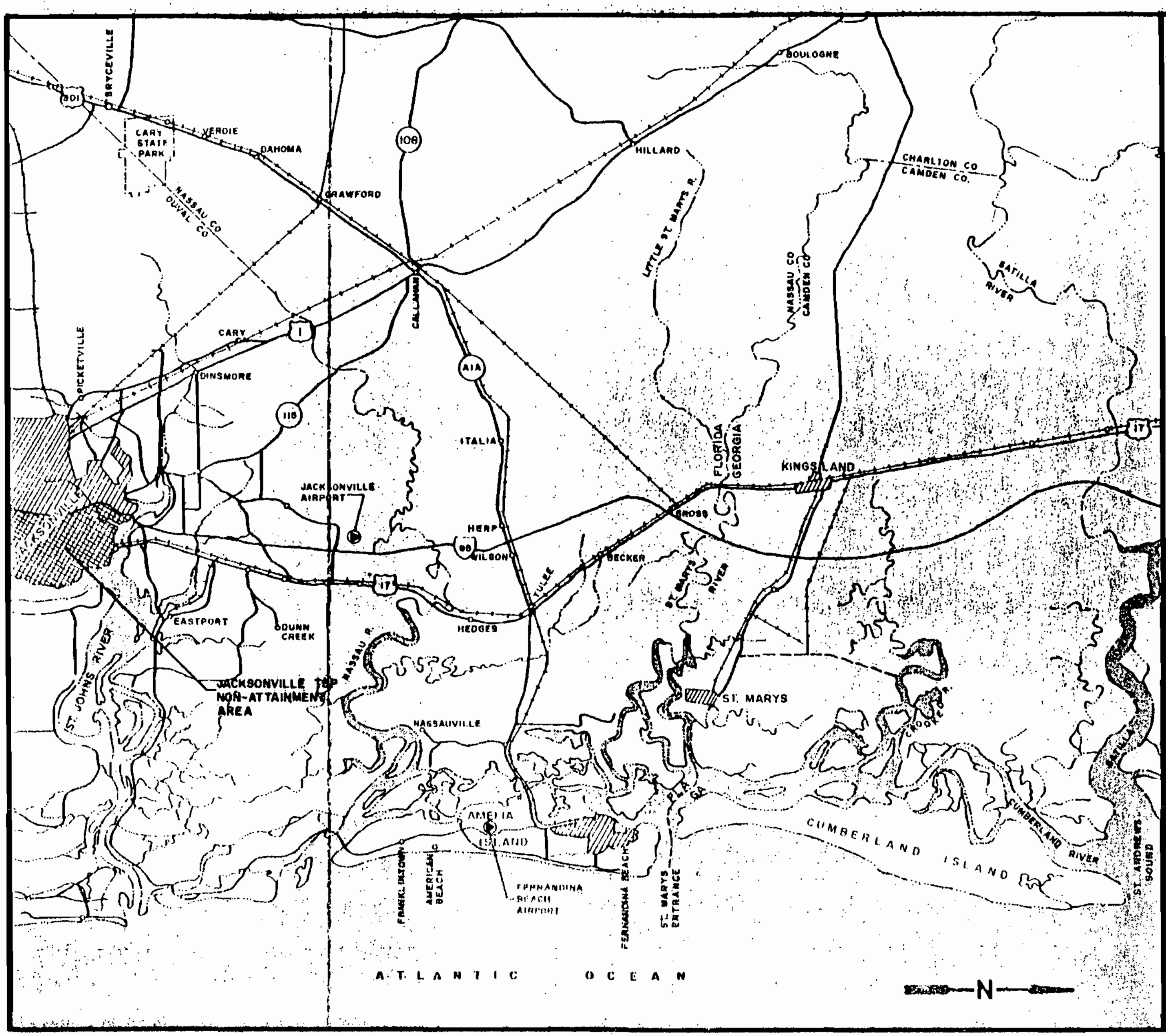
The only aspects of existing mill operations which will change as a result of the proposed project, and which will have an effect on air quality, are the power and recovery boilers. There are four power boilers (Nos. 3, 4, 5 and 6) which are currently oil or oil and wood waste fired. The three recovery boilers (Nos. 3, 4, and 5) are fired by black liquor.



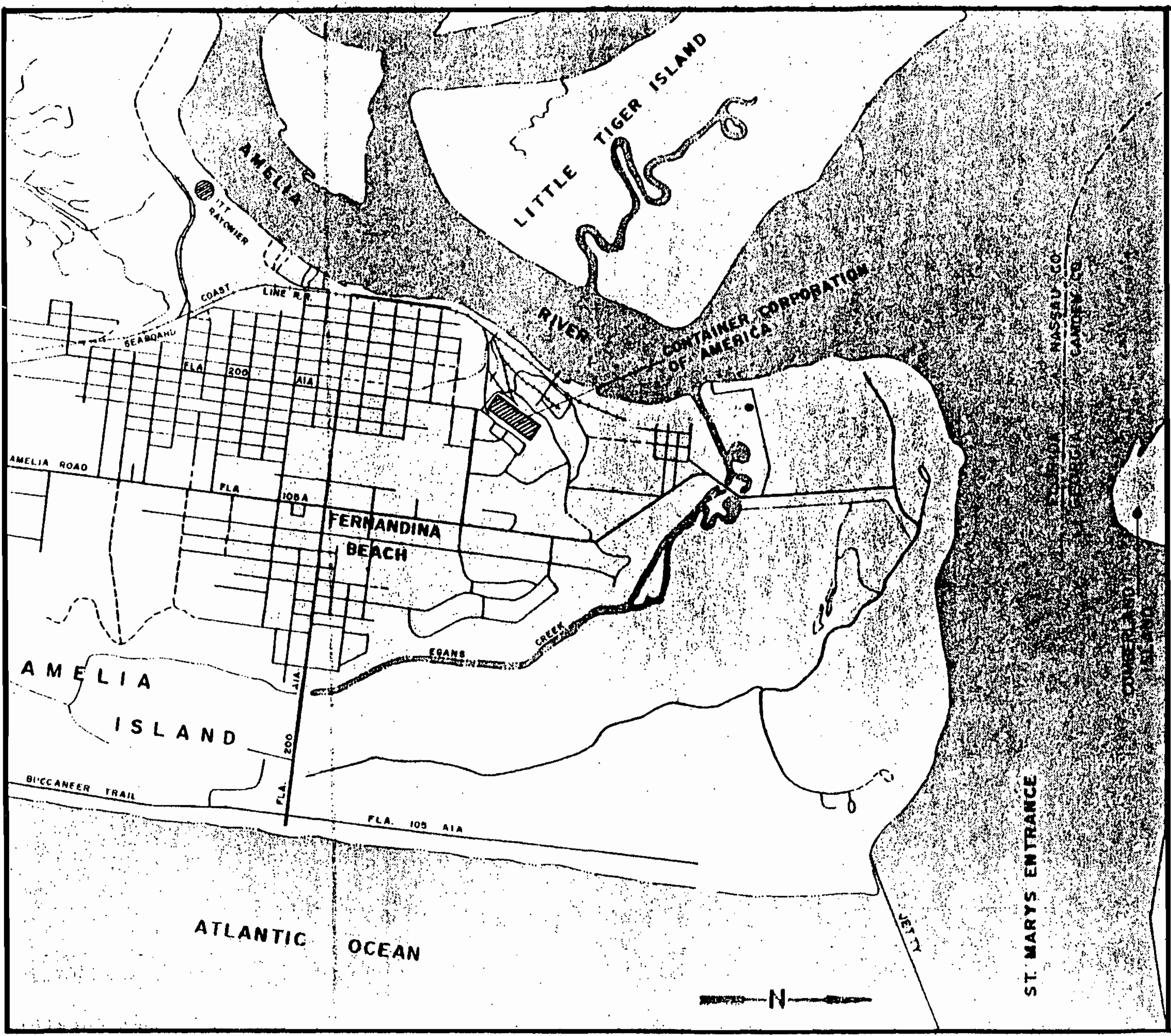
CONTAINER CORPORATION
OF AMERICA
FERNANDINA BEACH, FLORIDA

FIGURE NO. 2-1
REGIONAL LOCATION MAP

Best Available Copy



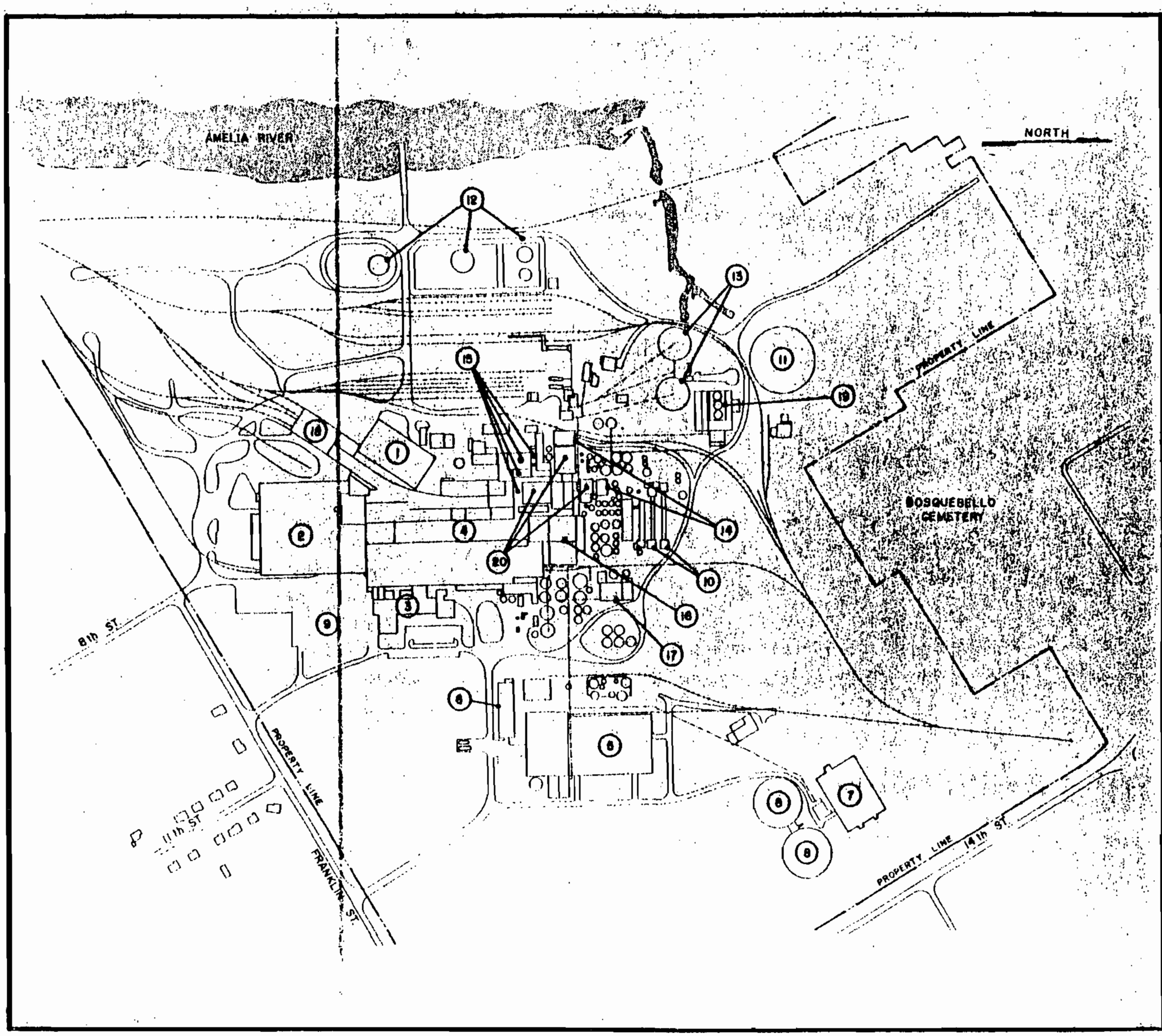
CONTAINER CORPORATION OF AMERICA
FERNANDINA BEACH, FLORIDA
FIGURE NO. 2-2
AREA LOCATION MAP



0 1/2 1
SCALE IN STATUTE MILES

CONTAINER CORPORATION OF AMERICA
FERNANDINA BEACH, FLORIDA
FIGURE 2-3
SITE MAP

Best Available Copy



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19. COOLING TOWER
20. RECOVERY BOILERS & SMELT TANKS

0 400 1000

APPROX. SCALE: 1" = 400'

CONTAINER CORPORATION
OF AMERICA
FERNANDINA BEACH, FLORIDA
FIGURE NO. 2-4
PLOT PLAN

2.3 PLANS AND SPECIFICATIONS FOR THE PROPOSED PROJECT

The objectives of the proposed fuel conversion project are to:

- Re-establish the mill's economic viability;
- Reduce the mill's dependence on oil by using as much wood waste as possible for fuel, supplemented by coal and oil;
- Allow more economic operation in terms of energy cost by increasing the mill's flexibility in terms of fuel mix; and
- Allow the mill to become electrically self sufficient by generating more on-site electrical power.

The proposed project will involve the following additions or alterations to the baseline mill:

- A new coal/wood waste power boiler capable of producing approximately 825,000 lbs. of steam per hour;
- Retiring No. 6 power boiler;
- Placing No. 3 power boiler on "cold" standby;
- Retiring No. 3 recovery boiler and its associated smelt tank;
- Coal preparation and materials handling facilities to supply the new boiler;
- Air pollution control equipment associated with the new boiler; and
- Ash handling and disposal facilities associated with the new boiler.

The proposed locations of these and related facilities are shown in Figure 2-5.

The major feature of the proposed project is a new combination power boiler, designated power boiler No. 7, to replace power boilers No. 3 and No. 6, and recovery boiler No. 3 and its associated smelt tank. The new boiler, capable of generating 825,000 lbs. of steam per hour at 825°F and 850 psig, will be designed to burn either 100% coal or a mixture of up to 30% wood waste and 70% coal based on heat value, or approximately a 50/50 mixture based on fuel weight. The boiler will have both pulverized coal firing and a traveling grate for co-firing with coal and wood waste. The boiler will maximize char re-injection and also include an ash removal system (both fly ash and bottom ash). A schematic of the proposed boiler arrangement is shown in Figure 2-6. Operating performance data for the proposed boiler are summarized in Table 2-1.

The boiler will be equipped with appropriate instrumentation for combustion control. An oxygen analyzer will be used to monitor excess oxygen in the flue gas, and will be equipped with a high and low alarm so the boiler operator can maintain combustion air flow in the proper range. Opacity monitoring will also be provided.

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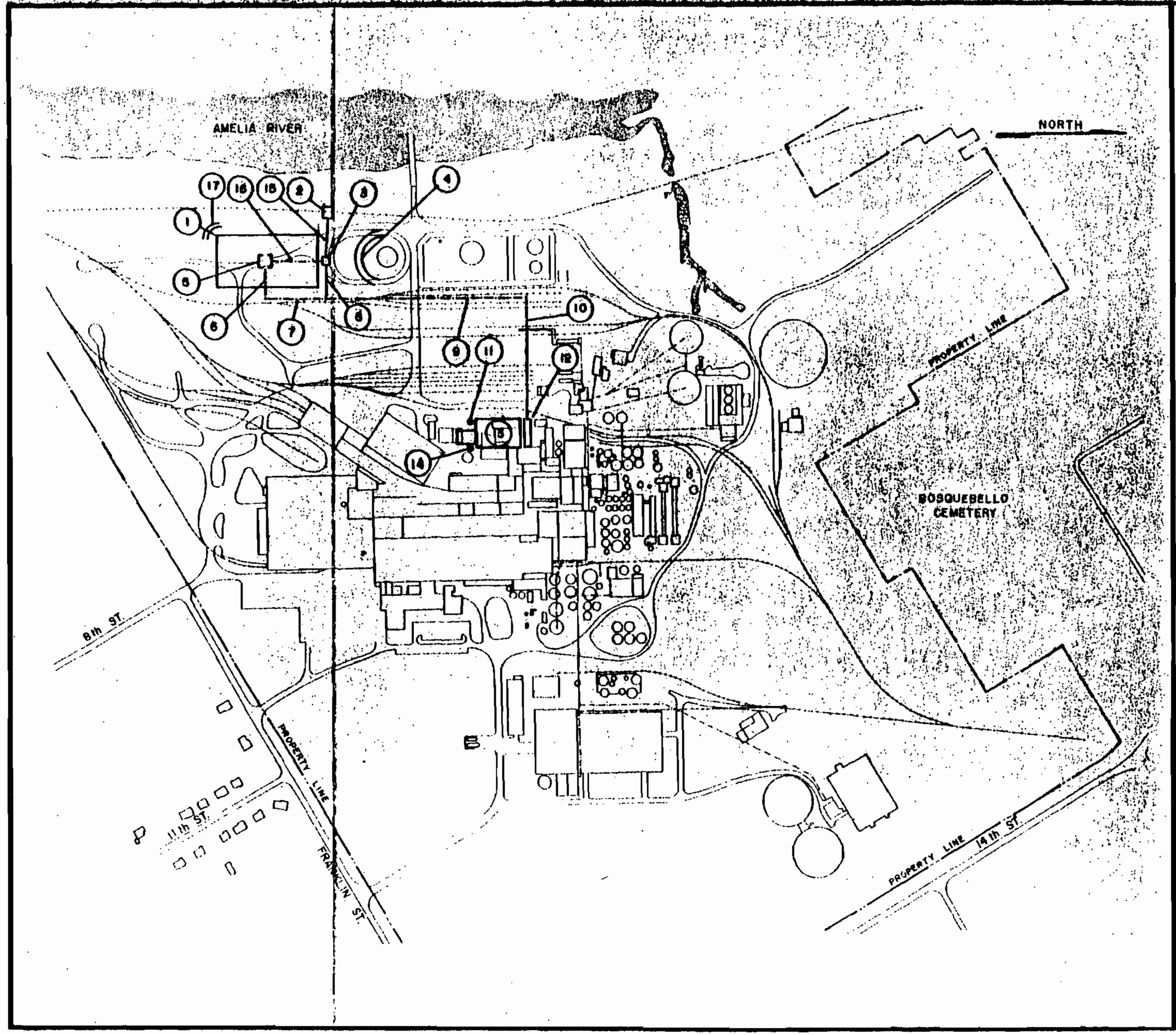

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1. COAL PILE
2. CAR DUMP WITH SHAKER
3. ENCLOSED CRUSHER
4. RELOCATED BERM
5. RECLAIM HOPPER (UNDERGROUND)
6. TUNNEL CONVEYOR
7. CONVEYOR NO. 4
8. CONVEYOR NO. 3
9. CONVEYOR NO. 5
10. CONVEYOR NO. 6
11. STACK FOR NO. 7 BOILER
12. COAL BUNKER OR SILOS
13. NO. 7 BOILER, DUST COLLECTOR AND PRECIPITATOR
14. FLY ASH SILO
15. CONVEYOR NO. 1
16. CONVEYOR NO. 2
17. BERM (AROUND PERIMETER OF COAL PILE)

0 400 1000

APPROX. SCALE: 1" = 400'

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FIGURE 2-5
MAJOR EQUIPMENT AND FACILITIES
ASSOCIATED WITH PROPOSED PROJECT

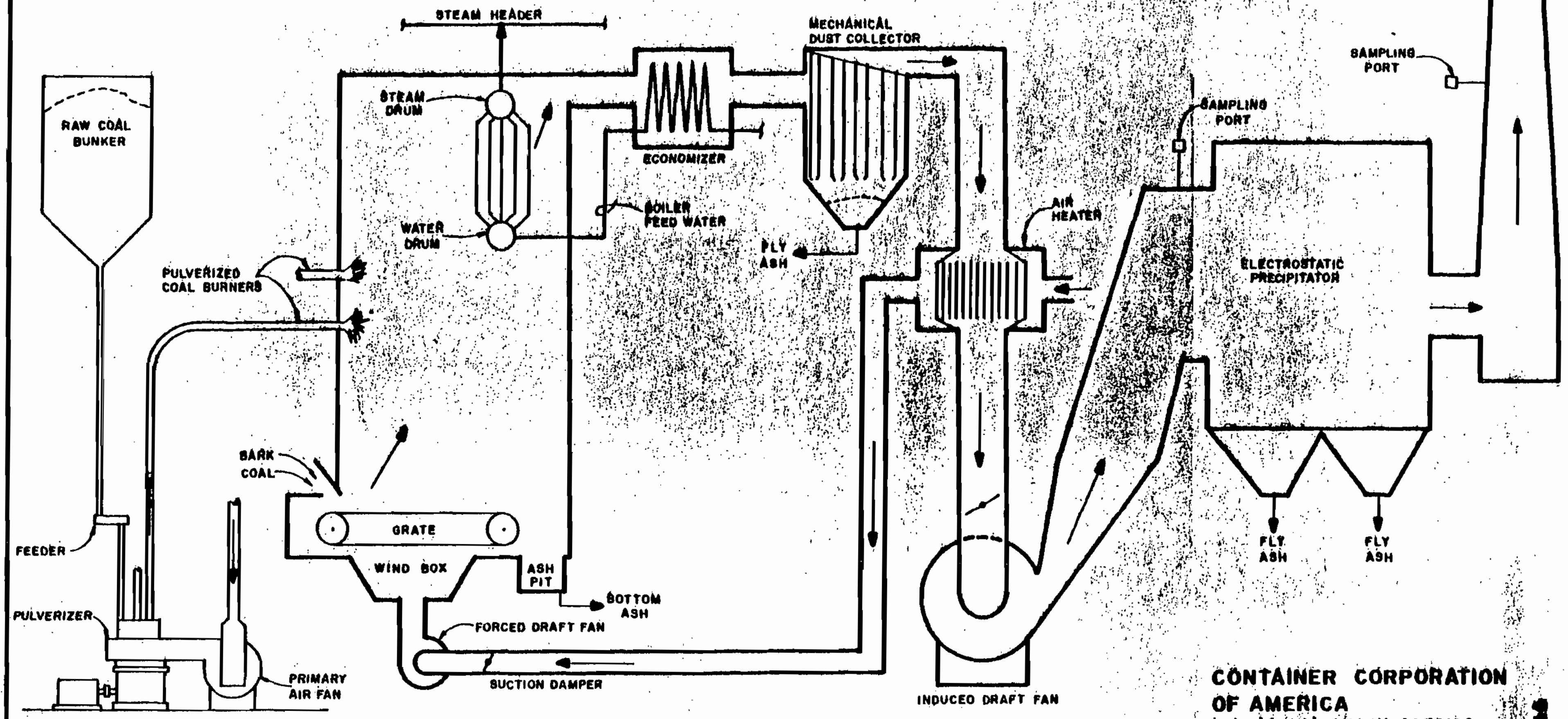

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**FIGURE NO. 2-8
PROPOSED NO. 7 POWER BOILER
SCHEMATIC**

Table 2-1

POWER BOILER NO. 7 DATA SUMMARY

	Maximum Rating		Design (Annual Average)
	Coal Only	Coal/Wood Waste	Coal Only
Steam capacity (lb/hr)	825,000	825,000	742,500
Temperature (^oF)	825	825	825
Pressure (psig)	850	850	850
Feedwater (lbs/hr)	851,000	851,000	737,500
Temperature (^oF)	350	350	350
Pressure (psig)	1,025	1,025	1,025
Boiler efficiency (%)	88	84	88
Heat input (MM Btu/hr)	1,021	773(coal)+ 311(wood waste)	885
Type of firing	Pulverized coal and traveling grate for wood waste/coal		
Char reinjection	Maximum possible (when firing with wood waste)		
Particulate control device	Mechanical collector followed by electrostatic precipitator		

When firing on a combination of coal and wood waste, the proposed boiler will utilize char re-injection to increase boiler efficiency and at the same time minimize the emissions of uncombusted carbon.

Auxillary equipment for the boiler includes an economizer, F.D. and I.D. fans and drives, air preheater, instrumentation, breaching and ductwork, and related piping to comprise a full and operational boiler installation. Sampling ports will be included in the design.

To feed the new boiler, a totally dedicated coal handling system is proposed. The system is designed to deliver a nominal 41 tons per hour.

The coal handling system is depicted schematically in Figure 2-7. It consists of the unloading area, storage area, preparation facility, and conveyor system. The basic control techniques used to reduce fugitive dust emissions to a minimum include the use of enclosed conveyors, enclosed silo storage (for coal feed to the No. 7 power boiler), enclosed crusher area, underground reclamation from the coal pile storage area, and the use of surfactant sprays at all open unloading and transfer points.

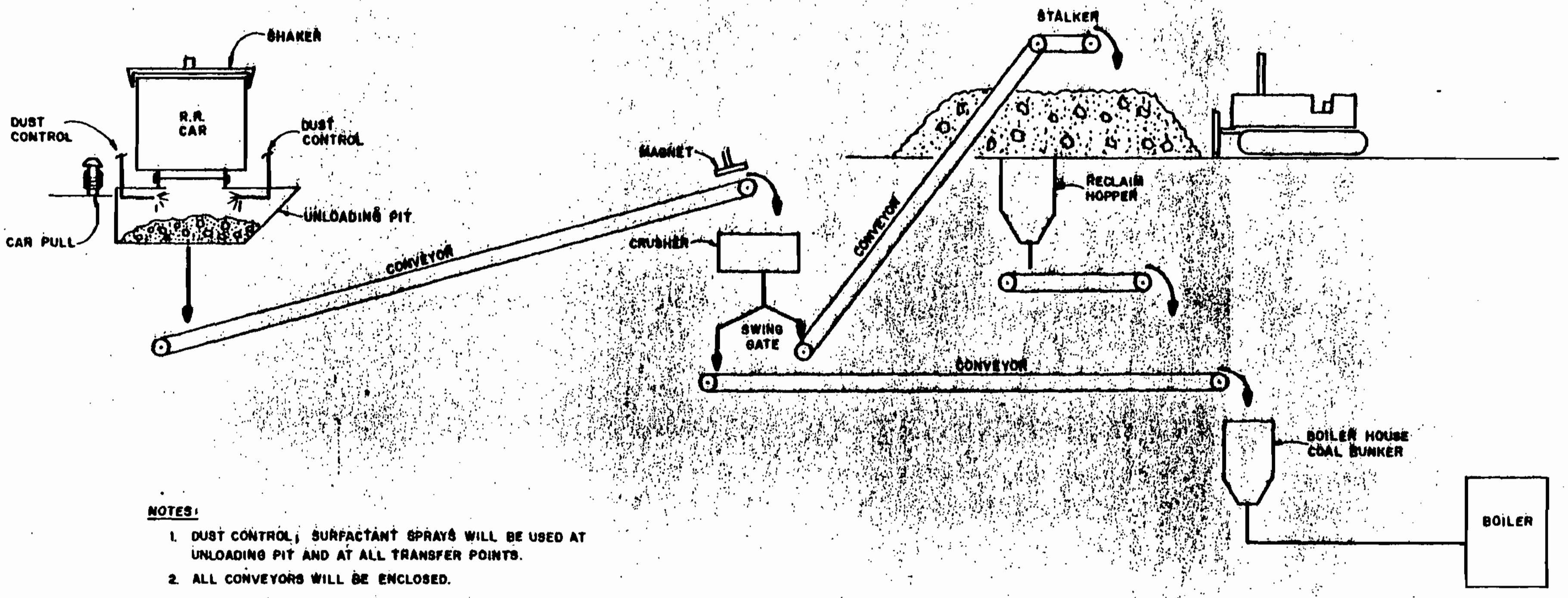
Figure 2-5 provides a plot plan representation of the conveyor system. It includes six (6) above ground, enclosed conveyors. An endless belt design is used which is supported and moved by a three-roll carrying idler system. Belt capacity is sized by the desired speed, slope of coal movement and the size of the coal being transported. The nominal design is a belt of 36 inch width, with 18 degree (maximum) slope of operation, operating with 20 degree idler roller inclination and velocities to 300 fpm.

Railroad cars will be unloaded by bottom dumping. A car shaker will impart mechanical energy to the sloping portions of the car to facilitate coal flow. Surfactant spray will be used above and below the railcar during dumping operations, and dust control curtains will seal off dust emanation at the sides of the railcar, below the rail surface.

A crusher system, located in an enclosed area, will shear and compress delivered run of the mine coal to a maximum size of 1.25 inch, suitable for storage. The crusher will be capable of handling 50 tons per hour.

Two types of coal storage areas will be used for the proposed facility operation: dead (reserve) storage which guards against transportation and other potential coal delivery delays and will allow uninterrupted operation of the boiler; and live (or active) storage, which supplies coal directly to the boiler.

The dead (reserve) storage area is an open area, which is designed to provide 45 days of reserve storage (or about 40,000 tons of coal). Normal handling will transfer part of an incoming shipment to live storage. The remainder will be transferred to dead storage (after crushing), at rates governed by process needs and delivery schedules. A tripper conveyor (or traveling stacker) will be used to deliver the coal to the dead storage area, using surfactant control at the point of discharge. As shown in Figure 2-7, the tripper unit will be located at the discharge end of No. 2 conveyor.



NOTES:

1. DUST CONTROL; SURFACTANT SPRAYS WILL BE USED AT UNLOADING PIT AND AT ALL TRANSFER POINTS.
2. ALL CONVEYORS WILL BE ENCLOSED.
3. OUTDOOR STORAGE PILE WILL BE COMPACTED AND SEALED WITH A SPRAY TO MINIMIZE FUGITIVE DUST LOSSES OR EROSION.

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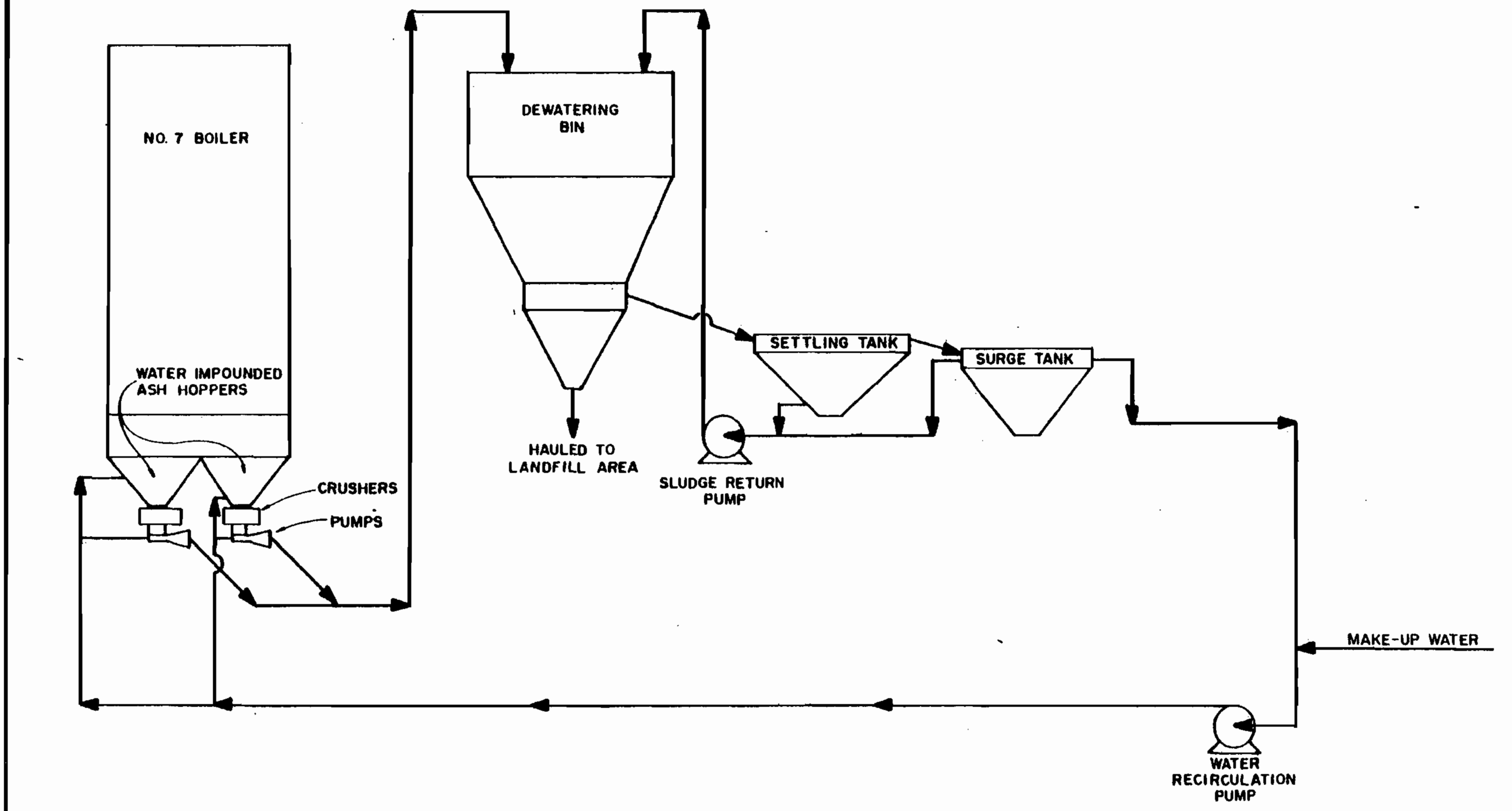
FIGURE NO. 2-7
COAL HANDLING SYSTEM
SCHEMATIC



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FERNANDINA BEACH, FLORIDA

FIGURE NO. 2-8
PROPOSED BOILER NO. 7
BOTTOM ASH CONVEYING SYSTEM SCHEMATIC

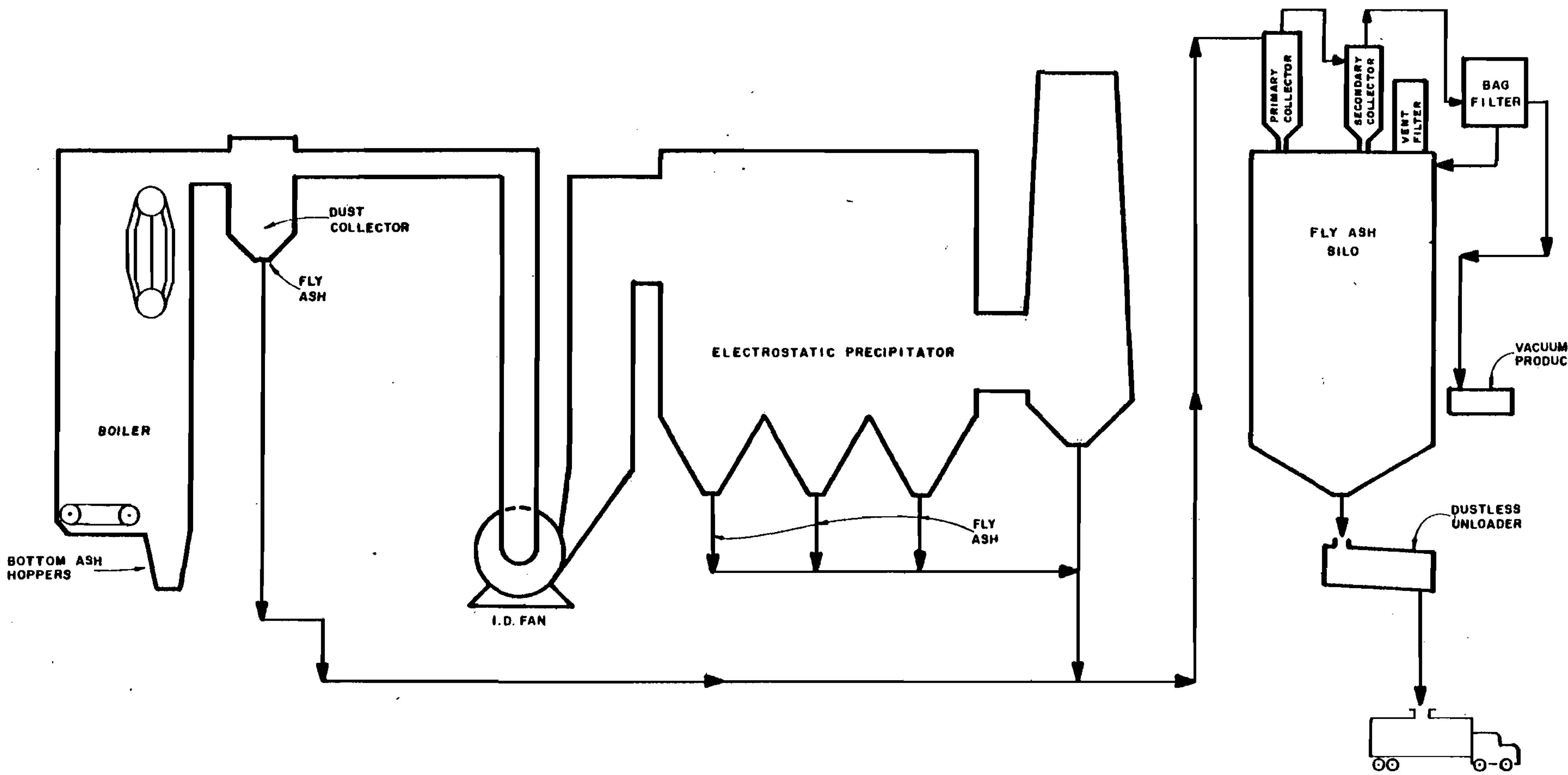

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FIGURE NO. 2-9
PROPOSED BOILER NO. 7
FLY ASH SYSTEM SCHEMATIC

Table 2-2

ASH HOPPER SPECIFICATIONS

1. Number of hoppers	Dust collector - 3 Economizer - 3
2. Volume of hoppers	250 ft^3 each
3. Minimum slope of hopper valleys	60°
4. Number of hopper level indicators	2 per dust collector hopper 6 total
5. Type of hopper level indicators	Bindicators (Zurn or equal)

2.4 SCHEDULE

CCA proposes to begin construction of the proposed project as soon as possible after issuance of all environmental permits to construct. Construction is anticipated to be completed within 18 months. Start-up and initial test runs will be conducted during a four to six week period after construction is completed, with full-scale operation estimated to occur within three months after initial start-up. Manpower scheduling for construction is shown in Figure 2-10.

2.5 FUEL USE AND COMPOSITION

As previously indicated (See Table 2-1), the proposed combination boiler will be capable of burning a fuel mixture of wood waste and coal. To facilitate start ups and provide for emergencies, the boiler will also be designed to allow up to 25% steam generation on oil. On a heat input basis, wood waste will provide a maximum of 30% of the energy requirements, with the remaining 70% being derived from coal. At times the boiler will be operated exclusively on coal up to its maximum rated capacity of 825,000 pounds per hour of steam. The normal design operating condition, i.e., the "average annual" condition, is based on utilization of 100% coal in the computation of boiler performance and emission source characteristics.

An analysis of the coal that potentially would be utilized is presented in Table 2-3. The results of the analysis indicate that the average sulphur content is approximately 0.7%, while the heating value of the coal is approximately 12,500 Btu's per pound. Other pertinent information from the analysis of the coal samples indicate that the trace metal content for lead is approximately 5 ppm, for beryllium about 1 ppm. The ash content for the coal ranges from 5.2% to 6.7%, while the system is designed to handle up to 11% ash content coal.

All types of wood waste, including logging, wood yard, and lumber mill waste materials, will be utilized.

2.6 EMISSION SOURCE CHARACTERISTICS

The physical source characteristics for the proposed combination boiler are provided in Table 2-4. Uncontrolled (inlet) and controlled (outlet) emission for the four primary criteria pollutants (SO_2, TSP, NO_X and CO) as well as total non-methane hydrocarbons, are provided in Table 2-5.

Emission rates shown for the respective pollutants are based on the maximum rated continuous steam production capacity of the boiler for the fuel mixture that results in the highest emission rate. The tabulation, therefore, represents worst case conditions.

2.7 EMISSION CONTROL EQUIPMENT

Particulate control equipment for the proposed power boiler consists of a multiclone collector followed by an electrostatic precipitator or equivalent technology. Table 2-6 summarizes the pertinent data and performance specifications of the multiclone.

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FIGURE 2-10

BOILER ERECTION LABOR

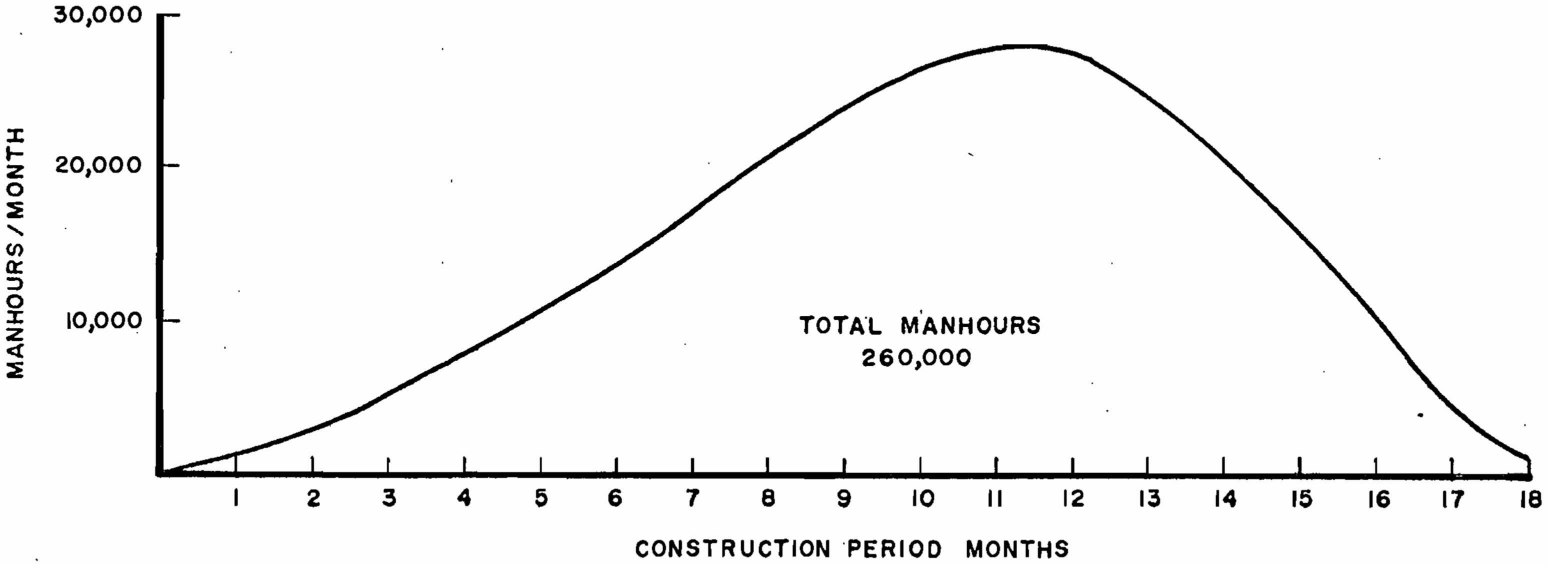

TABLE 2-3

COAL ANALYSIS*

High Heating Value	12,500 - 13,500 BTU/lb
Moisture Content	3 - 5.5%
Volatile Material	35% (nominal)
Ash Content	5.2 - 6.7%
Nitrogen Content	1.5% (nominal)
Sulfur Content	.7% (nominal)

Trace Elements

	PPM		%
Barium	102	Aluminum	.74
Beryllium	1	Titanium	.03
Chromium	7	Selenium	.90
Copper	10	Iron	.19
Nickel	6	Magnesium	.02
Rubidium	2	Calcium	.07
Strontium	144	Sodium	.03
Vanadium	11	Potassium	.03
Zinc	8	Phosphorus	0.0
Zirconium	8		
Lead	5		

* SOURCES: Bureau of Mines, 1969: Analysis of Tripple and Delivered Samples of Coal, Logan County, W. Va., U.S. Dept. of Interior.

Westmoreland Coal Co., 1978: Triangle Mine Complex Coal Data, Pocahontas Coal Seam, W. Va.

Geological Survey, 1976: Collection, Chemical Analysis and Evaluation of Coal Samples in 1975, U.S. Dept. of Interior Report 76-468.

TABLE 2-4

PHYSICAL SOURCE CHARACTERISTICS OF PROPOSED POWER BOILER NO. 7

	MAXIMUM RATED CAPACITY		DESIGN (Annual Average)
	Coal Only	Coal/Bark	Coal Only
Steam Capacity (lbs/hour)	825,000	825,000	742,500
Flue Gas Temperature (^{o}F)			
Inlet (To ESP)	350^{o}	350^{o}	348^{o}
Outlet (To Stack)	335^{o}	335^{o}	332^{o}
Flue Gas Rate (ACFM)			
Inlet (To ESP)	355,500	385,000	320,000
Outlet (To Stack)	333,500	361,000	300,000
Flue Gas Density (lb/ft^3)	0.052	0.052	0.051
Excess Air (percent)	30	30	32

Stack Height (ft)	340
Stack Diameter (ft)	14.8

TABLE 2-5

CONTROL DESIGN INFORMATION
FOR
COMBINATION COAL/WOOD WASTE BOILER

Pollutant*		Inlet @ MCPR**	Outlet @ MCPR**
TSP	emission rate gr/dscf	2.6	---
	% expected efficiency	---	99.0
	% guarantee efficiency	---	99.0
	design emission rate (gr/dscf)	---	0.02
SO_2 (coal only)	emission rate (gm/sec)	154.4	154.4
NO_2 (coal only)	emission rate (gm/sec)	92.6	92.6
C_xH_y ***	emission rate (gm/sec)	1.5	1.5
CO	emission rate (gm/sec)	5.1	5.1

* Emission rates shown for the respective pollutants are based on the maximum rated continuous steam production capacity of the boiler for the fuel mixture that results in the highest emission rate. <u>The tabulation, therefore, represents worst case conditions.</u>

** MCPR = at Maximum Continuous Production Rate, i.e 825,000 lbs of steam/hour

*** Reactive hydrocarbons expressed as methane.

TABLE 2-6

MULTICLONE DATA AND ANTICIPATED PERFORMANCE SPECIFICATIONS

Number of tubes	600 installed
Length of tubes	32"
Fractional efficiency vs HP curves	Not available at this time
Diameter of tubes	9"
Pressure drop	3.0 W.C.
Manufacturer	Zurn or equal
Model No.	MTSA-600-0 KYT-TA
Efficiency:	
Design:	65% (woodwaste); 35% (coal)
Operating	65% (woodwaste); 35% (coal)
Particulate leaving	2.6 gr/dscf (maximum)

After leaving the multiclone and passing through the air preheater, the airstream (now containing 2.6 grains per dry standard cubic foot of particulate) proceeds to an exhaust fan and then to the electrostatic precipitator for further removal of particulates. This high-efficiency electrostatic precipitator will be installed on the cold side of the regenerative air heaters. The precipitator will limit particulate concentration of flue gas exiting the precipitator to a maximum of 0.1 lb. per million BTU's. The flue gas will then be released through the stack.

The design and performance specifications of the proposed electrostatic precipitator are summarized in Table 2-7. The design for the precipitator will be based on the worst case coal conditions of 11% ash, 12,500 BTU's per pound. This will be achieved by design efficiency of about 99% which will achieve the BACT emission limit of 0.1 lbs/MMBTU.

In addition to the control equipment proposed for the boiler itself, several features have been incorporated into the material handling system to control emissions of fugitive dust, as discussed in Section 2.3. These include: (1) covered conveyors, (2) canvas covers on all ash-handling trucks, (3) use of a surfactant at all coal conveyor transfer points, (4) compaction of the coal pile and use of a surfactant, (5) enclosed crusher, (6) bottom coal unloading with curtains and surfactant spray, and (7) enclosed live storage.

TABLE 2-7

ELECTROSTATIC PRECIPITATOR DESIGN AND ANTICIPATED PERFORMANCE SPECIFICATIONS

Location	At Induced Draft Fan Discharger (Downstream of Multiclone and Air Preheater) - Cold Side Precipitator
Collection Area	181.450 sq. ft.
No. of Fields	10 (Total) - 5 fields per chamber
No. of Chambers	2, Both to be operating simultaneously
Gas Velocity	4 fps (Design Value)
Gas Conditioning	(None)
Charging Area Design	Needle-Plate Discharge Electrodes (Positive Polarity) Negative Polarity, Grounded Collector Plates (Automatic Spark Rate Control to Reduce Rapping Frequency).
Temperature of Operation	350°F @ Rated Flow
Electrical	Primary Voltage 480 VAC Secondary Voltage 70K VDC (Maximum) Secondary Current Density 0.02 MA/ft^2 Plate area (Nominal)

Linear Flow Design Techniques

Use of appropriate number of Perforated Distribution Plates and Tubing

Baffle Plate Placement to Prevent Flow By Pass.

Design Efficiency	99% (Vendor Guarantee)

Determination of Source Emissions for the Existing and Modified Mill

SECTION 3

DETERMINATION OF SOURCE EMISSIONS FOR THE BASELINE AND MODIFIED MILL

3.1 BASELINE MILL EMISSIONS

The baseline characteristics and emission rates of all the major sources at the Fernandina Beach mill are provided in Tables 3-1 through 3-6. Parameters for the baseline mill operating configuration are quantified for the baseline year 1974. Emission rates were derived from EPA publication AP-42[1] , or based on permit limits in conjunction with average annual or maximum allowable consumption rates for oil and/or wood waste, or production throughput values for the recovery boilers and associated smelt tanks and lime kilns. The throughput values for the recovery boilers are expressed in terms of black liquor solids (BLS). Maximum daily emission rates computed for each of the boilers represent the peak 24-hour emission rate. These computed emission rates assume power boiler No. 3 is operated at the full rated capacity on residual oil containing 2.75% sulfur. Power boilers No. 4 and No. 5 are assumed to be co-fired on a combination of oil at a 2.75% sulfur content and wood waste at their existing permitted limits. In computing the baseline power boiler emission rates for sulfur dioxide, a sulfur content of 2.75% in fuel oil was applied.

Prior to 1980, there were no explicit permit limits on the composition or quantity of fuels that could be burned in the power boilers. However, in its permit applications, CCA routinely listed its average oil-to-wood fuel ratios and stated that it would limit the sulfur content of the oil to 2.75%. New operating permits for No. 4 and No. 5 power boilers were issued in January 1980. The Florida DER, at CCA's request, allowed the use of 3% sulfur oil, but also set forth allowable particulate and sulfur dioxide limitations based on the average boiler fuel use. Such limitations are inconsistent with past and anticipated future fluctuations in fuel use and CCA intends to request permit modificatons from the Florida DER. While CCA believes that the permit modifications are not subject to PSD review and will not consume increment, in order to be conservative, this analysis has assumed 2.75% sulfur oil and the average fuel split as the "baseline" condition, and 3% sulfur oil and maximum oil/wood waste consumption as the "modified" condition.

3.2 MODIFIED MILL EMISSIONS

The source characteristics and emission rates for the modified mill are presented in Tables 3-7 through 3-12. Major changes in the mill configuration include the following:

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[1] EPA, August 1977 through July 1979; Compilation of Emission Factors, Third Edition, and Supplements 1-9, AP-42, OAPQS.

TABLE 3-1
SOURCE CHARACTERISTICS FOR BASELINE MILL CONFIGURATION

Stack Source	Stack Height (feet)	Stack Diameter (feet)	Gas Temp. (°F)	Exit Velocity (fps)	Fuel Consumption Rate or Process Rate Average Annual (lbs/hr)	Fuel Consumption Rate or Process Rate 24-hr. maximum (lbs/hr)
Power Boiler No. 3	248	8	405	63.3	10,089 (oil)	12,611 (oil)
Power Boiler No. 4	248	8	414	47.2	6,733 (oil) and 22,577 (ww)	8,417 (oil and 28,222 (ww)
Power Boiler No. 5	248	11	405	53.3	19,787 (oil) and 48,000 (ww)	24,734 (oil) and 60,000 (ww)
Recovery Boiler No. 3	150	9	242	43.5	37,500 (BLS)	40,977 (BLS)
Smelt Tank No. 3	127	2	189	19.1	15,413 (smelt)	16,842 (smelt)
Recovery Boiler No. 4	265	11.5	428	61.6	125,000 (BLS)	136,589 (BLS)
Smelt Tank No. 4	244	6	171	17.1	51,375 (smelt)	56,138 (smelt)
Lime Kiln No. 2	60	3.5	190	40.2	22,464*	26,000*
Lime Kiln No. 3	60	4.5	189	57.7	30,906*	32,000*

Note: All oil is at 2.75% sulfur with a heating value of 18,000 BTU/lb. Wood waste is assumed to have an average heating value of 4,500 BTU/lb. Black Liquor solids have an average heating value of 6040 BTU/lb.

Note: ww - wood waste.
* calcium carbonate.

TABLE 3-2
PARTICULATE EMISSION RATE FOR BASELINE MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 3	0.1 lb/10^6 BTU (oil)	2.3 (oil)	2.9 (oil)
Power Boiler No. 4	0.1 lb/10^6 BTU (oil) 0.3 lb/10^6 BTU (ww)	1.5 (oil) and 3.8 (ww) 5.3 (Total)	1.9 (oil) and 4.8 (ww) 6.7 (Total)
Power Boiler No. 5	0.1 lb/10^6 BTU (oil) 0.3 lb/10^6 BTU (ww)	4.5 (oil) and 8.2 (ww) 12.7 (Total)	5.6 (oil) and 10.2 (ww) 15.8 (Total)
Recovery Boiler No. 3	2 lb/ton (BLS)	4.7	5.2
Smelt Tank No. 3	(1)	1.6	1.7
Recovery Boiler No. 4	2 lb/ton (BLS)	15.8	17.2
Smelt Tank No. 4	(1)	3.4	3.6
Lime Kiln No. 2	(1)	2.0	2.2
Lime Kiln No. 3	(1)	2.5	2.5

(1) Emission Factor based on formula specified in Florida SIP (Section 17-205) for process emission source.
Note: ww - wood waste.
Source: All Emission Factors are based on existing permissible limits.

TABLE 3-3
SULFUR DIOXIDE EMISSION RATE FOR BASELINE MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 3	3.03 lb/10^6 BTU (oil)	69.3 (oil)	86.7 (oil)
Power Boiler No. 4	3.03 lb/10^6 BTU (oil) 0.01 lb/10^6 BTU (ww)	46.3 (oil) and 0.1 (ww) 46.4 (Total)	57.8 (oil) and 0.2 (ww) 58.0 (Total)
Power Boiler No. 5	3.03 lb/10^6 BTU (oil) 0.01 lb/10^6 BTU (ww)	135.7 (oil) and 0.3 (ww) 136.0 (Total)	169.7 (oil) and 0.3 (ww) 170.0 (Total)
Recovery Boiler No. 3	5 lb/ton (ADTP)	9.6	10.5
Smelt Tank No. 3	N/A	N/A	N/A
Recovery Boiler No. 4	5 lb/ton (ADTP)	32.1	35.1
Smelt Tank No. 4	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A

Note: ww - wood waste.

Source: Emission Factors for Recovery Boilers are based on EPA Publication AP-42, Third Edition, August 1977. Emission Factors for oil are based on permissible limits. Emission Factors for wood fuel are based on TRW, 1979; Pollutant Emission Factors for Wood-Fired Boilers, EPA Contract 68-02-2613, Task No. 30, Durham, NC, Table 4-1.

TABLE 3-4
CARBON MONOXIDE EMISSION RATE FOR BASELINE MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 3	5 lb/10^3 gal (oil)	0.8 (oil)	1.0 (oil)
Power Boiler No. 4	5 lb/10^3 gal (oil) 0.2 lb/10^6 BTU (ww)	0.5 (oil) and 2.6 (ww) 3.1 (Total)	0.7 (oil) and 3.2 (ww) 3.9 (Total)
Power Boiler No. 5	5 lb/10^3 gal (oil) 0.2 lb/10^6 BTU (ww)	1.5 (oil) and 5.4 (ww) 6.9 (Total)	1.9 (oil) and 6.8 (ww) 8.7 (Total)
Recovery Boiler No. 3	2 lb/ton (ADTP)	3.9	4.2
Smelt Tank No. 3	N/A	N/A	N/A
Recovery Boiler No. 4	2 lb/ton (ADTP)	12.9	14.0
Smelt Tank No. 4	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A

Note: ww - wood waste.
Source: Emission Factors for wood derived fuel are based on TRW, 1979; Air Pollutant Emission Factors for Wood-Fired Boilers, EPA Contract 68-02-2613, Task No. 30, Durham, NC, Table 4-1. All other Emission Factors are based on EPA Publication AP-42, Third Edition, August 1977.

TABLE 3-5
NITROGEN OXIDE EMISSION RATE FOR BASELINE MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 3	60 lb/10^3 gal (oil)	9.5 (oil)	11.8 (oil)
Power Boiler No. 4	60 lb/10^3 gal (oil) 0.17 lb/10^6 BTU (ww)	6.3 (oil) and 2.1 (ww) 8.4 (Total)	7.9 (oil) and 2.7 (ww) 10.6 (Total)
Power Boiler No. 5	60 lb/10^3 gal (oil) 0.17 lb/10^6 BTU (ww)	18.6 (oil) and 4.6 (ww) 23.2 (Total)	23.2 (oil) and 5.8 (ww) 29.0 (Total)
Recovery Boiler No. 3	N/A	N/A	N/A
Smelt Tank No. 3	N/A	N/A	N/A
Recovery Boiler No. 4	N/A	N/A	N/A
Smelt Tank No. 4	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A

Note: ww - wood waste.

Source: Emission Factors for wood derived fuel are based on TRW, 1979; Air Pollutant Emission Factors for Wood-Fired Boilers, EPA Contract 68-02-2613, Task No. 30, Durham, NC Table 4-1. All other Emission Factors are based on EPA Publication AP-42, Third Edition, August 1977.

TABLE 3-6
HYDROCARBON EMISSION RATE FOR BASELINE MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 3	1 lb/10^3 gal (oil)	0.1 (oil)	0.2 (oil)
Power Boiler No. 4	1 lb/10^3 gal (oil) 0.01 lb/10^6 BTU (ww)	0.1 (oil) and 0.1 (ww) 0.2 (Total)	0.1 (oil) and 0.2 (ww) 0.3 (Total)
Power Boiler No. 5	1 lb/10^3 gal (oil) 0.01 lb/10^6 BTU (ww)	0.3 (oil) and 0.3 (ww) 0.6 (Total)	0.4 (oil) and 0.3 (ww) 0.7 (Total)
Recovery Boiler No. 3	N/A	N/A	N/A
Smelt Tank No. 3	N/A	N/A	N/A
Recovery Boiler No. 4	N/A	N/A	N/A
Smelt Tank No. 4	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A

Note: ww - wood waste.

Source: Emission Factors for wood derived fuel are based on TRW, 1979; Air Pollutant Emission Factors for Wood-Fired Boilers, EPA Contract 68-02-2613, Task No. 30, Durham, NC Table 4-1. All other Emission Factors are based on EPA Publication AP-42, Third Edition, August 1977.

TABLE 3-7
SOURCE CHARACTERISTICS FOR MODIFIED MILL CONFIGURATION

					Fuel Consumption Rate or Process Rate	
Stack Source	Stack Height (feet)	Stack Diameter (feet)	Gas Temp. (°F)	Exit Velocity (fps)	Average Annual (lbs/hr)	24-hr maximum (lbs/hr)
Power Boiler No. 4	248	8	414	47.2	6,733 (oil) and 22,577 (ww)	17,200 (100% oil) or 56,333 (100% ww)
Power Boiler No. 5	248	11.0	405	53.3	19,787 (oil) and 48,000 (ww)	36,556 (100% oil) or 79,833 (48.8% ww) and 16,270 (51.2% oil)
Power Boiler No. 7	340[1]	14.8	335	42.3	73,512 (100% coal)	81,680 (100% coal) or 61,840 (71.3% coal) and 69,111 (28.7% ww)
Recovery Boiler No. 4	265	11.5	428	61.6	125,000 (BLS)	136,589 (BLS)
Smelt Tank No. 4	244	6	171	17.7	51,375 (smelt)	56,138 (smelt)
Recovery Boiler No. 5**	289/289	9/9	411/411	61.2/61.2	125,000 (BLS)	137,500 (BLS)
Smelt Tank No. 5	289	4	164	34.1	51,375 (smelt)	56,513 (smelt)
Lime Kiln No. 2	60	3.5	190	40.2	22,464*	26,000*
Lime Kiln No. 3	60	4.5	189	57.7	30,906*	32,000*

Note: ww - woodwaste.

[1] Maximum FAA-Restricted Stack Height without detailed Aeronautical Survey

NOTE: Oil used in power boilers No. 4 and 5 contains 3.0% sulfur and has average heating value of 18,000 BTU/lb. Average heating value of wood waste assumed to be 4,500 BTU/lb. Average heating value of Black liquor solids assumed to be 6,040 BTU/lb. The average heating value of the coal to be used to fire power boiler No. 7 is assumed to be 12,500 BTU/lb.

* calcium carbonate.

** two identical stacks.

TABLE 3-8
PARTICULATE EMISSION RATE FOR MODIFIED MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 4	0.1 lb/10^6 BTU (oil) 0.3 lb/10^6 BTU (ww)	1.5 (oil) and 3.8 (ww) 5.3 (Total)	3.9 (oil) or 9.6 (ww)
Power Boiler No. 5	0.1 lb/10^6 BTU (oil) 0.3 lb/ 10^6 BTU (ww)	4.5 (oil) and 8.2 (ww) 12.7 (Total)	8.3 (oil) or 13.6 (ww) + 3.7 (oil) 17.3 (Total)
Power Boiler No. 7	0.1 lb/10^6 BTU (coal) 0.1 lb/10^6 BTU (ww)	11.6 (coal)	12.9 (coal) or 9.7 (coal) + 3.9 (ww) 13.6 (Total)
Recovery Boiler No. 4	2 lb/ton (BLS)	15.8	17.2
Smelt Tank No. 4	(1)	3.4	3.6
Recovery Boiler No. 5	.044 gr/DSCF	9.5	10.5
Smelt Tank No. 5	.2 lb/ton (BLS)	1.6	1.7
Lime Kiln No. 2	(1)	2.0	2.2
Lime Kiln No. 3	(1)	2.5	2.5

(1) Emission factor based on formula specified in Florida SIP (Section 17-205) for process emission source.
Note: ww - wood waste.
Source: All Emission Factors are Based on existing permissible limits.

TABLE 3-9
SULFUR DIOXIDE RATE FOR MODIFIED MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 4	3.3 lb/10^6 BTU (oil) 0.01 lb/10^6 BTU (ww)	50.4 (oil) and 0.1 (ww) 50.5 (Total)	128.7 (oil) or 0.3 (ww)
Power Boiler No. 5	3.3 lb/10^6 BTU (oil) 0.01 lb/ 10^6 BTU (ww)	148.1 (oil) and 0.3 (ww) 148.4 (Total)	273.6 (oil) or 0.5 (ww) + 121.8 (oil) 122.3 (Total)
Power Boiler No. 7	1.2 lb/10^6 BTU (coal) 0.01 lb/10^6 BTU (ww)	138.9 (coal)	154.4 (coal) or 116.9 (coal) + 0.4(ww) 117.3 (Total)
Recovery Boiler No. 4	5 lb/ton (ADTP)	32.1	35.1
Smelt Tank No. 4	N/A	N/A	N/A
Recovery Boiler No. 5	5 lb/ton (ADTP)	32.1	35.3
Smelt Tank No. 5	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A

Note: ww - wood waste.

Source: Emission Factors for Recovery Boilers are based on EPA Publication AP-42, Third Edition, August 1977. Emission Factors for oil and coal are based on permissible limits. Emission factors for wood derived fuel TRW, 1979; Air Pollutant Emission Factors for wood-fired boilers, EPA Contract 68-02-2613, Task No. 30, Durham, N.C, Table 4-1.

TABLE 3-10
CARBON MONOXIDE EMISSION RATE FOR MODIFIED MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 4	5 lb/10^3 gal (oil) 0.2 lb/10^6 BTU (ww)	0.5 (oil) and 2.6 (ww) 3.1 (Total)	1.3 (oil) or 6.4 (ww)
Power Boiler No. 5	5 lb/10^3 gal (oil) 0.2 lb/10^6 BTU (ww)	1.5 (oil) and 5.4 (ww) 6.9 (Total)	2.9 (oil) or 9.0 (ww) + 1.3 (oil) 10.3 (Total)
Power Boiler No. 7	1 lb/ton (coal) 0.2 lb/10^6 BTU (ww)	4.6 (coal)	5.1 (coal) or 3.9 (coal) + 7.8(ww) 11.7 (Total)
Recovery Boiler No. 4	2 lb/ton (ADTP)	12.9	14.0
Smelt Tank No. 4	N/A	N/A	N/A
Recovery Boiler No. 5	2 lb/ton (ADTP)	12.9	14.1
Smelt Tank No. 5	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A

Note: ww - wood waste.

Source: Emission factors for wood derived fuel are based on TRW, 1979; Air Pollutant Emission Factors for Wood-Fired Boilers, EPA Contract 68-02-2613, Task No. 30, Durham, N.C, Table 4-1. All other emission factors are based on EPA Publication AP-42, Third Edition, August 1977.

TABLE 3-11
NITROGEN OXIDE EMISSION RATE FOR MODIFIED MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 4	60 lb/10^3 gal (oil) 0.17 lb/10^6 BTU (ww)	6.3 (oil) and 2.1 (ww) 8.4 (Total)	16.1 (oil) or 5.4 (ww)
Power Boiler No. 5	60 lb/10^3 gal (oil) 0.17 lb/10^6 BTU (ww)	18.6 (oil) and 4.6 (ww) 23.2 (Total)	34.3 (oil) or 7.7 (ww) + 15.3 (oil) 23.0 (Total)
Power Boiler No. 7	0.6 lb/10^6 BTU (coal) 0.17 lb/10^6 BTU (ww)	69.5 (coal)	77.2 (coal) or 58.4 (coal) + 6.7 (ww) 65.1 (Total)
Recovery Boiler No. 4	N/A	N/A	N/A
Smelt Tank No. 4	N/A	N/A	N/A
Recovery Boiler No. 5	N/A	N/A	N/A
Smelt Tank No. 5	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A

Note: ww - wood waste.

Source: Emission factors for wood derived fuel are based on TRW, 1979; Air Pollutant Emission Factors for Wood-Fired Boilers, EPA Contract 68-02-2613, Task No. 30, Durham, N.C, Table 4-1. Emission factors for oil-fired boilers are based on EPA Publication AP-42, Third Edition, August 1977. Emission factor for coal fired operation of Power Boiler No. 7 is based upon manufacturer's guarantee.

TABLE 3-12
HYDROCARBON EMISSION RATE FOR MODIFIED MILL CONFIGURATION

Stack/Source	Emission Factors	Average Annual (gm/sec)	24-Hr. Max (gm/sec)
Power Boiler No. 4	1 lb/10^3 gal (oil) 0.01 lb/10^6 BTU (ww)	0.1 (oil) and 0.1 (ww) 0.2 (Total)	0.3 (oil) or 0.3 (ww)
Power Boiler No. 5	1 lb/10^3 gal (oil) 0.01 lb/10^6 BTU (ww)	0.3 (oil) and 0.3 (ww) 0.6 (Total)	0.6 (oil) or 0.5 (ww) + 0.3 (oil) 0.8 (Total)
Power Boiler No. 7	0.3 lb/Ton (coal) 0.01 lb/10^6 BTU (ww)	1.4 (coal)	1.5 (coal) or 1.2 (coal) + 0.4 (ww) 1.6 (Total)
Recovery Boiler No. 4	N/A	N/A	N/A
Smelt Tank No. 4	N/A	N/A	N/A
Recovery Boiler No. 5	N/A	N/A	N/A
Smelt Tank No. 5	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A

Note: ww - wood waste.

Source: Emission factors for wood derived fuel are based on TRW, 1979; Air Pollutant Emission Factors for Wood-Fired Boilers, EPA Contract 68-02-2613, Task No. 30, Durham, N.C, Table 4-1. All other emission factors are based on EPA Publication AP-42, Third Edition, August 1977.

- The oil-fired power boiler No. 3 will be maintained as cold standby and will be brought on line only during outages of other boilers;
- Recovery boiler No. 3 and its associated smelt tank will be shut down; and
- A new power boiler (No. 7) will start-up capable of using up to 100% coal.

The average annual and 24-hour maximum fuel consumption rates for the new proposed boiler (No. 7) correspond to steam production rates of 742,500 and 825,000 lbs. per hour, respectively. Power boiler No. 3 will serve only in a standby capacity; as a result there will be no additional air pollution burden associated with this boiler.

During start up or emergencies, if the new boiler were to be partially fired with oil, emission limitations established by the NSPS would be maintained.

3.3 COMPARISON OF NET CHANGE IN EMISSIONS FROM BASELINE MILL AND MODIFIED MILL

Total baseline emissions of each pollutant are tabulated and compared to projected pollutant emissions from the modifed mill, as presented in Tables 3-13 through 3-17.

In the worst case, the net change in particulate emissions over the baseline will be an increase of 14.1 gms/sec of particulates on an average annual basis. On a 24-hour maximum basis, there will be an increase of 5.0 gms/sec of particulate emissions if the new No. 7 power boiler were operating entirely on 11% ash content coal and No. 5 power boiler is on oil only. If power boiler No. 7 is operating on coal and wood waste, and No. 5 power boiler continued the use of oil and wood waste for fuel, the net change resulting from the modification would be an increase of 20.4 gms/sec in particulate emissions (Table 3-13).

As shown in Table 3-14, on an average annual basis, there will be an increase in sulfur dioxide emissions of 104.5 gms/sec over the baseline; the reasons for the increase are:

- The recently revised operating permits for Nos. 4 and 5 power boilers allow the use of 3% sulfur content oil, as compared with the 2.75% sulfur content assumed for the baseline; and
- As part of the modified short-term case, use of 100% oil and 100% wood waste is assumed. (Burning of more wood waste will also increase the particulate emissions).

When power boiler No. 7 is operated on 100% coal and power boiler No. 5 is operated on 100% oil under the modified mill configuration, there will be a net increase in SO_2 emissions of 262.2 gms/sec on a 24-hour maximum basis. When power boilers No. 4 and No. 5 are fired on oil and wood waste, and power boiler No. 7 on coal and wood waste (which is expected to be the normal operating mode), there will be a substantial net decrease in the SO_2 emissions, equivalent to 54.6 gms/sec on a 24-hour maximum basis.

TABLE 3-13
COMPARISON OF NET CHANGE IN PARTICULATE EMISSIONS

	BASELINE MILL CONFIGURATION		MODIFIED MILL CONFIGURATION		NET CHANGE	
SOURCE	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)
Power Boiler No. 3	2.3 (oil)	2.9 (oil)	0.0	0.0	-2.3 (oil)	-2.9 (oil)
Power Boiler No. 4	5.3 (oil + ww)	6.7 (oil + ww)	5.3 (oil + ww)	3.9 (oil) or 9.6 (ww)	0.0	-2.8 (oil) or +2.9 (oil + ww)
Power Boiler No. 5	12.7 (oil + ww)	15.8 (oil + ww)	12.7 (oil + ww)	8.3 (oil) or 17.3 (oil + ww)	0.0	-7.5 (oil) or +1.5 (oil + ww)
Power Boiler No. 7	0.0	0.0	11.6 (coal)	12.9 (coal) or 13.6 (coal + ww)	+11.6 (coal)	+12.9 (Coal) or +13.6 (Coal + ww)
Recovery Boiler No. 3	4.7	5.2	0.0	0.0	-4.7	-5.2
Smelt Tank No. 3	1.6	1.7	0.0	0.0	-1.6	-1.7
Recovery Boiler No. 4	15.8	17.2	15.8	17.2	0.0	0.0
Smelt Tank No. 4	3.4	3.6	3.4	3.6	0.0	0.0
Recovery Boiler No. 5	0.0	0.0	9.5	10.5	+9.5	+10.5
Smelt Tank No. 5	0.0	0.0	1.6	1.7	+1.6	+1.7
Lime Kiln No. 2	2.0	2.2	2.0	2.2	0.0	0.0
Lime Kiln No. 3	2.5	2.5	2.5	2.5	0.0	0.0
TOTALS	50.3 (oil + ww)	57.8 (oil + ww)	64.4 (oil + ww + coal)	62.8 (oil + coal) or 78.2 (oil + coal + ww)	+14.1 (oil + coal)	+5.0 (oil + coal) or +20.4 (oil + ww + coal)

Note: ww - wood waste.

TABLE 3-14
COMPARISON OF NET CHANGE IN SULFUR DIOXIDE

SOURCE	BASELINE MILL CONFIGURATION		MODIFIED MILL CONFIGURATION		NET CHANGE	
	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)
Power Boiler No. 3	69.2 (oil)	86.6 (oil)	0.0	0.0	-69.2 (oil)	-86.6 (oil)
Power Boiler No. 4	46.3 (oil + ww)	58.0 (oil + ww)	50.5 (oil + ww)	128.7 (oil)or 0.3 (ww)	+4.2 (oil + ww)	+70.7 (oil) or -57.7 (oil + ww)
Power Boiler No. 5	123.7 (oil + ww)	154.6 (oil + ww)	148.4 (oil + ww)	273.6 (oil)or 122.3 (oil + ww)	+12.3 (oil + ww)	+103.5 (oil) or -47.8 (oil + ww)
Power Boiler No. 7	0.0	0.0	138.9 (coal)	154.4 (coal) or 117.3 (coal + ww)	+138.9 (coal)	+154.4 (coal) or +117.3 (coal + ww
Recovery Boiler No. 3	10.6	11.6	0.0	0.0	-10.6	-11.6
Smelt Tank No. 3	N/A	N/A	0.0	0.0	0.0	0.0
Recovery Boiler No. 4	35.3	38.6	32.1	35.1	-3.2	-3.5
Smelt Tank No. 4	N/A	N/A	N/A	N/A	N/A	N/A
Recovery Boiler No. 5	0.0	0.0	32.1	35.3	+32.1	+35.3
Smelt Tank No. 5	N/A	N/A	N/A	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A	N/A	N/A	N/A
TOTALS	297.5 (oil + ww)	364.9 (oil + ww)	402.0 (oil + coal)	627.1 (oil + coal) or 310.3 (oil + ww + coal)	+104.5 (oil + ww + coal)	+262.2 (oil + coa or -54.6 (oil + ww coal

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Note: ww - wood waste.

TABLE 3-15
COMPARISON OF NET CHANGE IN CARBON MONOXIDE

SOURCE	BASELINE MILL CONFIGURATION		MODIFIED MILL CONFIGURATION		NET CHANGE	
	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)
Power Boiler No. 3	0.8 (oil)	1.0 (oil)	0.0	0.0	-0.8 (oil)	-1.0 (oil)
Power Boiler No. 4	3.1 (oil + ww)	3.9 (oil + ww)	3.1 (oil + ww)	1.3 (oil) or 6.4 (ww)	0.0	-2.6 (oil) or +2.5 (oil + ww)
Power Boiler No. 5	6.9 (oil + ww)	8.7 (oil + ww)	6.9 (oil + ww)	2.9 (oil) or 10.3 (oil + ww)	0.0	-5.8 (oil) or +1.6 (oil + ww)
Power Boiler No. 7	0.0	0.0	4.6 (coal)	5.1 (coal) or 11.7 (coal + ww)	+4.6 (coal)	+5.1 (coal) or +11.7 (coal + ww)
Recovery Boiler No. 3	3.9	4.2	0.0	0.0	-3.9	-4.2
Smelt Tank No. 3	N/A	N/A	0.0	0.0	N/A	N/A
Recovery Boiler No. 4	12.9	14.0	12.9	14.0	0.0	0.0
Smelt Tank No. 4	N/A	N/A	N/A	N/A	N/A	N/A
Recovery Boiler No. 5	0.0	0.0	12.9	14.1	+12.9	+14.1
Smelt Tank No. 5	N/A	N/A	N/A	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A	N/A	N/A	N/A
TOTALS	28.2 (oil + ww)	32.6 (oil + ww)	40.4 (oil + ww + coal)	37.4 (oil + coal) or 56.5 (oil + ww + coal)	+12.2 (oil + coal)	+5.6 (oil + coa or +24.7 (oil + ww + coal)

Note: ww - wood waste.

TABLE 3-16
COMPARISON OF NET CHANGE IN NITROGEN OXIDES

	BASELINE MILL CONFIGURATION		MODIFIED MILL CONFIGURATION		NET CHANGE	
SOURCE	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)
Power Boiler No. 3	9.5 (oil)	11.8 (oil)	0.0	0.0	-9.5 (oil)	-11.8 (oil)
Power Boiler No. 4	8.4 (oil + ww)	10.6 (oil + ww)	8.4 (oil + ww)	16.1 (oil) or 5.4 (ww)	0.0	+5.5 (oil) or -5.2 (oil + ww)
Power Boiler No. 5	23.2 (oil + ww)	29.0 (oil + ww)	23.2 (oil + ww)	34.3 (oil) or 23.0 (oil + ww)	0.0	+5.3 (oil) or -6.0 (oil + ww)
Power Boiler No. 7	N/A	N/A	69.5 (coal)	77.2 (coal) or 65.1 (coal + ww)	+69.5 (coal)	+77.2 (coal) or +65.1 (coal + ww)
Recovery Boiler No. 3	N/A	N/A	0.0	0.0	N/A	N/A
Smelt Tank No. 3	N/A	N/A	0.0	0.0	N/A	N/A
Recovery Boiler No. 4	N/A	N/A	N/A	N/A	N/A	N/A
Smelt Tank No. 4	N/A	N/A	N/A	N/A	N/A	N/A
Recovery Boiler No. 5	N/A	N/A	N/A	N/A	N/A	N/A
Smelt Tank No. 5	N/A	N/A	N/A	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A	N/A	N/A	N/A
Lime Kiln No. 3	N/A	N/A	N/A	N/A	N/A	N/A
TOTALS	41.1 (oil + ww)	51.4 (oil + ww)	101.1 (oil + ww + coal)	127.6 (oil + coal) or 93.5 (oil + ww + coal)	+60.0 (oil + coal)	+76.2 (oil + coal) or +42.1 (oil + ww + coal)

Note: ww - wood waste.

TABLE 3-17
COMPARISON OF NET CHANGE IN HYDROCARBONS

SOURCE	BASELINE MILL CONFIGURATION		MODIFIED MILL CONFIGURATION		NET CHANGE	
	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)	Average Annual (gm/sec)	24-Hour Max. (gm/sec)
Power Boiler No. 3	0.1 (oil)	0.2 (oil)	0.0	0.0	-0.1 (oil)	-0.2 (oil)
Power Boiler No. 4	0.2 (oil + ww)	0.3 (oil + ww)	0.2 (oil + ww)	0.3 (oil) or 0.3 (ww)	0.0	0.0 (oil) or 0.0 (oil + ww)
Power Boiler No. 5	0.6 (oil + ww)	0.7 (oil + ww)	0.6 (oil + ww)	0.6 (oil) or 0.8 (oil + ww)	0.0	-0.1 (oil) or +0.1 (oil + ww)
Power Boiler No. 7	0.0	0.0	1.4 (coal)	1.5 (coal) or 1.6 (coal + ww)	+1.4 (coal)	+1.5 (coal) or +1.6 (coal + ww)
Recovery Boiler No. 3	N/A	N/A	0.0	0.0	N/A	N/A
Smelt Tank No. 3	N/A	N/A	0.0	0.0	N/A	N/A
Recovery Boiler No. 4	N/A	N/A	N/A	N/A	N/A	N/A
Smelt Tank No. 4	N/A	N/A	N/A	N/A	N/A	N/A
Recovery Boiler No. 5	N/A	N/A	N/A	N/A	N/A	N/A
Smelt Tank No. 5	N/A	N/A	N/A	N/A	N/A	N/A
Lime Kiln No. 2	N/A	N/A	N/A	N/A	N/A	N/A
Lime Kinl No. 3	N/A	N/A	N/A	N/A	N/A	N/A
TOTALS	0.9 (oil + ww)	1.2 (oil + ww)	2.2 (oil + ww + coal)	2.4 (oil + coal) or 2.7 (oil + ww + coal)	+1.3 (oil + coal)	+1.2 (oil + coal or +1.5 (oil + ww + coal)

Note: ww - wood waste.

When using oil and coal, on a short term basis there will be a net increase in carbon monoxide emissions of 5.6 gms/sec. When using oil, wood waste and coal, there will be a net increase of 24.7 gms/sec under the modified system (Table 3-15). On an average annual basis, there will be no significant change in CO emissions from the proposed modification in mill configuration.

Table 3-16 presents the comparison figures and the net change in nitrogen oxide emission levels under the modified mill configuration. On an average annual basis, as well as on a short term (24-hour) basis, the net result from the modifed mill condition will be an increase in the emission of nitrogen oxides.

For hydrocarbons, there will be net increases in emissions as a result of the operation of the modified mill, on a short term as well as a long term basis. As shown in Table 3-17, the increases will be approximately 1.3 gms/sec.

Because the mill site is within 100 kilometers from two Class I PSD areas (the Okefenokee Wildlife Wilderness Sanctuary and Wolf Island National Wildlife Refuge and Wilderness Area), the net changes in the emissions associated with the modified mill configuration must be evaluated for all regulated air pollutants. The operation of the new power boiler (No. 7) entirely with coal will produce 138.9 gms/sec, equivalent to nearly 4,170 tons of SO_2 on an average annual basis. The peak 24-hour SO_2 emission level of power boiler No. 7 with 100% coal firing is nearly 13 tons, while there is a 25% reduction of SO_2 emissions if the power boiler No. 7 is using a combination of coal and wood waste as fuel.

Section 4

Determination of Best Available Control Technology

SECTION 4

DETERMINATION OF BEST AVAILABLE CONTROL TECHNOLOGY

Under the 1977 Clean Air Act Amendments and implementing regulations for the approval of construction permits, it must be demonstrated that Best Available Control Technology (BACT) will be utilized. Basically, the determination of BACT should address the technological question of whether the control technique proposed in the permit application (for each pollutant under PSD review) can be selected as BACT, or whether a more stringent level of emission control should be used. This discussion will consider the availability of the technology, and its economic, energy and environmental impacts.

As will be shown in subsequent portions of this submission (Sections 5 and 6), because the site containing the mill is in attainment status[1] for the pollutants involved, and because the impact of major pollutants on Class I areas, or the city of Jacksonville non-attainment area, will be below levels identified as being significant, the more stringent Lowest Achievable Emission Rate (LAER) requirement will not apply to this project.

The methodology used in determining BACT follows an EPA recommended approach[2] and will contain the following elements:

- Proposal of a control system representing BACT;
- Presentation of alternative control systems; and
- Defense of the BACT selection.

Section 3 lists the estimated annual emissions from the proposed coal/wood waste boiler. Based on estimates of uncontrolled emissions using AP-42[3], the proposed No. 7 power boiler is a major source of the listed pollutants and is, therefore, subject to BACT determination.

4.1 PROCESS AND FUEL CONSIDERATIONS

The type of boiler and fuel type will affect the emission characteristics of the proposed power boiler and, hence, will influence the design of the control systems as representing BACT. The proposed No. 7 power boiler is a pulverized coal fired boiler which is modified to include a traveling grate stoker. The traveling grate stoker is used to fire wood waste and coal. The design allows 1021 million BTU/hr heat input supplied by coal firing alone. Wood waste can

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[1] CFR Part 81, Chapter I, Subpart C, Appendix A, Section 81.310.

[2] EPA, Dec. 1978; Guidelines for Determining Best Available Control Technology (BACT), Office of Air, Noise, and Radiation, OAQPS.

[3] EPA, Aug. 1977 through July 1979; Compilation of Emission Factors, Third Edition, and Supplements 1-9, AP-42, OAPQS.

supply up to 311 million BTU/hr and coal 773 million BTU/hr, providing a combined rated capacity of 1084 million BTU/hr. This permits steaming up to the maximum rate of 825,000 lbs/hr, which is the nameplate rating of the boiler.

As shown in Table 2-4, the flue gas leaving the air preheater has a rated total gas flow (at full load and at 350°F discharge temperature) of 385,000 ACFM. This occurs during the maximum rated condition in which both wood waste and coal firing is occurring (0.528/0.472 wood waste to coal fuel fired ratio by weight, or 34.6 tons/hr wood waste feed and 30.9 tons/hr coal feed). As indicated above, this will produce a heat input of 1084 million BTU/hr. The rated gas flow for the use of coal only at rated capacity will be 355,500 ACFM (at 350°F), during which the coal fuel flow will be 40.8 ton/hr. Both conditions will produce steam at the rated capacity of 825,000 pph.

4.2 BACT FOR PARTICULATE CONTROL

4.2.1 Proposed BACT (Electrostatic Precipitator)

CCA proposes the use of mechanical dust collectors (Multiclone System) downstream of the economizer, followed by an electrostatic precipitator, located downstream of the air preheater. The mechanical dust collectors are intended to control the relatively large char particles which will emanate from the wood waste burning. These collected char particles will be re-injected into the boiler, via injection ports located above the traveling grate. The overall design collection efficiency of the mechanical collectors will be 65% on wood waste and 35% on coal.

The electrostatic precipitator (ESP) will utilize a large collection area in order to provide maximum collection efficiency for low sulfur Eastern and Mid-Western coals. A total collection surface area of 181,450 sq. ft. is provided for in the design.

The major design parameters of the proposed particulate control system are listed in Table 4-1. This control system has been designed to meet or exceed NSPS levels. The design efficiency levels in Table 4-1 were computed from the estimated uncontrolled emission levels listed in Table 4-2 which, in turn, were calculated using AP-42 emission factors. Table 4-2 shows that uncontrolled releases up to 8373 lb/hr are possible, but the control system will contain these releases well below the NSPS limit of 0.10 lb/MM BTU. (The air quality impact analysis in this submission used the NSPS level of 0.10 established for the State of Florida. Note however, that the worst case (11% ash content) is assumed, which is roughly twice the ash content of coals CCA is presently considering).

4.2.2 Alternative Particulate Control Systems

Alternative Control Systems for particulate discharge control which were considered for use with the proposed boiler include:

- Wet Scrubbers;
- Dry Scrubbers; and
- Fabric Filters.
- Novel Devices

TABLE 4-1

DESIGN PARAMETERS FOR PROPOSED PARTICULATE CONTROL SYSTEM

- MULTICLONE

Location	At Economizer Discharge
Number of Tubes	600
Tube Length	32 inches
Tube Diameter	9 inches
Pressure Drop	3 inches Water Gage (Max. Rated)
Inlet Grain Loading	4 gr/scf (Nominal)
Outlet Grain Loading	2.6 gr/scf. (Maximum)
Air Flow	280,950 Acfm @ 650°F (Wood/Coal Firing, Rated) 259,420 Acfm @ 650°F (Coal Firing, Rated)
Design Efficiency	65% (Bark Firing Only) 35% (Coal Firing Only)

Collected Dust Disposal
Automatic Vacuum of System - To Sand Classifier. Char is screened out and reinjected into boiler, sand is transported to ash storage silo.

Particle Size Into Multiclone	Coal:	90% $\leq$40 microns
		50% $\leq$10 microns
	Wood:	50% $\leq$40 microns
		10% $\leq$10 microns

- ELECTROSTATIC PRECIPITATOR

Location	At Induced Draft Fan Discharger (Downstream of Multiclone and Air Preheater) - Cold Side Precipitator
Collection Area	181,450 sq. ft.
No. of Fields	10 (Total) - 5 fields per chamber
No. of Chambers	2 parallel, Both to be operating simultaneously
Gas Velocity	4 fps (Design Value)
Gas Conditioning	(None)
Charging Area Design	Needle-Plate Discharge Electrodes (Positive Polarity) Negative Polarity, Grounded Collector Plates (Automatic Spark Rate Control to Reduce Rapping Frequency).
Temperature of Operation	350°F @ Rated Flow

TABLE 4-1
(Continued)

DESIGN PARAMETERS FOR PROPOSED PARTICULATE CONTROL SYSTEM

Electrical	Primary Voltage 480 VAC Secondary Voltage 70K VDC (Maximum) Secondary Current Density 0.01 MA/ft^2 Plate area (Nominal)
Linear Flow Design Techniques	Use of appropriate number of Perforated Distribution Plates and Tubing Baffle Plate Placement to Prevent Flow By Pass.
Design Efficiency	99% (Vendor Guarantee)

TABLE 4-2

ESTIMATED PARTICULATE EMISSION LEVELS* FOR VARIOUS FUEL SCHEDULES

Fuel Schedule	100% Coal	52.8% Wood/ 47.2% Coal	100% Wood
Rating	825,000 lb/hr Steam	825,000	200,000
Heat Input(10^6 BTU/hr)	1021	1084	311
Fuel Consumption	40.8 tons/hr	34.6 Wood/30.9 Coal	34.6
Uncontrolled Release	7630 lb/hr[1]	8373[1]	2595
Multiclone Discharge	4960 lb/hr[2]	4664[4]	908[5]
ESP Discharge	49.6 lb/hr[3]	46.6[3]	9.1
Emission Rate	0.0486 lb/MM Btu	0.0430	0.0292

*Source: AP-42

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[1] Assuming Worst Case 11% Ash in Coal; 3.75% Ash in Wood Waste

[2] 35% Efficiency Assumed on Coal

[3] 99% Efficiency

[4] 35% Efficiency Assumed on Coal, 65% Efficiency Assumed on Wood

[5] 65% Efficiency Assumed on Wood

4.2.2.1 Wet Scrubbers

These systems have generally involved low to medium energy scrubbers, which cannot achieve the NSPS discharge limit of 0.1 lb/MM BTU. As a result, medium to high energy scrubbers have been proposed in permit submissions for new wood waste or combination boilers. Venturi-type scrubbers also have been designed to permit variation of the throat or orifice area to maintain optimum pressure drop and essentially constant collection efficiency.

These high energy scrubber systems have demonstrated better particulate collection, providing in excess of 97% control efficiency with 12 inch water pressure differentials. A recent proposal for a 350,000 lbs/hr wood waste boiler incorporating a wet scrubber has a design emission rate of 0.071 lb/MM BTU[4]. These scrubbers, as a class, have the advantage of small size, and as a result are considerably less costly to install than an Electrostatic Precipitator or a Baghouse. They are also not significantly influenced by the temperature and moisture content of flue gas, and can work with a reduced gas volume (due to cooling) with corresponding reductions in scrubber sizing.

There are considerable disadvantages, however, which outweigh the use of wet scrubbers in this project. Cool, moist exit gas may require reheat to eliminate objections to a visible water-vapor plume and to ensure sufficient buoyancy to be compatible with the 340 ft. high discharge stack. Scrubbers also present significant corrosion problems when used with high chloride content coals. (The Philadelphia Electric Company's Eddystone Station, which used a wet-venturi particulate scrubber on its coal-fired Unit No. 1, had serious corrosion of the type 316 stainless steel scrubber vessel and required a costly retrofit of pH control equipment and coating of exposed metal surfaces).

Wet scrubber performance for the collection of fine particulates is directly proportional to power input. Although part of the energy lost through pressure drop in the flue gas can be offset by supplying scrubber water at high pressure, no known design approach can predict the energy needed for a specific particulate control requirement. Finally, as the use of wet scrubbers imposes additional loading on waste water treatment facilities; any cost advantage wet scrubbers appear to have over ESP systems is significantly reduced.

4.2.2.2 Dry Scrubbers (Gravel Bed Filters)

Dry scrubbers have been used to control particulate discharges from wood waste boilers, but there are no published reports of installations on coal-fired or coal/wood waste combination boilers. A major manufacturer of dry scrubbers has indicated that it would supply a system having a rated pressure drop of 9 inches W.C., which would consume less power than a wet scrubber, but which would have a similar power requirement to an ESP. Because dry ash handling could be used with this technique, a potentially significant operating and

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[4] Stone Container Corp., Dec. 1979: PSD Permit Application for Stone Container Corporation's Proposed Combination Boiler, Prepared for EPA Region V.

environmental advantage might be achieved. The cost advantage is also significant, probably presenting the lowest capital investment and maintenance cost system available.

However, we have not been able to secure any vendor assurance that emissions from these control devices would consistently achieve NSPS at 0.1 lb/MM BTU. The best guarantee has been 0.15 lb/MM BTU, for a series mechanical-dry scrubber design. Additionally, based on the results of performance testing conducted at boilers operated at Scott Paper Company's Winslow, Maine mill, dry scrubbers have only achieved emission rates of 0.256 and 0.176 lb/MM BTU during winter and summer testing, respectively. The Scott Paper Company boiler is fired with 50% residual oil and 50% wood waste. It is anticipated that emissions from the Fernandina Beach mill's boiler would be more difficult to collect due to the smaller particles generated from coal firing. We conclude therefore, that dry scrubber technology has not yet developed to the point where it can be considered BACT.

4.2.2.3 Fabric Filters (Baghouse)

The Baghouse probably has the potential to provide the highest control efficiency, even with particles down to submicron size. At least one manufacturer would guarantee an emission limit of 0.01 grain/ACF, which would represent 99.5% control efficiency for this application. Additionally, several power companies have elected to use baghouses for control of fly ash from low sulfur coals, mainly because of their concern over the potential high resistivity of the fly ash product and the concomitant requirement to use a large ESP system. Pennsylvania Power and Light Company has used bag filters since 1973 at their Sunbury Station and Ohio Edison Company is installing baghouses for four boiler systems at their W.H. Sammis Plant. The Sunbury station uses anthracite coal having low sodium content, as well as low sulfur content (0.8%) and produces ash with relatively high electrical resistivities. The Sammis Plant is to use low sulfur content bituminous coal (0.75%), but the design engineer was unable to incorporate a large ESP in the restricted area available for the control system at this station.

With respect to wood waste fired boilers, we know of only two baghouse installations with operational experience. One is at Simpson Timber Company in Shelton, Washington which began operation in February of 1976, using salt-laden, hogged fuel. Bag life was reported at only 10 months for system # 1. The short bag life was attributed to rapid bag pulsing caused by air flow 15% above design. System # 2 is reported to pulse half as often and bag failures were less than 8% at the time of the report. Numerous minor problems have been experienced, most of which have been corrected.

The second existing wood waste fired boiler installation controlled by a baghouse is the Long Lake Lumber Company in Spokane, Washington. This baghouse experienced a serious fire during its operation, the cause of which was attributed to high hopper levels and an open access door which allowed air into the baghouse causing combustion. The unit has been repaired and fire protection systems installed. This unit has operated for over one year since the fire without experiencing fire-related problems. Baghouses have since been ordered for similar applications at several paper/lumber mills in the Pacific Northwest.

A few of these units are scheduled for start-up in late 1979, however, we are unaware of any others in operation at this time.

Bag filters provide high efficiency with only a moderate air pressure drop (2-4 inches of water, gauge), thus requiring less power than a wet or dry scrubber, but more power than for an ESP. Capital investment requirements are generally lower than for cold side ESP's, which must collect low sulfur fly ash, but the operating costs are higher since the bags must be periodically replaced.

Several manufacturers and union representatives have expressed concern over using a baghouse when wood derived fuel is to be used, because of the potential fire hazard. Continuous gas temperature may not exceed 500°F where glass fiber is employed, and this limit is lower for other fibers. A mechanical collector could be installed upstream of the baghouse to collect the wood char (as is the case for the proposed ESP system), but small hot particle breakthrough is possible causing bag deterioration and loss of control efficiency.

4.2.2.4 Novel Devices

In 1973, EPA initiated a Novel Device Program to evaluate and test new technology or new combinations of well studied systems in order to achieve cost-effective control of fine particulates. Fourteen of these systems were tested in various industrial facilities and one of these, the Combustion Power Co.'s electroscrubber, was tested in a wood waste boiler at a Weyerhauser Co. mill. This system consists of a granular filter bed with an electrostatic grid immersed within the bed. The filter bed is slowly moved cross flow wise to the air stream in order to minimize plugging. This system augments the dry gravel bed type scrubber action by impacting an additional electrostatic charge on the dust laden air. Collection efficiencies of about 96% have been tested for particulates down to the half-micron size levels, and outlet loadings of 0.01 grains/dscf have been achieved. While units up to 40,000 ACFM may be commercially available, no experience with larger units has been obtained and as such, operating and maintenance costs are unknown.

4.2.2.5 Defense of the BACT System

Table 4-3 lists the major criteria associated with candidate control technologies. While the proposed ESP system has the highest capital cost requirement, its energy and operating cost requirement is competitive with the remaining technologies. It will provide more than acceptable emission levels by vendor guarantee.

In terms of environmental impact, the proposed BACT system will result in marginally higher ground level TSP concentrations than might result from a baghouse system. However, as demonstrated in Section 6, the proposed system results in ground level TSP concentrations which are well within all applicable state and Federal ambient air quality requirements. When compared with other alternative control systems, the proposed BACT system will result significantly lower ground level TSP concentrations.

TABLE 4-3

MATRIX OF BACT SELECTION CRITERIA FOR PARTICULATE CONTROL

Control Method	Control Efficiency	Energy Requirement	Capital Cost	Operating Cost	Special Problems
Electrostatic Precipitator (Proposed)	99%[1]	Lowest	Highest	Lowest	• Flyash will have low electrical resistivity
Wet Scrubber	97.5%	Highest	Intermediate	Intermediate	• Needs wastewater treatment • Requires gas reheat • Chloride corrosion susceptibility • Visible plume
Dry Scrubber	NA[2]	Intermediate	Lowest	Intermediate	--
Fabric Filters	99.5%	Intermediate	Intermediate	Highest	• Susceptible to fire • Susceptible to plugging by moisture • Susceptible to perforation

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[1] Vendor guarantee.

[2] Will not achieve NSPS.

A major area of concern is the proposed ESP system's use with low sulfur coal and the resultant potential for control efficiency degradation. It must be noted however, that Eastern or Mid-Western low sulfur (rather than Western low sulfur) coal will be used. Such coal, available from West Virgina fields, for example, characteristically has a sodium content of about 0.50% of the total ash weight, which produces sufficient conductivity to prompt the vendor to guarantee 99% collection efficiency with low sulfur, bituminous coal. Similarly, it must be noted that the design of the ESP system has a large surface collection area (471 ft^2 per 1000 ACF). This factor together with the coal selection influenced CCA's choice of ESP as BACT.

4.2.2.6 BACT for Coal Preparation and Handling

As previously indicated, a dust supression system will be incorporated in the coal preparation and handling facilities. The purpose of this system is to prevent fugitive coal dust generation during coal preparation and handling by applying a surfactant spray to the coal, and enclosing certain of the equipment.

Conveyors to transport the coal will be covered, thereby preventing fugitive emissions during conveyance. Fugitive dust which could potentially be generated at transfer points will be minimized through the use of a surfactant.

The coal crusher will be housed in the power boiler building to minimize fugitive dust. Surfactants will be used in conjunction with the coal pile as will compaction of the pile itself.

Coal unloading will be accomplished through a bottom discharge system employing side curtains and surfactant spray. Additionally, the unloading pit will be located below ground.

With regard to the coal preparation and handling facilities, alternative controls would be to: 1) enclose the coal unloading area, and 2) employ baghouses on conveyor transfer points. Other facilities and equipment represent BACT for coal preparation plants.

The addition of a building or shed to enclose the unloading area would of course involve additional expense. Capital costs for the most rudimentary structure would be on the order of $30,000. Baghouses at conveyor transfer points would cost on the order of $500,000.

With the exception of the energy requirements for construction of an enclosure, and operating and maintenance energy requirements for baghouses, there is no difference from an energy standpoint between the proposed control system and the alternatives.

Some small, but undefinable degree of additional particulate emission control would result from installation of an unloading enclosure and employment of baghouses at the conveyor transfer points. However, because the enclosure would have to have two open sides for passage of the rail cars, and because the wet suppression system would constitute the bulk of emission control in any event, the additional control offered by alternatives would be minimal. In terms of ambient particulate concentrations, the difference would most likely be insignificant.

4.3 BACT FOR SULFUR DIOXIDE SO_2

4.3.1 Proposed BACT (Use of Low Sulfur Coal)

CCA proposes the use of Eastern (or Mid Western) low sulfur content, bituminous coal as BACT for sulfur dioxide emission control. Assuming a heating value of 12,500 BTU/lb (HHV), the sulfur content in the coal is limited to 0.75% in order to meet the NSPS limit of 1.2 lb/ SO_2 /MM BTU generated (based on the heat input and fuel consumption listed in Table 4-2 for 100% coal firing).

The NSPS for large electrical utility steam-generating facilities now require the application of flue gas desulfurization (FGD), together with some sulfur reduction achieved by currently practiced coal preparation techniques[5]. Application of FGD to utility boiler systems has been vigorously supported by EPA and other government agencies[6], but a considerably less active program has been available for industrial boilers, particularly those serving the paper industry[7]. As a result, CCA has selected the use of low sulfur bituminous coal as BACT for this proposed boiler system.

Low sulfur compliance coal was the choice of a number of Eastern electrical utility applicants prior to the adoption of the Electrical Utility NSPS in June 1979. An example of this was found in our discussions with Delmarva Power and Light Company which received the first PSD Permit in Region III for their 400 MW Indian River Unit No. 4. They will burn low sulfur coal in this unit, which is scheduled for start up in September 1980. They also cite that compliance bituminous coal (0.75% sulfur content) is available under long term contract (2 years or more).

There is bituminous low sulfur coal available to CCA, particularly from West Virginia and from Kentucky coal fields. Table 4-4 lists the major parameters for these coals, based on Bureau of Mines testing as well as private sources. The Island Creek Coal Company, the Avery Coal Company, and Westmoreland Coal indicate that compliance coal is available at a rate of at least one million tons per year.

4.3.2 Alternative Control Systems

Alternative control systems which could be considered as candidates for SO_2 control with the proposed boiler include:

- Compliance (low sulfur) coal from other coal ranks;
- Coal cleaning prior to combustion; and
- Flue gas desulfurization (FGD).

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[5] EPA, 11 June 1979: NSPS; Electrical Utility Steam Generating Units, Final Rule, 40 CFR Part 60

[6] EPA, May 1979: Comparison of the Availability and Reliability of Equipment in the Electrical Utility Industry, EPA-600/7-79-113, IERL, RTP, NC

[7] EPA April 1979: EPA Industrial Boiler FGD Survey, EPA-600/7-79-0676, IERL, RTP, NC.

TABLE 4-4

TYPICAL PROPERTIES OF BITUMINOUS COMPLIANCE COAL

Locale/Seam	Moisture	Volatile Material	Fired Carbon	Ash	Nitrogen	Sulfur	Higher Heating Value	Sodium Content In Ash As Na_2O
Rita, W. VA./ Chafin Cedar Grove[1]	2.8%	35.9%	57.4%	6.7%	1.4%	0.8%	13,790 BTU/lb	0.73%
Ragland, W. Va./ Island Creek No. 24[1]	3.4%	36.2%	58.5%	5.3%	1.6%	0.7%	13,900 BTU/lb	0.51%
Lorado, W. Va./ Lorado No. 5[1]	4.6%	33.7%	60.3%	6.0%	-	0.7%	13,540 BTU/lb	-
Metalton, W. Va./ Pocahyntas No. 3[2]	5.50%	16.91%	72.86%	5.23%	1.24%	0.7%	14,026 BTU/lb	0.56%
Lawrence, Ky./ U. Whitesburg[3]	4.4%	36.3%	46.4%	12.9%	1.5%	0.6%	12,110 BTU/lb	0.23%

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[1] Bureau of Mines, 1969: Analysis of Tipple and Delivered Samples of Coal, Logan County, W. Virginia, U.S. Dept. of Interior.

[2] Westmoreland Coal Co., 1978: Triangle Mine Complex Coal Data, Pocahontas Coal Seam, W. Virginia.

[3] Geological Survey, 1976: Collection, Chemical Analysis and Evaluation of Coal Samples in 1975, U.S. Dept. of Interior Report 76-468.

4.3.2.1 Compliance Coal From Other Ranks

4.3.2.1.1 Western Coals

Table 4-5 shows the approximate distribution of U.S. coal reserves, by rank and sulfur content. This table shows that each type of coal has some low sulfur deposits. However, certain combinations of coal heating values and sulfur content may not provide compliance coal. For example, combustion of a subbituminous coal of 9500 BTU/lb and 0.75% sulfur content would produce 1.5 lbs SO_2/MM BTU. On the average, the NSPS (1.2 lb/MM BTU) could be met by 54% and 57% of the Montana and Wyoming deposits, respectively.

With respect to the western coals (generally, subbituminous and lignite), the cost of transportation could make this alternative impractical. For example, in 1976 when the F.O.B. mine cost of Wyoming coal was $7/ton, the delivered cost per heat-equivalent ton was $36 in St. Louis and $45 in Philadelphia[8]. The cost is expected to be significantly higher now.

Additional equipment costs for burning western coal come mainly from differences in coal handling and in the combustion system. Lignite coals have a significantly increased explosion hazard potential and more care in pre-combustion handling, as well as in combustion chamber design, is necessary. The boiler system essentially must also be derated, compared to using bituminous coals. Due to high moisture content of subbituminous coals, use of such coals would reduce the capacity of the induced draft (ID) fan 20% and would produce a total boiler derating greater than 20%[9]. This consideration would make it difficult for the proposed boiler system to handle coals of mixed rank, as well as to penalize the system if only the low ranked coals were to be used.

4.3.2.1.2 Anthracite Coal

With respect to anthracite coal, it has been found that three major problems are related to its use as compliance coal. These involve high cost of mining, handling problems at the proposed boiler sites, and problems with its use with electrostatic precipitator control systems (for particulate control). The anthracite coal regions in the U.S. currently are producing at about a 6 million tons per year rate, although the capacity of the existing mines is about 11 million tons per year. This low rate of production stems from the high cost of mining in compliance with deep mine safety requirements, and the controls necessary to prevent ground and surface water contamination, particularly from acid contamination due to accompanying pyrite formations.

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[8] Ponder, W.H., et al, Aug. 1976: SO_2 Control Technologies - Commerical Availabilities and Economics, Third Annual Conference on Coal Gasification and Liquefaction, Pittsburgh, PA.

[9] Lundberg, R.M., Oct. 1974: Experiences in Burning Western Coals, Proc. Tech. Conf., Sulfur in Utility Fuels: The Growing Dilemma, Chicago, Ill.

TABLE 4-5

PERCENTAGE DISTRIBUTION OF IDENTIFIED U.S. COAL RESERVES ACCORDING TO SULFUR CONTENT[1]

	Sulfur Content (%)		
	Low 0-1	Medium 1.1-3.0	High 3+
Anthracite	97.1	2.9	-
Bituminous Coal	29.8	26.8	43.4
Subbituminous Coal	99.6	0.4	-
Lignite	90.7	9.3	-
All Ranks	65.0	15.0	20.0

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[1] Averitt, P., 1 Jan. 1974: Coal Resources of the United States, Geological Survey Bulletin 1412, U.S. Dept. of Interior.

The average cost for producing anthracite is about 65 percent greater than for a corresponding weight of bituminous coal[10]. Special factors influencing the cost of anthracite are: necessity for substantial pumping in deep mines, required treatment facilities for mine water (Strip and deep mines), the hard rock overburden which must be removed for stripping operations, archaic deep mining methods, the run-down condition of the railroads in the anthracite coal regions, and the high bonding (and reclamation) costs for restoring stripped land or disposing of waste mining material.

High output steam generating plants utilizing anthracite coal have generally installed traveling grate stoker units. It is costly to use pulverized anthracite coal because of its excessive hardness and because of the dust control problems. The Combustion Engineering Company and the Riley Company are the only firms we have found which continue to manufacture custom built traveling grate anthracite stokers; but the cost is very high (for units having steam generation capabilities in excess of 400,000 pph) compared to pulverized, bituminous coal units. Anthracite stoker firing requires both front and rear refractory arches to maintain ignition of the fuel bed, thereby lengthening residence time.

Because of the low sulfur and sodium content of the fly ash, ESP units on anthracite-fired units have exhibited a tendency (much like that of Western coals) to produce high electrical resistivity. At 350°F temperature (which is approximately the same as anticipated for the Boiler No. 7 flue gas entering the ESP) a particle resistivity of about 6×10^{11} ohm-cm is expected, as compared with a range of 7×10^{10} to 2×10^{11} for high sulfur (or sodium) content coals. This could reduce the ESP precipitation rate from a range of about 0.25 to 0.35 ft/sec., to about 0.10 ft/sec. [11,12] These problems may largely be correctable by increasing ESP size (or using baghouses), by adding conditioning agents to the flue gas, or by using high-acceleration rapping of the ESP precipitator plates.

4.3.2.2. Coal Cleaning prior to Combustion

There are presently two principal methods for the precombustion removal of pyritic sulfur from coal. These are the deep physical cleaning of coal and the Meyers Process, which is a chemical removal process. Other methods are under consideration (such as the DOE Sponsored Solvent Refined Coal Process), but these are not expected to reach commercial status before 1985. There is a program to demonstrate deep physical coal cleaning now underway at the Pennsylvania Electric Company's Homer City Power Station, near Johnstown, Pennsylvania. This facility is expected to produce compliance coal (1.2 lb SO_2MM

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[10] Bureau of Mines, March 1975: Evaluation of Mining Constraints to the Revitalization of Pennsylvania Anthracte, U.S. Dept. of Interior Report OFR47-75, Wash. D.C.

[11] Bump, R.L., 17 Jan 1977: Electrostatic Precipitators in Industry Chemical Engineering, 84(2):129-136

[12] TVA, 1968: SO_2 Removal from Power Plant Stack Gas ... NTIS PB 178 972

BTU generated) for Homer City Unit No. 3. It is currently being funded jointly by the utility, EPA, DOE and EPRI, but is not yet considered available for commercial application [13].

The Meyers Process (or its later development, referred to as the Gravichem Process) is a chemical process which involves an oxidation treatment. It is supposedly capable of removing almost all of the pyritic sulfur in coal, and involves the oxidation of the pyrites after the coal is slurried in an acid solution. This technique, also, is not yet ready for commercialization, and both the deep physical cleaning schemes and the Meyers Process are expected to add over $20/ton additional cost to the cost of coal.

4.3.2.3 Flue Gas Desulfurization (FGD)

The first full-scale U.S. application of flue gas desulfurization technology to industrial boilers was made at the General Motors Plant in St. Louis, Missouri, where two systems were fitted to two coal-fired boilers in 1972. A total of 232 boilers at 36 plant sites have FGD systems and facilities for 21 additional plant sites are currently planned. Table 4-6 summarizes the number and capacity of these systems. Table 4-7 summarizes the process and available cost information relative to these systems, for units controlling flow levels in excess of 200,000 SCFM.

For the scrubbers listed in Table 4-7 which have a gas flow comparable to the proposed boiler facility (over 400,000 SCFM), the capital cost requirement could vary from $1.8 million to $10 million, depending on how consistent the information is from Reference (8) relating to a complete system. In terms of specific cost (based on dollars per SCFM treated) the capital costs requirement for the use of a large, industrial type FGD system could amount to $4.3/SCFM to $22.4/SCFM, which would indicate a cost range for the Boiler No. 7 application in the range (for 1978 dollars): $2.6 million to $13.5 million. This means that the capital cost requirement for the use of a large, industrial type FGD system could amount to 4.3% to 27.0% of the capital budget of the entire project. It must be noted that the lower figure is derived from a capital cost given for the scrubber modules only, in 1974 dollars and does not represent a complete FGD system cost (See Great Southern Paper Co. entry in Table 4-7).

Currently, FGD Systems can generally be included in one of three major categories: throwaway, regenerative, and dry processes. A throwaway process results in a solid or liquid waste stream which requires disposal. A regenerable process produces chemicals which are potentially saleable chemicals or may be reintroduced into the scrubber system. Dry scrubber systems generally produce dry residual streams by providing a gas-solid chemical reacting environment or by using flue gas enthalpy to dry scrubber liguor droplets during (and, hopefully subsequent to) a gas-liguid chemical reaction.

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[13] Personal Contact, William Verracci, President, Pennsylvania Electric Company, Johnstown, Ohio, November 1979.

TABLE 4-6

NUMBER AND CAPACITY OF INDUSTRIAL BOILER FGD SYSTEMS[1]

Status	No. of Installations	No. of Boilers Controlled	No of Separate FGD Systems	Capacity
Operational	36	232	126	5.465×10^6 SCFM
Under Construction	12	48	24	1.101×10^6 SCFM
Planned	9	25	13	1.940x106 SCFM
TOTAL	57	305	163	8.506×10^6 SCFM

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[1] EPA, April 1979: Industrial Boiler FGD Survey, 1st Quarter 1979, EPA-600/7-79-0676/ERL,RTP,NC.

TABLE 4-7

INDUSTRIAL BOILER PROCESS TYPE AND FGD COSTS*

Company Location Capacity (SCFM)	Vendor/Process/Status/ Start-Up Date	Cost Capital	 Operating
ARCO/Polymers, Inc. Monaca, Pennsylvania 305,000	FMC Environmental Equipment/ Double Alkali (Concentrated)/Construction 6/80 The capital cost represents the total cost of the entire FGD system indluding installation, ductwork, stack, piping, engineering start-up, testing, instrumentation, overheads and waste disposal facilities in mid-1979 dollars. The projected operating cost is $8/ton of coal.	$11,600,000	$ 2,400,000
Caterpillar Tractor Co. East Peoria, Illinois 210,000	FMC Environmental Equipment/ Double Alkali (Concentrated)/Operational 4/78 No economic information has been supplied for the Caterpillar FGD systems.	N/A	N/A
Chevron U.S.A., Inc.	Koch Engineering/Sodium Carbonate Scrubbing/ Operational 7/78 The capital cost is in 1978 dollars. This represents the total installed cost of the FGD system including site preparation. The operating cost includes electricity, soda ash, and maintenance (labor and materials). This corresponds to a 340 day year and approximately $900/day per scrubber in 1978.	$ 2,800,000	$ 920,000
Chevron U.S.A., Inc. Bakersfield, California 146,000	Koch Engineering/Sodium Carbonate Scrubbing/ Construction 7/79 No economic information has been supplied for the Chevron FGD systems.	N/A	N/A

TABLE 4-7
(Continued)

INDUSTRIAL BOILER PROCESS TYPE AND FGD COSTS*

Company Location Capacity (SCFM)	Vendor/Process/Status/ Start-Up Date	Cost Capital	 Operating
FMC (Soda Ash Plant), Green River, Wyoming 446,000	FMC Environmental Equipment/Sodium Carbonate Scrubbing/Operational 5/76 This total capital cost, in 1975 dollars, includes ESP and FGD purchase and installation costs.	$10,000,000	N/A
Georgia-Pacific Paper Co. Crossett, Arkansas 220,000	Neptune Airpol, Inc./Caustic Waste Stream 7/75 This capital cost represents the absorber cost only and is in 1974 dollars.	$ 275,000	N/A
Getty Oil Company Bakersfield, California 891,000	In-House Design/Sodium Carbonate Scrubbing/Operational 12/78 The capital cost includes cost of scrubber, fan, ducting, tanks, pumps, piping, electrical, and installation in 1978 dollars for 5 scrubber systems. The operating cost includes electricity, scrubber maintenance, and soda ash for 9 systems. It is based on a 340-day year.	$ 5,400,000	$5,220,000
Great Southern Paper Co. Cedar Springs, Georgia 420,000	Neptune Airpol, Inc./Caustic Waste Stream/Operational 1975 The capital cost is the total installed cost for two scrubber modules in 1974 dollars.	$ 1,800,000	N/A

TABLE 4-7
(Continued)

INDUSTRIAL BOILER PROCESS TYPE AND FGD COSTS*

Company Location Capacity (SCFM)	Vendor/Process/Status/ Start-Up Date	Cost	
		Capital	Operating
Kerr-McGee Chemical Corp. Trona, California 490,000	Combustion Equipment Assoc./Sodium Carbonate Scrubbing/Operational 6/78 Kerr-McGee spent $1.5 million in a pilot plant for several years before and during construction of the new facility. Out of the $200 million porject cost, $16 million is for the boiler related pollution control costs.	$ 6,000,000	N/A
Neboosa Papers, Inc. Ashdown, Arkansas 211,000	Neptune Airpol, Inc./Caustic Scrubbing/ Operational 2/76	N/A	N/A
Texaco, Inc. San Ardo, California 347,000	Cilcote/Sodium Hydroxide Scrubbing/ 11/73 No economic information has as yet been provided by Texaco.	N/A	N/A

4.3.2.3.1 Throwaway Systems

Common systems include lime/limestone, sodium carbonate, and double alkali systems. The lime/limestone system is generally a wet scrubbing system in which lime (CaO) is slaked to form calcium hydroxide ($CaOH_2$) before mixing into a slurry; whereas limestone ($CaCO_3$) is finely ground before mixing to form a slurry. These processes have been widely demonstrated for utility boiler use and can provide as high as 95% SO_2 removal efficiencies. When used with western low sulfur coals, these systems have worked reliably and have provided availability in excess of 80%. When used with eastern coals with a higher scrubber load requirement, however, many of these systems have experienced plugging and chemical scaling problems. Control of process chemistry and the need to provide a large maintenance program (coupled with an appropriate parallel module design) seem to be the keys to acceptable availability factors [14].

The sodium carbonate technology uses a clear solution of sodium carbonate to produce a liquid stream containing sodium sulfite and bisulfite. These compounds are water soluble. Cost and availability of large quantities of the reagent limit their use to locations in reasonable proximity to a source of sodium carbonate. Additionally, the disposal of sodium waste may not be environmentally acceptable due to the high leachability of sodium ions, and would cause a water treatment problem.

The double alkali (sodium-lime) process combines aspects of the above schemes. SO_2 is absorbed in a clear sodium sulfite solution and produces sodium bisulfite. This stream is treated in a reactor with lime to precipitate calcium sulfite/sulfate. At the same time, a sodium sulfite solution is regenerated for reuse in the system. Sodium carbonate is added to the system to replace the sodium lost in the waste stream. It is essential to control the system carefully to reduce oxidation in the scrubber (and reduce sodium losses) and to prevent calcium sulfate saturation (and consequent scaling) in the scrubbing liquor. Versions of this technology are being used at paper manufacturing facilities, and these are listed in Table 4-8.

While all three systems are potentially compatible with pulp mill operations, only the Nekoosa Papers, Inc. unit installed at their Ashdown, Arkansas mill involves full coal firing and is consequently examined in more detail herein. The other two facilities are similar, but have been generally used for wood waste or oil firing. (Reference (8) indicates little or no firing with coal has been made on the Georgia-Pacific facility).

Figure 4-1 is a schematic of the Nekoosa Papers, Inc. scrubber system[8]. It contains two airpol variable throat venturi scrubbers, followed by cyclonic separators. They operate with a 500,000 pph steam boiler and are rated at 325,000 ACFM (total at 355°F), using 1 to 1.5% sulfur content coal. The discharge from the scrubbers was expected to be salt cake which could be used for paper operations at the mill. The venturis operate at 14-16 inches W.G. pressure drops with an inlet SO_2 concentration of 600 ppm (and a particulate loading of 1.42 grains (SCF). Scrubber liquor is recirculated at about 200

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[14] Op cit, Reference 6.

TABLE 4-8

DOUBLE ALKALI SYSTEMS IN USE AT PAPER MANUFACTURING FACILITIES

Georgia-Pacific Paper Co. Crossett, Arkansas Neptune Airpol, Inc. Bark, Coal/Oil (1.5% -2.0% sulfur) Start-up 7/75 Caustic Waste Stream Status - Operational	*Bkgd: The FGD System consists of an Airpol Caustic scrubbing unit to remove sulfur dioxide and particulate matter from the flue gas of a coal/bark or oil/bark power boiler. The system preceded by cyclones for particulate removal.
ITT Rayonier, Inc Fernandina Beach, Florida Neptune Airpol, Inc. Bark, Oil (2.0% - 2.5% sulfur) 176,000 SCFM (Total - 4 boilers) Start-up 1975 Sodium Hydroxide Scrubbing Status - Operational	*Bkgd: At Fernandina Beach, ITT Rayonier fires bark and oil in two of the four process steam boilers. Particulate and SO_2 emissions are controlled in two Airpol scrubbing trains.
Nekoosa Papers, Inc. Ashdown, Arkansas Neptune Airpol, Inc. Coal (1% - 1.5% sulfur) 211,000 SCFM (Total - 1 boiler) Start-up 2/76 Caustic Scrubbing Status - Operational	*Bkgd: The FGD System consists of two Airpol caustic scrubbers controlling flyash and sulfur dioxide.

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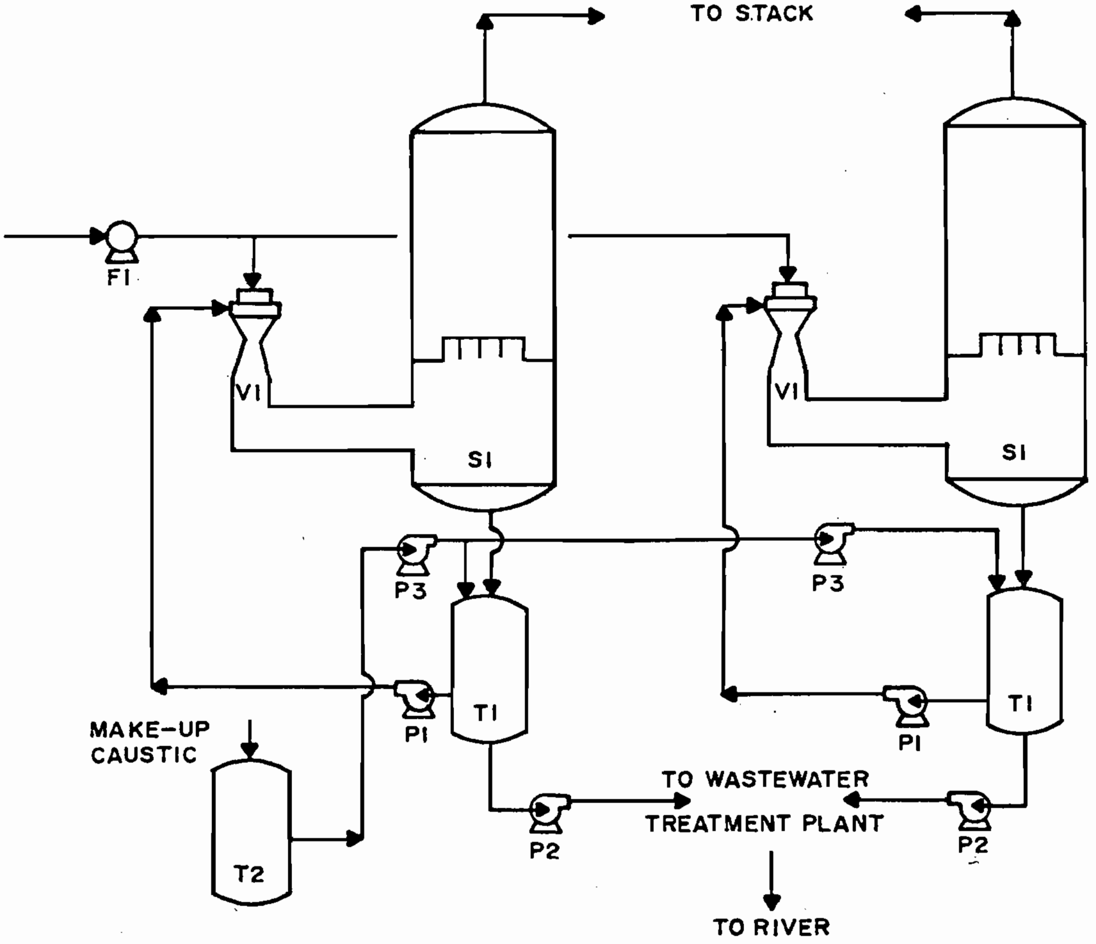
* Op Cit, Reference cited in Table 4-6.

FIGURE 4-1
SCHEMATIC OF NEKOOSA PAPERS, INC.
SCRUBBER SYSTEM AT ASHDOWN, ARKANSAS



INDEX

F1	FORCED DRAFT FAN
P1	RECIRCULATION PUMP
P2	BLEED PUMP
P3	MAKE-UP PUMP
S1	SEPARATOR
T1	RECIRCULATION TANK
T2	MAKE-UP TANK
V1	VARIABLE THROAT VENTURI

gpm and blowdown from the recirculation tanks are rated at 300 gpm. The blowdown goes to an ash pond, a stabilization pond and is then discharged to a nearby river. Scrubber underflow contains Na_2SO_3/SO_4 and some fly ash.

Caustic is obtained from the mill's pulp bleaching operations. It is used at a rate of 600 gpm (or 12 lb/min NAOH) and is added to the recirculation tank. The pH of the entering caustic is 10.5 to 11.0, and the pH in the recirculation tank is 5.5 to 6.0. Gases are exhausted (without reheat) through a flake glass-lined stack at about 125°F.

The predominant difficulties with the FGD system have been two-fold. First, the plant has been unable to develop an adequate pH control mechanism. The pH control system monitors the amount of caustic agent, i.e., sodium hydroxide, which goes into the recycle tank, keeping the pH of the scrubber solution at a noncorrosive level. The plant has been plagued with problems in operating the pH control system and has suffered a great deal of corrosion. The second problem concerns the chemical regeneration portion of the system. The intent of the plant was to separate the fly ash from the scrubber liquid and take the scrubber liquid through a series of evaporators where sodium sulfate, i.e., saltcake, would be generated. The plant has been unable to operate the fly ash separation system properly, and there is not enough evaporation capacity for the plant to process the scrubber effluent at full operational capacity.

Interestingly, ITT Rayonier operates a similar FGD system for use with wood waste and oil firing at Fernandina Beach. The system exhibited good reliability in 1979. Their original concept was to use hot, spent stream caustic from mill operations for scrubber purposes. Due to process-related problems, however, this goal has not been achieved. ITT has been selling spent caustic to nearby Kraft mills and has been purchasing sodium hydroxide at a rate of about 3 tons/day to maintain pH.

4.3.2.3.2 Regenerable Processes

For the Magnesium Oxide Process, a slurry of magnesium oxide (MgO) is circulated to absorb SO_2 in a wet scrubber. The solid product, magnesium sulfite ($MgSO_3$), is separated, dried and then regenerated. In the regeneration step, the $MgSO_3$ is calcined (thermally decomposed) to MgO and an SO_2 gas stream. The SO_2 recovered from the decomposition can be converted to sulfuric acid and the MgO reused in the FGD process. At present, there is one MgO system under demonstration operation which scrubs about one-sixth of the Philadelphia Electric Company's coal-fired units at their Eddystone Power Station near Philadelphia. Construction is underway to provide scrubbing for a full 650 MWe facility, also at Eddystone. This system has proved to be very costly (over $280/KWe, capital requirement in 1980 dollars) and the energy needs for MgO regeneration and flue gas reheat are high.

The Wellman-Lord (Sodium Sulfite) Process uses a solution of sodium sulfite (Na_2SO_3) to absorb SO_2 and produce soluble sodium bisulfite ($NaHSO_3$). (This portion of the scrubbing loop is very similar to the double alkali process). Due to the oxidation of Na_2SO_3 in the scrubber, a sodium sulfate (Na_2SO_4) purge is necessary. Sodium losses are replaced by either sodium hydroxide (NaOH) or sodium carbonate (Na_2CO_3). The bisulfate solution exits the scrubber and enters an evaporator, in which decomposition takes place. SO_2 gas and water are driven off and Na_2SO_3 crystals are formed. The water is condensed and used to dissolve the crystals, for return to the FGD system. The SO_2 gas stream is recovered for sale or for conversion to sulfuric acid or elemental sulfur. The only process currently used with the Wellman-Lord is one developed by Allied Chemical to produce elemental sulfur from SO_2.

The disadvantages of the Wellman-Lord/Allied processes are:

- The scrubbing portion of the system produces a significant liquid purge of sodium salts (sulfate and others). These salts are quite soluble and can lead to disposal problems, with a high potential for groundwater pollution.
- Large quantities of steam are required by the evaporation process. This high energy demand would result in a derating of the power station.
- The sodium chemicals required for makeup are expensive reagents.

4.3.2.3.3 Dry Scrubber Systems

The first full-scale pilot tests of fabric filters for dry SO_2 removal took place in 1974 at Colorado Ute Nucla Station. These tests involved injection of nacholite (a mineral form of sodium bicarbonate) into the flue gas ducts and into the existing filter bags. In late 1976, to eliminate the need for bicarbonate alkali and to provide greater reagent utilization, the two-stage process currently in favor was investigated. In this process, the alkali is injected into the flue gas in a spray dryer where a large fraction of the SO_2 removal occurs. The downstream fabric filter is no longer a single-purpose collector for the spray dryer reaction products and fly ash, but becomes a dual purpose second-stage SO_2 absorber and flue gas particulate collection device.

The use of dry sodium-based scrubbers presents problems similar to the sodium wet scrubbers. The solid waste produced by a dry scrubber contains highly mobile sodium ions, susceptible to leaching if contacted by water. Availability and cost of the sodium reagent are also problems.

4.3.2.4 Defense of the BACT Selection

Table 4-9 summarizes the major selection criteria which can influence the choice of BACT. In general, FGD involves significantly high capital investment requirements (from \$50 to over \$250 per equivalent electrical kilowatt) and increased operating costs (up to 30% over that for the base boiler system), but this disadvantage might be offset by the current price differential between low sulfur bituminous coal (as low as \$42.50/ton, delivered) and high sulfur bituminous coal (running currently at \$34/ton delivered, for 2.0% sulfur content), the latter which can be used with FGD.

An economic analysis was performed to determine if FGD offers any cost advantage when compared to the low sulfur bituminous coal selection. The price for the low sulfur case was assumed to be \$46/ton and \$34/ton for the high sulfur case. (The anthracite option, assuming \$60/ton coal is also included as an additional option). Table 4-10 summarizes the results.

The FGD option chosen for analysis is the caustic scrubbing system similar to that shown in Figure 4-1. The estimated difference in capital cost is \$12,191,000. This differential is partly due to the requirement to offset the boiler derating which would be required to operate the FGD system (about 5%), but mostly due to the cost of the FGD system itself (about 19% of the base boiler facility, or about \$100 KWe equivalent). If the costs are related to net annualized operating costs, taking into account the depreciation credit, the annual cost differential between the FGD and the low sulfur bituminous coal case is \$837,000. (Use of anthracite results in capital and annualized operating cost differentials of \$5,000,000 and \$4,328,000, respectively). While there may be a severe penalty in electing FGD as BACT with respect to capital investment, the lowered cost of coal will tend to offset the debt service which must be paid annually.

A major consideration in not selecting FGD for BACT also involves the lack of demonstrated, reliable operation of such systems designed for paper mills. The Nekoosa Papers, Inc. system which is the only full scale installation we have found, has had significant operational problems, including pH control, corrosion, and its inability to provide appropriate chemical regeneration. As a result, with the availability of low sulfur bituminous coal in West Virginia and Kentucky, the low sulfur coal option still appears appropriate for BACT.

4.4 BACT FOR NITROGEN OXIDES (NO_x)

NO_x emissions resulting from fossil fuel combustion may be affected by three options or techniques. The first critical design decision affecting potential NO_x emissions is the boiler furnace firing method. The two major firing techniques are grate firing and suspension firing. Suspension firing of solid fuels involves pulverizing or chipping the solid fuel to provide sufficiently small fuel particles which can be conveyed pneumatically and efficiently burned in short residence times consistent with economical furnace volumes.

The proposed primary fuel (coal supplemented by wood waste) can be processed to allow pneumatic conveying, and suspension firing can be achieved. The extremely high moisture content of wood waste is detrimental to the efficient combustion of the fuel within residence times consistent with conventional suspension firing designs. Long residence times are necessary to drive off the moisture, thus allowing temperature to rapidly reach levels at which combustion can occur. Therfore, although suspension firing (in a tangential pattern, for example) is potentially capable of generating lower NO_x emissions, it is less suitable for combusion of this fuel. Consequently, a grate-type firing method will be employed.

The second technique used to minimize NO_x emissions encompasses balancing a number of boiler operating parameters/design options. The four parameters are (1) low excess air, (2) staged combustion air, (3) variable air preheat temperature, and (4) flue gas recirculation. The proposed boiler will utilize

TABLE 4-9

MATRIX OF BACT SELECTION CRITERIA FOR SULFUR DIOXIDE CONTROL

Control Method	Control Efficiency	Energy Requirement	Capital Cost	Operating Cost	Special Problems
Low Sulfur Bituminous Coal	Achieves NSPS [1]	N/A[2]	N/A[2]	$42.5-$50 per ton delivered	• Questionable Contracting after 5 years. • Will exhibit high resistivity for ESP unless Sodium content is relatively high
Compliance Coal from other Coal Ranks	Achieves NSPS [1]	N/A[2]	Up to 20% higher than standard Boiler	Over $60 per ton delivered	• Requires special Boiler • Requires special on-site coal handling equipment. • Not compatible with ESP control.
Coal Cleaning	May not achieve NSPS	N/A [3]	N/A[3]	Adds $20 per ton to coal cost	• Applicable cleaning processes still under development.
Throwaway FGD	Better than NSPS	Up to 5% penalty in overall steam generation capability	$50 to $150 per KWe	Up to 20% over base boiler system	• Subject to Plugging, chemical scaling. • May cause sodium son leaching with some systems. • Used in paper mills, but had pH control and reagent regeneration problems with coal.

TABLE 4-9 (Continued)

Control Method	Control Efficiency	Energy Requirement	Capital Cost	Operating Cost	Special Problems
Regenerable FGD	Better than NSPS	Up to 10% penalty in overall steam generation capability	$100 to over $250 per KWe	Up to 30% over base boiler system	● Not proven to permit commercialization for industrial boilers. ● May cause sodium son leaching with some systems. ● Not compatible with paper mill operation.Dry
Dry FGD	Achieves NSPS	Up to 5% penalty in overall steam generation capability	$50 to $120 per KWe	Up to 20% over base boiler systems	● Not proven to commercial scale for industrial boilers. ● Not proven with eastern bituminous coals.

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[1] 9.8% of Facilities Cost.
[2] 20% of Facilities Cost per Annum.
[3] Assume one-half of Depreciation if available for Credit at 10% Rate per Annum.

TABLE 4-10

ECONOMIC ANALYSIS OF SO_2 CONTROL CHOICES FOR BACT

(Expressed in thousands of dollars)

	Low Sulfur Bituminous Coal	Throwaway FGD via Caustic Scrubbing	Anthracite Coal
Capital Investment	$50,000	$62,191	$55,000
Operating Cost [1]	4,900	6,095	5,390
Annual Cost of Capital[2]	10,000	12,438	11,000
Reagent Cost	-	85	-
Coal Cost	10,145	7,873	13,232
Sum, Annual Cost	$25,045	$26,491	$29,622
Less, Depreciation Credit [3]	(2,500)	(3,110)	(2,750)
Net Annualized			
Operating Cost	$22,545	$23,281	$26,872
Increase in Annual Operating Cost	-	837	4,328
Increase in Capital Investment	-	12,191	5,000

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[1] 9.8% of Facilities Cost (Capital Investments).

[2] 20% of Facilities Cost per Annum.

[3] Assume one-half of Depreciation is available for Credit at 10% rate per annum.

control of variables (1) and (2) above, to limit NO_x emissions to 0.6 lb/MM BTU. This will be accomplished by minimizing excess air and staging combustion via overfire and underfire air ratios. The use of variable preheat temperature (lower combustion air temperature) has not been proven to significantly reduce NO_x formation, and has generally been determined to be unacceptable due to its detrimental effect on boiler efficiency, as well as causing increased carbon monoxide (CO) and hydrocarbon (HC) emissions. Lowering air preheat temperature is especially unfavorable for efficient combustion of wood waste fuel since considerable energy is necessary to dry the fuel with combustion air prior to combustion. Flue gas recirculation has also been ruled out as a viable NO_x control option due to its detrimental effect on boiler efficiency and overall combustion efficiency. Additionally, flue gas recirculation is as yet unproven in wood firing boilers.

The third method of controlling NO_x emissions is by the use of add-on controls. Existing NO_x scrubber technology such as the Shell/UOP Process is in the developmental stage with no commercially available systems in the U.S. Further, the costs, energy penalties, and environmental effects associated with NO_x flue gas scrubbing are not well defined. Therefore, NO_x flue gas scrubbing is not considered appropriate for controlling NO_x at this facility. A second potentially available add-on control option uses ammonia injection (with or without a catalyst) to covert the NO_x to nitrogen. Processes such as the Exxon Thermal DeNO_x and Hitachi Zosen process must currently be considered to be in the developmental stage for a wood waste-fired boiler. Most NO_x control research has been performed on oil and gas-fired boilers. However, it is thought that these processes will also be effective on coal-fired boilers and several demonstration projects have recently been initiated by EPA. Since this technology is not commercially available nor tested for this particular application, it is not considered to represent BACT.

NO_x controls (exclusive of add-on methods) result in a lowering of overall combustion efficiency, which is reflected in increased emissions of CO, and to a lesser extent HC. As the current NO_x NSPS for fossil fuel-fired boilers is approached, further significant reductions in NO_x emissions are only possible by seriously affecting combustion efficiency and thus overall boiler efficiency and reliability. Therefore, the "break-even point" between NO_x emissions and CO emissions and boiler efficiency/reliability occurs near the specified level of NO_x emissions, i.e., 0.6 lb/MM BTU.

The peak uncontrolled emissions of NO_x has been estimated to be within the range of 2,205 to 2,615 tons per year using EPA emission factors of 0.17 lbs per MM BTU wood wastes[15] and 18 lbs. per ton of coal[16].

In order to determine the potential NO_x emissions from wood residue fired boilers employing today's technology in design and operation, an extensive

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[15] Nunn, Arthur B., III, 1979: Air Pollutant Emission Factors for Wood-fired boilers; EPA Contract No. 68-02-2613, Task No. 30. Prepared by TRW Environmental Engineering Division, Durham, N.C.

[16] Op Cit, Reference 4.

stack sampling program was recently performed by the National Council of the Paper Indutry for Air and Stream and Improvements (NCASI). The boiler units surveyed had been in operation for less than three years and basically represent the new generation units of either spreader-stoker or inclined grate design. In general, the three-hour average NO_x emission rate ranged from 0.06 to 0.3 lbs per MM BTU. Those units firing dried wood waste fuels contributed to the higher emission rate. The results of this survey are summarized in a paper recently presented at the NCASI West Coast Regional Meeting[17].

As a conservative estimate of the expected NO_x emissions associated with the combustion of wood wastes in power boiler No. 7, using the upper value of 0.3 lbs/MM BTU of wood waste in conjunction with the extremely conservative emission factor of 18 lbs per ton of coal, the peak NO_x emission rate is estimated to be about 2,615 tons per year. This value is less than the 0.6 lbs/MM BTU specified in the current NSPS for Electric Utility Steam Generating units fired with a solid fuel. This level of control of NO_x emissions will be accomplished through the design of the furnace, fuel feed system, and combustion controls. Specifically, this will involve the proper configuration of the combustion chamber and grate, and controls to adjust under and overfire air. The large furnace volume in relation to heat release results in moderate flame temperatures and the large area of water wall provides rapid heat transfer from the combustion chamber gases into the steam generating tubes. Finally, the grate area and stoker have been designed to develop an even fuel bed and therefore, constant combustion conditions. These features are recognized technology in the development of boilers designed for low rates of NO_x emission.

Available evidence indicates no effective control of NO_x emissions by scrubbers or other add-on emission control equipment. BACT must, therefore, involve (a) design features as enumerated above to control flame temperatures and (b) effective operator manipulation of air and burner controls.

A feature of wood waste combustion with moisture in the 50% range is the need to supply excess air to maintain oxygen at adequate levels for combustion, as the water vapor being generated in the combustion chamber has a smothering effect on the combustion process. This limits one NO_x control measure that is available when burning fossil fuels, namely control of excess air to low levels. However, as stated in EPA's Technology Transfer Manual of Environmental Pollution Control-Pulp and Paper Part I Air (EPA 1976) page 16-13, "The nitrogen oxide emissions from wood-fired power boilers are generally lower than for fossil fuel firing because of the large combustion volumes per unit amount of fuel burned, the normally high excess air levels of 50% or more and the high fuel moisture content that results in low flame temperatures of 980 to 1200°C (1800-2200°F)".

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[17] Hood, K.T., 1979: Summary of Finding of NCASI Study of NO_x Contributions from Paper Industry Combustion Sources. Presented at NCASI West Coast Regional Meeting, 1 West Coast Regional Center, Corvallis, Oregon.

As a result, the boiler cannot be operated without those NO_x "controls" described above. Therefore, the anticipated actual NO_x emissions from Table 2-10 are redefined as uncontrolled emissions. The use of furnace design/combustion controls to limit formation NO_x is considered to represent the application of BACT.

4.5 BACT FOR HYDROCARBONS (HC)

The peak uncontrolled HC emissions using the EPA, AP-42 emission factors of 0.3 lb per ton of coal and 0.01 lb per MM BTU of wood waste[18] will be within the range of 52 to 56 tons per year, depending on the fuel mix used. Therefore, the proposed new boiler is not a major emitting source of this pollutant for PSD review purposes.

The State of Oregon DEQ[19] has performed a study, based on testing of wood waste-fired boilers to determine hydrocarbon emissions. The results of the study indicated that the current EPA emission factor is too high. Actually, the current AP-42 emission factor is within a range of 2-70 lbs per ton of fuel. The Oregon study found that the average HC emission factor coincides with the lowest end of EPA's range, with the high and low values approximately one-tenth of EPA's high and low values. These findings are consistent with recent investigations of EPA's published HC emission factors for coal-fired boilers, which were found to be high by a factor of 30.

The wood waste fired boilers in the Oregon study which most closely resembled the proposed wood waste-fired boiler, were the Dutch Ovens. The average HC emission factor for these existing older Dutch Ovens was 0.77 lb per ton with a low factor of 0.22 lb per ton. The proposed boiler, while similar to the Dutch Oven in combustion zone design, is considerably more sophisticated with respect to furnace design details, combustion air admission points and rates, use of preheated combustion air, and combustion controls. Since the proposed boiler will be designed to be significantly more efficient than existing Dutch Oven units, it is expected that the HC emissions will be lower and more closely resemble HC emissions from a well-designed and operated coal-fired boiler. Therefore, based on the Oregon study data, it is expected that the HC emissions from the proposed boiler will not exceed the reported low value for Dutch Ovens.

Results of recent tests performed by Midwest Research Institute for EPA on a utility spreader stoker-fired boiler in Burlington Vermont, which was fired with 85 percent wood (BTU input) and 15 percent oil, indicate total hydrocarbon levels varying between 2-21 ppm by volume as propane in the flue gas. Applying this concentration range to the proposed boiler yields an HC emission factor between 0.03 to 0.3 lb per ton of fuel. Although these tests were performed on a spreader stoker boiler, which the Oregon study concluded to have higher HC emissions, the emissions are not unlike those expected for the

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[18] Op Cit, Reference 15.

[19] Bosserman, 1976.

proposed wood waste boiler. The results of these MRI tests again indicate the low level of HC emissions achievable during wood firing, with a well designed and operated boiler.

Maximizing combustion efficiency via the use of preheated combustion air, controlled excess air levels, and controlled distribution of combustion air, sets the proposed boiler apart from the various stokers, dutch ovens, and even teepee burners on which the EPA, AP-42 emission factor was developed. These inherent designed-in combustion controls are expected to minimize HC emissions, thus representing application of BACT for a wood waste burning boiler.

The emission factor for wood wastes is based on total hydrocarbons (including methane) emission data taken from various types of older existing wood waste burning boilers, and are thus suspected to be high (in fact, these factors are being revised by EPA). As a conservative estimate of the expected emissions from the proposed boiler, 0.2 lb non-methane HC/ton of fuel was chosen. While this emission factor is still very high when compared to similar coal-fired boilers, it represents actual emission levels at which existing wood waste burning boilers have been measured. The potential for reducing HC emissions during wood waste combustion is therefore demonstrated. Controls for HC emissions are an integral part of the design and operation of the proposed boiler. Therefore, the expected peak of annual emissions of HC from the boiler will be 56 tons per year.

4.6 BACT FOR CARBON MONOXIDE (CO)

Using the EPA, AP-42 emission factor of 1 lb per ton of coal and 0.20 lb per MM BTU of wood waste as per TRW 1979 study, the estimated carbon monoxide emissions from the proposed boiler will be within the range of 173 to 396 tons per year. The discussion of HC emissions controls as given in section 4-5 is applicable to CO emissions, since these effluents are both products of incomplete combustion. The application of the HC emission controls is expected to maintain low CO emissions at approximately 200 ppm (represented by the lowest EPA factor) in the flue gas, or 410 tons per year. Decreasing CO emissions below this level cannot be achieved without a decrease in boiler efficiency and increased NO_x emissions. Thus, designing for this level of CO emission is considered to represent BACT for the proposed wood waste fired boiler.

Existing Conditions

SECTION 5

EXISTING CONDITIONS

5.1 EMISSIONS

Within the area which will be significantly impacted by emissions from the proposed project, there are three major source groupings: CCA's existing Fernandina Beach Mill, and two other mill complexes. The identity and location of these sources in relation to the mill site were previously shown in Figure 2-1. The location of the emission points at the CCA mill have been previously identified in Figure 2-4.

To effectively address the question of baseline ambient air quality in the project area, emission inventories have been compiled for conditions both before and after 1977 (the base year).

5.1.1 1977 Emissions (Baseline) Inventory

The emissions inventory for the CCA mill, as well as the two other nearby paper mill complexes, are presented in Table 5-1. Emission source characteristics and emission rates for the major pollutants were obtained from the Florida Department of Environmental Regulation (DER) and the Georgia Department of Natural Resources (DNR).

Emission rates for both sulfur dioxide and total suspended particulates presented in Table 5-1 represent either the maximum allowable (permitted) emissions, or the maximum possible (uncontrolled) emissions that are still within permit limits. Emission rates for carbon monoxide and nitrogen dioxide were derived from emission factors contained in EPA publication AP-42. Carbon monoxide emission rates are based on maximum 24-hour operation, while nitrogen dioxide emission rates are based on average annual operation.

5.1.2 Sources Added After the Base Year

Since August 7, 1977, no new major emitting source has received a permit in the project area. However, in January 1980, CCA's request to burn 3% sulfur residual oil in power boilers No. 4 and No. 5 was approved by the Florida DER. For baseline year 1977 these boilers were fired with 2.5% sulfur residual oil.

5.2 AMBIENT AIR QUALITY

Air quality monitoring has been routinely performed by the Florida DER in the vicinity of the CCA mill complex since 1976. Locations of state-operated ambient air quality monitoring sites are shown in Figure 5-1. All of the sites are located within three kilometers of the CCA mill.

Within certain practical considerations, the monitoring sites were specifically selected by state authorities to measure the peak individual, as well as cumulative impacts of the major sources in the Fernandina Beach area, including the CCA mill. Some of the monitoring sites serve in a dual capacity as population-oriented impact sites.

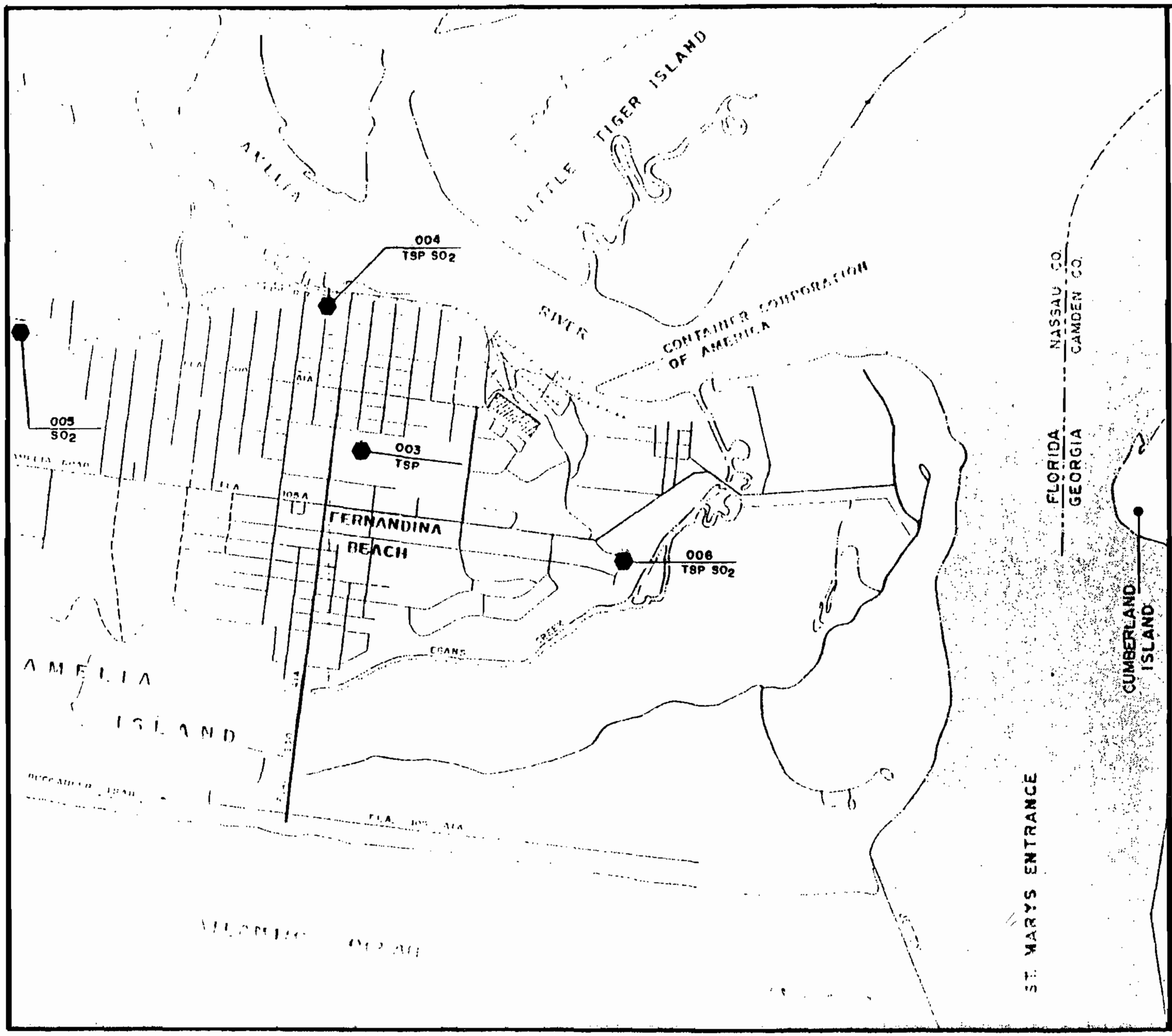
TABLE 5-1

BASELINE EMISSIONS INVENTORY DATA 1977

Stack No.	Serving	Emission Rate For Each Pollutant (g/s)				Stack Exit Diameter (m)	Stack Exit Velocity (m/s)	Stack Exit Temp. (°K)	Physical Stack Height (m)	Stack Base Evaluation (m)	UTM EASTING	UTM NORTHING
		TSP	SO_2	CO	NO_2							
1	Pwr.Blr. 3 CC	2.9	78.7	1.0	11.8	2.4	19.3	480.2	75.6	6.0	456.2	3394.2
2	Pwr.Blr. 4 CC	6.7	52.7	3.9	10.6	2.4	14.4	485.2	75.6	6.0	456.2	3394.2
3	Pwr.Blr. 5 CC	15.8	154.6	8.7	29.9	3.4	16.3	480.2	75.6	6.0	456.2	3394.2
4	Pwr.Blr. 6 CC	2.3	62.5	0.8	9.4	1.5	12.0	480.2	78.9	6.0	456.2	3394.2
5	Pwr.Blr. 3 CC	5.2	10.5	4.2	N/A	2.7	13.3	389.7	45.7	6.0	456.2	3394.2
6	Smelt Tank 3 CC	1.7	N/A	N/A	N/A	0.6	5.8	389.7	38.7	6.0	456.2	3394.2
7	Rcy.Blr. 4 CC	17.2	35.1	14.0	N/A	3.5	18.8	493.0	80.8	6.0	456.2	3394.2
8	Smelt Tank 4 CC	3.6	N/A	N/A	N/A	1.8	5.2	350.2	74.4	6.0	456.2	3394.2
9	Rcy.Blr. 5 CC	10.5	35.3	14.1	N/A	2.7	18.7	483.6	88.1	6.0	456.2	3394.2
10	Smelt Tank 5 CC	1.7	N/A	N/A	N/A	1.2	10.4	346.3	88.1	6.0	456.2	3394.2
11	Lime Kiln 2 CC	2.2	N/A	N/A	N/A	1.1	12.3	360.8	18.3	6.0	456.2	3394.2
12	Lime Kiln 3 CC	2.5	N/A	N/A	N/A	1.4	17.6	360.2	18.3	6.0	456.2	3394.2
13	Pwr.Blr.1-2 ITT	4.5	15.7	N/A	0.9	3.1	8.8	340.9	37.2	6.0	454.7	3392.2
14	Pwr.Blr.3-4 ITT	5.1	18.0	N/A	1.1	3.1	7.9	340.9	37.2	6.0	454.7	3392.2
15	Rcy.Blr. ITT	9.3	36.0	N/A	N/A	2.3	10.9	313.2	76.2	6.0	454.7	3392.2
16	Vent Scrubber ITT	N/A	8.0	N/A	N/A	0.9	15.5	323.2	37.5	6.0	454.7	3392.2
17	Pwr.Blr. 1-3 GP	19.4	281.0	1.2	50.7	4.3	7.3	449.7	83.8	6.0	448.2	3401.3
18	Pwr.Blr. 4 GP	5.9	59.9	0.3	11.8	1.8	20.0	699.7	36.6	6.0	448.2	3401.3
19	Bark Blr. 1 GP	13.1	40.3	3.2	21.3	2.4	13.8	349.7	36.6	6.0	448.2	3401.3
20	Bark Blr. 2 GP	2.5	13.2	3.2	21.3	2.1	18.8	338.6	36.6	6.0	448.2	3401.3
21	Rcy.Blr. 2 GP	3.5	7.6	78.5	N/A	2.3	13.1	425.8	47.2	6.0	448.2	3401.3
22	Rcy.Blr. 3 GP	3.2	7.6	88.2	N/A	1.6	25.2	394.1	53.3	6.0	448.2	3401.3
23	Rcy.Blr. 4 GP	3.3	15.8	176.6	N/A	2.6	22.1	427.4	76.2	6.0	448.2	3401.3
24	Smlt Tk 2-3-4 GP	9.5	N/A	N/A	N/A	1.5	9.5	344.0	64.4	6.0	448.2	3401.3
25	Lime Kiln 2-3 GP	3.8	N/A	N/A	N/A	1.5	8.0	346.0	30.5	6.0	448.2	3401.3

CC:	Container Corporation
ITT:	ITT Rayonier
GP:	Gilman Paper Company

SOURCES: Florida DER and Georgia DNR



STATION	LOCATION (UTM)	POLLUTANT
003	456.45E 3393.15N	TSP
004	455.49E 3392.91N	TSP SO_2
005	455.60E 3391.00N	SO_2
006	457.15E 3394.73N	TSP SO_2

CONTAINER CORPORATION OF AMERICA
FERNANDINA BEACH, FLORIDA

FIGURE 5-1
EXISTING MONITORING SITES

Monitoring Site 003 is located at the junior high school on Atlantic Avenue. Only total suspended particulate (TSP) concentration measurements are conducted at this site, on an every sixth day sampling schedule. Sampling has been routinely performed at the junior high school location since January 1977.

A second monitoring site, designated as 004, was established at the Fernandina Beach Police Station on the corner of Ash and South Second Street in June 1978. Air quality parameters measured at this site include both TSP and sulfur dioxide (SO_2). Unless otherwise noted, a temperature controlled gas bubbler was used to collect daily samples every sixth day at all SO_2 monitoring sites.

Only SO_2 was measured at Site 005. Sampling with a non-temperature controlled gas bubbler was conducted for a brief period during 1976 and was later discontinued in 1977 due to a cutback in agency funding and an unacceptable sampling procedure (i.e., non-temperature controlled gas bubbler).

The fourth monitoring station, identified as Site 006, is located on Highland Drive. This site was primarily selected to measure the peak cumulative impact attributable to emissions from both the CCA mill and the ITT Rayonier facility during southwesterly flow conditions. Both TSP and SO_2 measurements have been conducted at this monitoring site since June 1978.

The State of Florida's ambient air quality standards for SO_2, TSP, and photochemical oxidants are more stringent than the federal standards. With the exception of the standard for lead, which has not been officially adopted by the state, the state standards for the other criteria pollutants are identical to the federal standards. Federal and state ambient air quality standards are summarized in Table 5-2.

5.2.1 Ambient Sulfur Dioxide Concentrations

Ambient sulfur dioxide concentration data from the three sites for the period of record are summarized in Table 5-3. As indicated in the Table, exceedences of both Federal and state annual average and 24-hour standards were observed at Site 005 in 1976. Two exceedences of the state, and one exceedence of the Federal short-term standard are indicated during 1978. According to Florida DER personnel, exceedences of the short-term standard (one exceedence is allowed per year without contravening the standard) both in 1976 and 1978 were attributable to either start-up problems or identified upset conditions associated with the operation of the scrubber system at ITT Rayonier's mill. The high annual average concentration reported in 1976 at Site 005 is viewed as an aberration that was derived from an incomplete and unrepresentative data set, i.e., only 14 samples. In addition, the gas bubbler utilized during this period was not a temperature-controlled unit. As a result, although there were apparent violations of both the short-term and annual standards at Site 005 in 1976 and short term exceedences in 1978, these data have been discounted by the State DER and the area has been correctly designated as attainment for SO_2.

TABLE 5-2

SUMMARY OF AMBIENT AIR QUALITY STANDARDS - FEDERAL AND STATE

Pollutant	Interval*	Federal Primary Standard, ug/m^3	Federal Secondary Standard, ug/m^3	Florida State Primary Standard, ug/m^3	Florida State Secondary Standard, ug/m^3
Sulfur Dioxide	Annual Arithmetic Mean	80 (0.03 ppm)	----------	60 (0.02 ppm)	--------
	24-hr	365 (0.14 ppm)	---------	260 (0.10 ppm)	--------
	3-hr	-------	1300 (0.50 ppm)	---------	1300 (0.50 ppm)
Particulate Matter	Annual Geometric Mean	75	60	60	-------
	24-hr	260	150	150	-------
Nitrogen Dioxide	Annual Artithmetic Mean	100 (0.05 ppm)	100 (0.05 ppm)	100 (0.05 ppm)	100 (0.05 ppm)
Photo-chemical** Oxidants (measured as ozone)	1-hr	235 (0.12 ppm)	235 (0.12 pm)	160 (0.03 ppm)	160 (0.03 ppm)
Carbon Monoxide	8-hr	10 mg/m^3 (9 ppm)	10 mg/m^3 (9 ppm)	10 mg/m^3 (9 ppm)	10 mg/m^3 (9 ppm)
	1-hr	40 mg/m^3(35 ppm)	40 mg/m^3 (35 ppm)		40 mg/m^3 (35 ppm)
Hydrocarbons	3-hr (6-9 a.m.)	160 (0.24 ppm)	160 (0.24 ppm)	160 (0.24 ppm)	160 (0.24 ppm)
Lead***	Arithmetic mean averaged over calendar quarter	1.5	1.5	--------	-------

Note: *Except for Annual values which are values not to be exceeded, the Standards are values not to be exceeded more than once per year.

**Revised February 8, 1978, 44 FR 8220

***Promulgated October 5, 1978, 43 FR 46258

Table 5-3

SUMMARY OF SULFUR DIOXIDE CONCENTRATIONS[1] AT STATE MONITORING SITES IN FERNANDINA BEACH, FLORIDA

Site	Year	Type of Sampler	Arith. Avg.	Annual 24 Hr. OBS	Total 24 Hr. >260	High 24 Hr. Avg.	2nd 24 Hr. Avg.	3rd 24 Hr. Avg.
004	78	Gas Bubbler	43.1	26	0	149	80	72
004	79	Gas Bubbler	17.3	49	0	79	69	56
005	76	Gas Bubbler (No Temp)	103.0[2]	14	2	421	368	49
005	78	Gas Bubbler	57.0[4] 46	57	2	394[3]	320[3]	219
005	79	Gas Bubbler	30.2	51	0	187	127	93
006	78	Gas Bubbler	40.1	31	0	88	77	67
006	79	Gas Bubbler	24.8	45	0	170	76	67

[1] Concentration values expressed in micrograms per cubic meter.

[2] Data set discounted by Florida DER due to limited number of samples and lack of temperature control.

[3] Exceedences attributed by Florida DER due to upset or abnormal operating conditions at ITT Rayonier.

[4] Annual average value includes two upset values as noted above. Excluding these upsets, the annual average value at this site is 46.

Except as noted above, monitoring data show that the annual average SO_2 concentration ranges from 17.3 to 46 micrograms per cubic meter, and averages about 33.6 micrograms per cubic meter over the most recent 2-year period. The highest and second highest 24-hour average concentrations ranged from 127 micrograms per cubic meter at Site 005 to 69 micrograms per cubic meter at Site 004. The peak value is about 49 percent of the Florida primary standard of 260 micrograms per cubic meter. An evaluation of compliance with the 3-hour SO_2 standard could not be made, because 24-hour gas bubbler sampling units were used. However, the Florida DER is in the process of upgrading its existing state SO_2 monitoring network and is currently installing continuous SO_2 EPA equivalent monitors at the sites in Fernandina Beach. As a result, it is anticipated that for the year 1980 it will be possible to evaluate compliance with the 3-hour SO_2 standard.

5.2.2 Ambient Total Suspended Particulate Concentrations

Total suspended particulate data collected at the state monitoring stations in Fernandina Beach are presented in Table 5-4. Except for the one allowable excursion of the short-term standard in 1978, at Site 004, there have been no measured violations of the state's 24-hour ambient standard of 150 micrograms per cubic meter. A violation of the state annual TSP standard was observed at Site 004 in 1978. However, it is important to note that this annual geometric mean concentration is based on only 30 samples; as a result, this annual concentration value for the data set was excluded by the state DER in determining compliance status. The State DER has properly classified the area as attainment for total suspended particulates.

Except for the one allowable excursion of the 24-hour standard at Site 004 in 1978, and the exclusion of the annual data set for same year at this site, there have been no exceedences of the short-term or annual TSP standards at the state monitoring sites in Fernandina Beach, Florida. The highest 24-hour concentration for 1978 was 142 micrograms per cubic meter, about 5 percent below the state standard of 150 micrograms per cubic meter. The highest annual geometric mean concentration at the three sites during the past three years was 54.0 micrograms per cubic meter recorded at Site 004 in 1979. This value is about 10 percent below the state standard of 60 micrograms per cubic meter.

5.2.3 Other Criteria Pollutants

Measurements of the other criteria pollutants, including carbon monoxide, nitrogen dioxide, ozone (photochemical oxidants), and lead have not been conducted in the proposed project's area of significant impact.

It has been demonstrated that the proposed modification will not be a major emitter of hydrocarbons. Also, at most, there are only trace amounts of elemental lead or lead compounds in the fly ash. These two factors indicate that local site specific monitoring data for hydrocarbons and lead are not considered necessary to evaluate the impact of the proposed project on air quality.

With regard to nitrogen dioxide and carbon monoxide, it will be shown in the next section that the estimated 1-hour and 8-hour peak carbon monoxide concentrations from the mill modification will be considerably less than previously

Table 5-4

SUMMARY OF TOTAL SUSPENDED PARTICULATE CONCENTRATIONS* AT STATE MONITORING SITES IN FERNANDINA BEACH, FLORIDA

Site	Year	Type of Sampler	Annual Geo. Mean	Standard Geo. Dev	Total 24 Hr. OBS	Total 24 Hr. OBS > 150	High 24 Hr. OBS	2nd 24 Hr. OBS	34rd 24 Hr OBS
003	77	Hi-Vol.	38.6	1.5	49	0	102	94	78
003	78	Hi-Vol.	41.7	1.4	51	0	111	78	77
003	79	Hi-Vol.	37.9	1.3	56	0	66	63	62
004	78	Hi-Vol.	63.7	1.5	30	1	177	142	121
004	79	Hi-Vol.	54.0	1.4	58	0	117	104	88
006	78	Hi-Vol.	44-4	1.4	33	0	99	90	81
006	79	Hi-Vol.	40.1	1.4	55	0	81	76	74

*Concentration values expressed in micrograms per cubic meter.

established levels of significance for the respective averaging periods. Results of the modeling analyses also demonstrate that nitrogen dioxide concentrations from the proposed project, in addition to the contribution from other major sources (including natural background) will be substantially less than the annual standard.

5.2.4 Background (Uninventoried) Concentrations

In order to demonstrate compliance with applicable ambient air quality standards, it is necessary to take into account the background (uninventoried) concentrations for the various averaging times which are not directly attributable to emissions from a modeled source(s). Estimates were made of uninventoried background concentrations for total suspended particulates, sulfur dioxide and nitrogen dioxide.

To estimate the annual arithmetic mean background concentrations for TSP, a very conservative technique was applied. Except for recorded concentrations at Site 004 in 1978, the average annual geometric mean value at all sites for all sampled years were summed. An average geometric mean concentration was determined using the average standard deviation of the geometric mean for the same data set. By applying the technique suggested by Larsen (EPA, 1972), an average annual arithemetic mean concentration was computed. This value was calculated to be 59.5 micrograms per cubic meter. Utilizing the existing baseline inventory of major sources in the vicinity of the CCA mill and approximate meteorological data, air quality modeling was conducted to determine point-source related impact at each monitoring site. A composite average annual concentration was compiled. This value of 3.1 micrograms per cubic meter, subtracted from 59.5, equals the uninventoried TSP background concentration attributable to natural (sea-spray, etc.) and fugitive sources (open burning of vegetative undergrowth, roadway wind erosion, and entrainment of dust). The annual average uninventoried TSP background concentration is estimated to be 56.7 micrograms per cubic meter. It should be re-emphasized that this is an extremely conservative approach in determining background concentration levels.

This same conservative approach was followed in developing an estimate of the peak 24-hour background concentration of TSP. The highest and second-highest concentration observed at each site over the past three years were tabulated, and a composite 24-hour average highest and second-highest concentration was determined. This average value was calculated to be 92.4 micrograms per cubic meter. Next, the air dispersion model was applied and used to compute the highest and second highest 24-hour concentrations at each site. From these computed concentrations, an average, highest second-highest value was determined and found to be 5.7 micrograms per cubic meter. By subtracting the computed value from the measured concentration level, an extremely conservative uninventoried TSP background concentration for peak 24-hour conditions was estimated to be 86.7 micrograms per cubic meter.

In deriving an estimate of the background concentration levels for the short-term as well as long-term averaging periods for sulfur dioxide, the same basic approach was followed. It was found that the average annual mean uninventoried background concentration for SO_2 in the Fernandina Beach area is 26.1

micrograms per cubic meter, while the uninventoried 24-hour mean concentration level is 75.5 micrograms per cubic meter. It is assumed that the 3-hour background levels are comparable to the 24-hour concentration.

Due to the lack of nitrogen dioxide monitoring in the vicinity of the mill complex, it was not possible to apply the previously utilized technique. To determine an average annual background concentration for NO_2 and at the same time be consistent with previously applied conservative procedures, it is assumed that the average annual NO_2 background level will be 30 micrograms per cubic meter or approximately 50 percent greater than the value suggested by EPA[1].

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[1] EPA, May 1978; Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), Office of Air Quality Planning and Standards, Research Triangle Park, N.C., EPA 450/2-78-019.

Air Quality Impact Analysis

SECTION 6

AIR QUALITY IMPACT ANALYSIS

6.1 GENERAL CONSIDERATIONS

As previously indicated, emissions from the proposed project are subject to Federal and state emission limitations, and requirements for the use of Best Available Control Technology. Additionally, Federal and state statutes and regulations prohibit any facility to cause a violation of ambient air quality standards. Proposed facilities are also prohibited from degrading existing air quality beyond certain limitations.

The applicable ambient air quality standards have been presented in Table 5-2. Class II PSD increments for the appropriate averaging periods for sulfur dioxide and total suspended particulates, are summarized in Table 6-1. As part of the PSD permitting process, the potential impact on air quality of emissions from the proposed project have been examined. Modeling techniques predict that the proposed mill modification will not cause any violation of ambient air quality standards or exceed the allowable PSD increments.

6.2 MODIFIED MILL SOURCE GEOMETRY AND EMISSIONS

6.2.1 Source Geometry

The only new major point source of emissions which will result from the proposed project will be the new power boiler. Exhaust gases from power boiler No. 7 will be emitted through a single 340 foot stack. Good Engineering Practice (GEP) would permit a taller stack, but the stack height is constrained by Federal Aviation Agency requirements because of the proximity of the CCA mill to the Fernandina Beach Municipal Airport.

GEP stack height is defined as:

$$H_g = H + 1.5L$$

where:

H_g = GEP stack height.
H = the height of a structure or nearby obstruction.
L = a lesser dimension (Height or Width) of the structure or nearby obstruction.

A structure is considered "nearby" if it is within five structure widths or heights (whichever is less) of the stack. The tallest nearby structure to the proposed stack is the proposed No. 7 power boiler house, which will be approximately 200 feet above ground level. The maximum GEP stack height is determined by taking the building height + 1.5 X the building height (200 ft.) or projected width (225 ft.), whichever is less. As a result, the GEP stack would be 500 ft. Because the FAA limited stack height (340 ft.) is less than the GEP stack height (500 ft.), an analysis of the effects of aerodynamic downwash on ground level concentrations was performed as part of the air

TABLE 6-1

CLASS II PSD INCREMENTS

Pollutant	CONCENTRATION (MICROGRAMS/CUBIC METER)		
	3 Hr.	24 Hr.	Annual
SO_2	512	91	20
TSP	-	37	19*

*Geometric Mean

quality impact analysis on both a short term and long term basis. Where appropriate meteorological conditions exist, all tabulations presented in this Section include the effects of aerodynamic downwash on No. 7 power boiler stack.

6.2.2 Emissions

In developing the emissions inventory for the proposed modified mill configuration, an overall strategy which maximized the emission of the primary pollutants of interest was used. For example, in order to predict the worst case short term air quality impact for sulfur dioxide, it was assumed that power boilers Nos. 4 and 5 would be fired exclusively on residual oil containing 3.0% sulfur, and at the same time, the new combination boiler (No. 7) would be fired solely on coal. For additional conservatism, it was further assumed that all three power boilers would be operating at their maximum rated capacities.

A similar worst case approach was used to evaluate the maximum short term impact for particulate matter. In this case, power boiler No. 4 was assumed to be operating at its derated capacity of 165,000 lb/hr steam and fired soley on wood waste, while power boiler No. 5 would be co-fired on a combination of oil and the maximum amount of wood waste that can be fed across the grate. Power boiler No. 7 was assumed to be fired with a combination of coal and the maximum amount of wood waste that can be accommodated on the traveling grate. It is extremely improbable that sufficient wood waste could actually be obtained to operate at these levels, which represents the theoretical worst case situation.

Annual average emissions for both SO_2 and TSP are based on previous operating experience and projected production requirements. On an average annual basis, the power boilers will operate at a load factor of approximately 85% of their maximum continuous rated capacities. This 85% baseload factor, together with the conservative emission factor for nitrogen dioxide, was used in computing the average annual rate of emission of nitrogen dioxide from each of the power boilers. Emissions for the modified mill (i.e., power boilers Nos. 4 and 5 using 3% sulfur oil and the new combination power boiler No. 7) have been summarized in Tables 3-7 through 3-12. These emissions represent PSD increment-consuming sources.

As part of the air quality impact analysis, the increment expanding sources were also evaluated. The maximum as well as average annual emissions from the shutdown of power boilers Nos. 3 and 6 and recovery boiler No. 3 with its associated smelt tank are based on the same assumptions applied in computing emission rates for the modified mill configuration. Emission rates and source operating characteristics for these sources are summarized in the Tables 3-1 through 3-6.

6.3 DISPERSION METEOROLOGY

The dispersion of stack emissions from CCA's mill is determined by the speed, direction, and the turbulance level in the air flow past the mill. None of these parameters have been recorded in the immediate mill environs. The closest complete and continuous record of surface meteorological measurements has been taken at the U.S. Weather Service observation station at the Jacksonville

International Airport. Surface data for the five year period from 1970 through 1974 were obtained and reviewed as part of the air quality analysis. Coincident upper air data from Waycross, Georgia were also obtained for input to the air quality dispersion model.

6.4 DISPERSION MODELING

6.4.1 Modeling Approach and Receptor Geometry

The impact of the proposed project on ambient air quality was estimated based on emission rates discussed in Section 3, and the five year meteorological data base from observations at Jacksonville International Airport and Waycross, Georgia. Short and long term ground level concentrations of sulfur dioxide, particulate matter, and long term ground level concentrations of nitrogen dioxide were determined with the aid of the Industrial Source Complex model (ISC).

ISC model analyses were performed to determine the incremental as well as the net effect of emissions from the modified mill configuration on ambient air quality. Compliance with short and long term ambient air quality standards was analyzed for the proposed mill configuration in conjunction with the ITT Rayonier mill in Fernandina Beach, as well as the Gilman Paper Company mill in St. Marys, Georgia. These sources are the only major point source contributors of sulfur dioxide, particulate matter and nitrogen dioxide in the area where significant impacts may be expected from the proposed modified mill configuration.

The maximum and second maximum ground level concentrations of sulfur dioxide, total suspended particulates and nitrogen dioxide were determined for appropriate averaging times at the peak impact areas surrounding the mill. This required evaluation of the potential interaction of the respective sources. Computed concentrations were added to the uninventoried background concentrations (see Section 5.2.4), and then compared with the more stringent state ambient air quality standards. Hour-by-hour calculations were performed for CCA's Fernandina Beach mill, as well as the other two major sources using the hourly meteorological observations from the Jacksonville surface data record and the Waycross upper air data set for the period 1970 through 1974 to determine:

1) the days and periods that contribute to the short term maximum and second maximum ground level concentrations of sulfur dioxide and total suspended particulate matter;

2) the days and periods that could contribute to peak impact air quality levels on the identified PSD Class I areas;

3) the days that could contribute to a peak impact on the Jacksonville TSP non-attainment area; and

4) the year which could potentially contribute the highest peak impact associated with the proposed modified mill.

Table 6-2 presents the meteorological data for all the days that were identified as responsible for maximum and second maximum concentration levels for the baseline and modified mill sources.

TABLE 6-2
DAYS ASSOCIATED WITH MAXIMUM AND SECOND MAXIMUM SHORT TERM CONCENTRATIONS

DAY 121 1970

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	297.0	5.70	1307.0	296.0	0.0000	4	.2500	0.
2	292.0	4.60	1325.0	295.0	.0200	5	.3000	0.
3	305.0	3.60	1342.0	295.0	.0200	5	.3000	0.
4	286.0	3.60	1360.0	294.0	.0200	5	.3000	0.
5	303.0	4.10	1378.0	295.0	0.0000	4	.2500	0.
6	305.0	4.60	1396.0	295.0	0.0000	4	.2500	0.
7	300.0	4.10	1414.0	296.0	0.0000	3	.2000	0.
8	289.0	5.10	1431.0	298.0	0.0000	4	.2500	0.
9	300.0	7.20	1449.0	299.0	0.0000	4	.2500	0.
10	282.0	7.20	1467.0	300.0	0.0000	4	.2500	0.
11	301.0	8.20	1485.0	300.0	0.0000	3	.2000	0.
12	304.0	8.70	1502.0	300.0	0.0000	3	.2000	0.
13	292.0	7.70	1520.0	301.0	0.0000	3	.2000	0.
14	276.0	6.20	1538.0	301.0	0.0000	3	.2000	0.
15	277.0	6.70	1538.0	301.0	0.0000	4	.2500	0.
16	299.0	6.20	1538.0	300.0	0.0000	4	.2500	0.
17	295.0	7.20	1538.0	298.0	0.0000	4	.2500	0.
18	304.0	6.20	1538.0	299.0	0.0000	4	.2500	0.
19	284.0	7.20	1538.0	297.0	0.0000	4	.2500	0.
20	282.0	4.10	1539.0	296.0	0.0000	4	.2500	0.
21	291.0	2.60	1541.0	295.0	.0200	5	.3000	0.
22	270.0	3.60	1542.0	294.0	.0200	5	.3000	0.
23	266.0	3.10	1543.0	294.0	.0200	5	.3000	0.
24	310.0	2.60	1545.0	294.0	.0200	5	.3000	0.

TABLE 6-2 (Continued)

DAY 166 1971

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	58.0	4.10	1907.0	298.0	0.0000	4	.2500	0.
2	62.0	4.10	1960.0	298.0	0.0000	4	.2500	0.
3	57.0	3.10	2013.0	298.0	.0200	5	.3000	0.
4	61.0	4.10	2065.0	298.0	.0200	5	.3000	0.
5	56.0	3.60	2118.0	298.0	.0200	5	.3000	0.
6	55.0	2.60	161.0	298.0	.0200	5	.3000	0.
7	70.0	5.10	465.0	299.0	.0200	5	.3000	0.
8	76.0	5.10	769.0	301.0	.0200	5	.3000	0.
9	102.0	4.60	1073.0	303.0	0.0000	3	.2000	0.
10	192.0	4.60	1377.0	305.0	0.0000	3	.2000	0.
11	194.0	5.10	1681.0	306.0	0.0000	3	.2000	0.
12	92.0	4.10	1985.0	307.0	0.0000	2	.1500	0.
13	96.0	5.10	2289.0	308.0	0.0000	3	.2000	0.
14	102.0	5.10	2593.0	309.0	0.0000	3	.2000	0.
15	145.0	4.60	2593.0	310.0	0.0000	3	.2000	0.
16	70.0	4.10	2593.0	309.0	0.0000	3	.2000	0.
17	61.0	7.20	2593.0	306.0	0.0000	4	.2500	0.
18	61.0	6.70	2593.0	303.0	0.0000	4	.2500	0.
19	47.0	4.10	2593.0	301.0	0.0000	4	.2500	0.
20	8.0	2.60	2573.0	300.0	.0200	5	.3000	0.
21	45.0	3.60	2538.0	298.0	0.0000	4	.2500	0.
22	54.0	2.60	2503.0	298.0	.0200	5	.3000	0.
23	46.0	4.10	2468.0	298.0	0.0000	4	.2500	0.
24	59.0	3.60	2432.0	297.0	0.0000	4	.2500	0.

TABLE 6-2 (Continued)

DAY 143 1971

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	316.0	1.00	2181.0	292.0	.0350	6	.3000	0.
2	71.0	1.50	2138.0	290.0	.0350	6	.3000	0.
3	70.0	1.00	2096.0	290.0	.0350	6	.3000	0.
4	69.0	1.00	2053.0	290.0	.0350	6	.3000	0.
5	69.0	1.00	2011.0	290.0	.0350	6	.3000	0.
6	103.0	1.50	88.0	289.0	.0350	6	.3000	0.
7	80.0	1.50	280.0	290.0	.0200	5	.3000	0.
8	43.0	1.50	473.0	295.0	0.0000	4	.2500	0.
9	29.0	4.10	665.0	298.0	0.0000	3	.2000	0.
10	356.0	4.60	858.0	299.0	0.0000	3	.2000	0.
11	319.0	3.10	1050.0	300.0	0.0000	2	.1500	0.
12	316.0	5.10	1243.0	301.0	0.0000	3	.2000	0.
13	309.0	4.10	1435.0	300.0	0.0000	3	.2000	0.
14	325.0	5.10	1628.0	301.0	0.0000	3	.2000	0.
15	324.0	4.60	1628.0	301.0	0.0000	3	.2000	0.
16	324.0	5.70	1628.0	301.0	0.0000	3	.2000	0.
17	301.0	6.20	1628.0	300.0	0.0000	4	.2500	0.
18	321.0	7.20	1628.0	299.0	0.0000	4	.2500	0.
19	319.0	5.10	1628.0	298.0	0.0000	4	.2500	0.
20	313.0	4.10	1631.0	296.0	.0200	5	.3000	0.
21	319.0	4.10	1636.0	295.0	.0200	5	.3000	0.
22	332.0	3.60	1640.0	294.0	.0200	5	.3000	0.
23	322.0	2.10	1644.0	293.0	.0350	6	.3000	0.
24	307.0	2.10	1649.0	292.0	.0350	6	.3000	0.

TABLE 6-2 (Continued)

DAY 144 1971

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	306.0	2.10	1653.0	292.0	.0350	6	.3000	0.
2	308.0	1.50	1658.0	291.0	.0350	6	.3000	0.
3	115.0	1.50	1662.0	289.0	.0350	6	.3000	0.
4	108.0	1.00	1666.0	289.0	.0350	6	.3000	0.
5	106.0	1.00	1671.0	289.0	.0350	6	.3000	0.
6	110.0	1.00	93.0	289.0	.0350	6	.3000	0.
7	312.0	1.50	296.0	292.0	.0200	5	.3000	0.
8	359.0	2.10	498.0	298.0	0.0000	4	.2500	0.
9	316.0	5.70	700.0	299.0	0.0000	3	.2000	0.
10	13.0	6.20	902.0	299.0	0.0000	4	.2500	0.
11	320.0	5.10	1104.0	301.0	0.0000	3	.2000	0.
12	322.0	7.20	1306.0	301.0	0.0000	3	.2000	0.
13	318.0	7.70	1508.0	301.0	0.0000	3	.2000	0.
14	321.0	6.20	1710.0	301.0	0.0000	3	.2000	0.
15	322.0	6.20	1710.0	302.0	0.0000	4	.2500	0.
16	313.0	7.70	1710.0	301.0	0.0000	4	.2500	0.
17	301.0	7.70	1710.0	300.0	0.0000	4	.2500	0.
18	325.0	8.20	1710.0	299.0	0.0000	4	.2500	0.
19	309.0	6.70	1710.0	298.0	0.0000	4	.2500	0.
20	307.0	3.60	1724.0	296.0	.0200	5	.3000	0.
21	306.0	3.10	1743.0	296.0	.0350	6	.3000	0.
22	314.0	3.10	1761.0	295.0	.0350	6	.3000	0.
23	329.0	3.60	1780.0	295.0	.0200	5	.3000	0.
24	322.0	3.60	1799.0	295.0	.0200	5	.3000	0.

TABLE 6-2 (Continued)

DAY 26 1972

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	236.0	5.70	659.0	289.0	0.0000	4	.2500	0.
2	230.0	4.10	655.0	288.0	0.0000	4	.2500	0.
3	236.0	6.20	652.0	288.0	0.0000	4	.2500	0.
4	216.0	5.10	649.0	289.0	0.0000	4	.2500	0.
5	218.0	5.70	646.0	288.0	0.0000	4	.2500	0.
6	225.0	6.70	642.0	288.0	0.0000	4	.2500	0.
7	228.0	7.70	639.0	288.0	0.0000	4	.2500	0.
8	235.0	6.20	636.0	288.0	0.0000	4	.2500	0.
9	219.0	6.70	632.0	288.0	0.0000	4	.2500	0.
10	229.0	7.20	629.0	289.0	0.0000	4	.2500	0.
11	232.0	7.20	626.0	290.0	0.0000	4	.2500	0.
12	234.0	7.20	623.0	290.0	0.0000	4	.2500	0.
13	235.0	7.20	619.0	289.0	0.0000	4	.2500	0.
14	223.0	6.70	616.0	289.0	0.0000	4	.2500	0.
15	224.0	7.70	616.0	289.0	0.0000	4	.2500	0.
16	230.0	6.20	616.0	289.0	0.0000	4	.2500	0.
17	230.0	6.20	616.0	289.0	0.0000	4	.2500	0.
18	231.0	6.20	622.0	288.0	0.0000	4	.2500	0.
19	235.0	6.20	668.0	288.0	0.0000	4	.2500	0.
20	218.0	5.10	714.0	287.0	0.0000	4	.2500	0.
21	204.0	4.10	760.0	287.0	0.0000	4	.2500	0.
22	195.0	4.10	806.0	287.0	0.0000	4	.2500	0.
23	191.0	6.20	853.0	287.0	0.0000	4	.2500	0.
24	182.0	3.10	899.0	287.0	0.0000	4	.2500	0.

TABLE 6-2 (Continued)

DAY 209 1972

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	357.0	2.10	1765.0	296.0	.0200	5	.3000	0.
2	4.0	1.50	1774.0	296.0	.0350	6	.3000	0.
3	347.0	2.60	1784.0	296.0	.0200	5	.3000	0.
4	23.0	2.60	1793.0	296.0	.0200	5	.3000	0.
5	43.0	1.50	1803.0	296.0	.0350	6	.3000	0.
6	16.0	3.10	54.0	295.0	.0200	5	.3000	0.
7	24.0	3.10	283.0	297.0	0.0000	4	.2500	0.
8	29.0	2.60	512.0	300.0	0.0000	3	.2000	0.
9	59.0	3.60	742.0	303.0	0.0000	2	.1500	0.
10	91.0	3.60	971.0	304.0	0.0000	2	.1500	0.
11	76.0	5.10	1200.0	305.0	0.0000	3	.2000	0.
12	85.0	5.10	1429.0	306.0	0.0000	3	.2000	0.
13	79.0	5.70	1659.0	306.0	0.0000	3	.2000	0.
14	88.0	4.10	1888.0	308.0	0.0000	2	.1500	0.
15	65.0	4.60	1888.0	309.0	0.0000	3	.2000	0.
16	57.0	6.70	1888.0	309.0	0.0000	4	.2500	0.
17	57.0	4.10	1888.0	308.0	0.0000	3	.2000	0.
18	78.0	3.60	1888.0	306.0	0.0000	3	.2000	0.
19	73.0	2.10	1888.0	305.0	0.0000	4	.2500	0.
20	86.0	1.50	1859.0	300.0	.0200	5	.3000	0.
21	45.0	2.60	1815.0	301.0	.0350	6	.3000	0.
22	30.0	2.60	1771.0	300.0	.0350	6	.3000	0.
23	65.0	3.10	1727.0	301.0	.0200	5	.3000	0.
24	59.0	3.10	1682.0	300.0	.0200	5	.3000	0.

TABLE 6-2 (Continued)

DAY 311 1972

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	216.0	7.20	1363.0	295.0	0.0000	4	.2500	0.
2	230.0	8.20	1349.0	295.0	0.0000	4	.2500	0.
3	226.0	7.20	1334.0	295.0	0.0000	4	.2500	0.
4	228.0	6.70	1320.0	295.0	0.0000	4	.2500	0.
5	235.0	7.20	1306.0	295.0	0.0000	4	.2500	0.
6	241.0	6.20	1292.0	294.0	0.0000	4	.2500	0.
7	227.0	4.10	1277.0	294.0	0.0000	4	.2500	0.
8	230.0	4.60	1263.0	294.0	0.0000	4	.2500	0.
9	237.0	5.10	1249.0	294.0	0.0000	4	.2500	0.
10	265.0	7.20	1234.0	295.0	0.0000	4	.2500	0.
11	263.0	8.20	1220.0	296.0	0.0000	4	.2500	0.
12	276.0	7.70	1206.0	296.0	0.0000	4	.2500	0.
13	261.0	9.30	1191.0	297.0	0.0000	4	.2500	0.
14	267.0	7.20	1177.0	296.0	0.0000	4	.2500	0.
15	258.0	7.70	1177.0	295.0	0.0000	4	.2500	0.
16	262.0	7.20	1177.0	295.0	0.0000	4	.2500	0.
17	252.0	6.20	1177.0	295.0	0.0000	4	.2500	0.
18	250.0	5.10	1174.0	295.0	0.0000	4	.2500	0.
19	246.0	5.70	1166.0	295.0	0.0000	4	.2500	0.
20	247.0	4.60	1159.0	295.0	0.0000	4	.2500	0.
21	265.0	5.70	1152.0	296.0	0.0000	4	.2500	0.
22	282.0	6.70	1144.0	296.0	0.0000	4	.2500	0.
23	273.0	5.10	1137.0	295.0	0.0000	4	.2500	0.
24	256.0	4.60	1130.0	295.0	0.0000	4	.2500	0.

TABLE 6-2 (Continued)

DAY 48 1973

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	156.0	5.70	1078.0	276.0	0.0000	4	.2500	0.
2	158.0	6.20	1090.0	275.0	0.0000	4	.2500	0.
3	173.0	4.10	1101.0	274.0	.0200	5	.3000	0.
4	165.0	4.60	1112.0	274.0	.0200	5	.3000	0.
5	175.0	4.10	1124.0	273.0	.0200	5	.3000	0.
6	163.0	3.60	1135.0	273.0	.0200	5	.3000	0.
7	170.0	3.60	1146.0	272.0	.0200	5	.3000	0.
8	160.0	2.60	148.0	273.0	0.0000	4	.2500	0.
9	169.0	4.60	328.0	274.0	0.0000	3	.2000	0.
10	201.0	6.20	507.0	276.0	0.0000	4	.2500	0.
11	177.0	6.20	687.0	277.0	0.0000	4	.2500	0.
12	241.0	5.10	867.0	279.0	0.0000	3	.2000	0.
13	263.0	5.10	1046.0	280.0	0.0000	3	.2000	0.
14	223.0	5.10	1226.0	280.0	0.0000	3	.2000	0.
15	254.0	5.70	1226.0	280.0	0.0000	3	.2000	0.
16	239.0	5.70	1226.0	279.0	0.0000	4	.2500	0.
17	262.0	4.60	1226.0	279.0	0.0000	4	.2500	0.
18	260.0	4.60	1226.0	278.0	0.0000	4	.2500	0.
19	264.0	3.10	1211.0	277.0	.0200	5	.3000	0.
20	235.0	2.60	1194.0	277.0	.0200	5	.3000	0.
21	198.0	2.10	1176.0	276.0	.0200	5	.3000	0.
22	202.0	1.00	1158.0	276.0	.0350	6	.3000	0.
23	203.0	1.00	1140.0	276.0	.0350	6	.3000	0.
24	198.0	1.00	1122.0	277.0	.0350	6	.3000	0.

TABLE 6-2 (Continued)

DAY 137 1973

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	86.0	1.50	1346.0	284.0	.0350	6	.3000	0.
2	126.0	1.50	1389.0	283.0	.0350	6	.3000	0.
3	129.0	1.00	1433.0	281.0	.0350	6	.3000	0.
4	133.0	1.00	1476.0	281.0	.0350	6	.3000	0.
5	102.0	2.10	1520.0	281.0	.0350	6	.3000	0.
6	62.0	1.50	92.0	283.0	.0200	5	.3000	0.
7	78.0	2.10	319.0	286.0	0.0000	4	.2500	0.
8	89.0	2.10	546.0	290.0	0.0000	3	.2000	0.
9	66.0	4.10	773.0	294.0	0.0000	3	.2000	0.
10	61.0	4.60	1001.0	296.0	0.0000	3	.2000	0.
11	60.0	5.70	1228.0	298.0	0.0000	3	.2000	0.
12	62.0	6.70	1455.0	298.0	0.0000	3	.2000	0.
13	59.0	6.20	1683.0	299.0	0.0000	3	.2000	0.
14	88.0	3.60	1910.0	299.0	0.0000	2	.1500	0.
15	56.0	4.60	1910.0	300.0	0.0000	3	.2000	0.
16	51.0	5.10	1910.0	300.0	0.0000	3	.2000	0.
17	61.0	5.70	1910.0	300.0	0.0000	4	.2500	0.
18	81.0	4.60	1910.0	299.0	0.0000	4	.2500	0.
19	56.0	2.60	1910.0	297.0	0.0000	4	.2500	0.
20	60.0	3.60	1912.0	295.0	.0200	5	.3000	0.
21	53.0	3.10	1915.0	294.0	.0350	6	.3000	0.
22	63.0	4.10	1918.0	293.0	.0200	5	.3000	0.
23	62.0	3.60	1920.0	293.0	.0200	5	.3000	0.
24	53.0	5.10	1923.0	292.0	0.0000	4	.2500	0.

TABLE 6-2 (Continued)

DAY 264 1973

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	196.0	1.50	1818.0	295.0	.0350	6	.3000	0.
2	199.0	1.00	1809.0	295.0	.0350	6	.3000	0.
3	199.0	1.00	1800.0	295.0	.0350	6	.3000	0.
4	200.0	1.00	1792.0	295.0	.0350	6	.3000	0.
5	196.0	1.00	1783.0	294.0	.0350	6	.3000	0.
6	202.0	1.00	1774.0	294.0	.0350	6	.3000	0.
7	203.0	1.00	158.0	295.0	.0200	5	.3000	0.
8	210.0	1.50	379.0	296.0	0.0000	4	.2500	0.
9	231.0	2.60	600.0	301.0	0.0000	3	.2000	0.
10	243.0	3.10	821.0	302.0	0.0000	2	.1500	0.
11	228.0	3.60	1042.0	302.0	0.0000	3	.2000	0.
12	221.0	4.10	1263.0	304.0	0.0000	3	.2000	0.
13	282.0	4.10	1484.0	304.0	0.0000	3	.2000	0.
14	265.0	6.20	1705.0	304.0	0.0000	4	.2500	0.
15	256.0	5.70	1705.0	304.0	0.0000	3	.2000	0.
16	290.0	6.20	1705.0	303.0	0.0000	4	.2500	0.
17	283.0	5.70	1705.0	301.0	0.0000	4	.2500	0.
18	283.0	4.60	1705.0	300.0	0.0000	4	.2500	0.
19	259.0	3.60	1701.0	299.0	.0200	5	.3000	0.
20	252.0	2.60	1694.0	298.0	.0350	6	.3000	0.
21	292.0	4.10	1687.0	298.0	.0200	5	.3000	0.
22	266.0	2.60	1680.0	298.0	.0350	6	.3000	0.
23	240.0	3.10	1673.0	297.0	.0350	6	.3000	0.
24	216.0	2.60	1666.0	296.0	.0200	5	.3000	0.

TABLE 6-2 (Continued)

DAY 243 1974

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT	DECAY COEFFICIENT (PER SEC)
1	48.0	1.00	1279.0	297.0	.0350	6	.3000	0.
2	91.0	1.50	1313.0	297.0	.0350	6	.3000	0.
3	93.0	1.00	1347.0	296.0	.0350	6	.3000	0.
4	95.0	1.00	1380.0	296.0	.0350	6	.3000	0.
5	145.0	1.50	1414.0	296.0	.0350	6	.3000	0.
6	140.0	1.00	1448.0	296.0	.0350	6	.3000	0.
7	139.0	1.00	196.0	296.0	.0350	6	.3000	0.
8	358.0	1.50	414.0	299.0	.0200	5	.3000	0.
9	32.0	2.60	631.0	301.0	0.0000	4	.2500	0.
10	30.0	1.00	849.0	303.0	0.0000	3	.2000	0.
11	12.0	1.50	1066.0	304.0	0.0000	2	.1500	0.
12	47.0	3.60	1283.0	305.0	0.0000	2	.1500	0.
13	34.0	1.50	1501.0	305.0	0.0000	1	.1000	0.
14	35.0	1.00	1718.0	305.0	0.0000	1	.1000	0.
15	226.0	11.30	1718.0	299.0	0.0000	2	.1500	0.
16	334.0	5.10	1718.0	299.0	0.0000	3	.2000	0.
17	22.0	1.50	1718.0	299.0	0.0000	3	.2000	0.
18	190.0	1.50	1718.0	299.0	0.0000	3	.2000	0.
19	316.0	2.10	1716.0	299.0	0.0000	4	.2500	0.
20	96.0	2.60	1704.0	298.0	.0200	5	.3000	0.
21	69.0	3.10	1692.0	297.0	.0200	5	.3000	0.
22	130.0	4.10	1681.0	296.0	0.0000	4	.2500	0.
23	128.0	1.00	1669.0	296.0	.0200	5	.3000	0.
24	309.0	1.50	1657.0	295.0	.0350	6	.3000	0.

Air dispersion modeling for the primary pollutants (TSP, SO_2, NO_x and CO) was accomplished in four steps:

- o Baseline conditions were modeled;
- o Incremental and total cumulative impacts associated with power boilers Nos. 4, 5 and 7 were modeled;
- o Incremental and total cumulative peak impacts associated with the retirement of power boiler No. 3 as well as recovery boiler No. 3 and its associated smelt tank were evaluated; and
- o The net change in the ambient air quality levels at the highest and second highest impact locations for the proposed mill modification were determined.

Receptors for the analysis were determined through preliminary modeling based on one year of meteorological data, as well as on the results of previous analyses. A rectangular coordinate system was used in evaluating the peak impact of the proposed modified mill configuration. Power boiler No. 6 at the CCA facility was used as the origin. The array of receptors are shown in a sample computer printout in Table 6-3. In addition, discrete receptors (Table 6-4) were established at the leading edge of the Okefenokee and Wolf Island PSD Class I areas, the Jacksonville TSP non-attainment area, portions of Georgia, and at the existing monitoring sites established by Florida DER. As noted previously, the peak short term and long term computed baseline concentrations at the existing modeling sites were subtracted from the measured values to determine the uninventoried background concentrations.

Tables 6-5a and 6-5b present a summary of the days, and hour of the day, when maximum and second maximum short term concentrations of SO_2 and TSP, respectively, were predicted at the additional, discrete receptor points.

6.4.2 Modeling Results

Table 6-6 summarizes predicted maximum air quality concentrations resulting from the operation of the modified CCA Fernandina Beach mill. The air quality levels presented in the table represent anticipated peak ground level concentrations of sulfur dioxide, total suspended particulates, and nitrogen dioxide resulting from the combined operation of the modified CCA mill, as well as the ITT Rayonier and Gilman Paper Company mills. Table 6-6 also presents uninventoried background concentrations for the respective pollutants for the appropriate averaging times. These values have been incorporated into the maximum and second maximum predicted concentrations.

Maximum and second maximum ground level concentrations for sulfur dioxide are presented in the table for sequential averaging times of three and 24 hours. Also presented is the maximum annual arithmetic mean concentration of sulfur dioxide.

Maximum and second maximum ground level concentrations of TSP are also presented in Table 6-6 for sequential 24 hour averaging periods. Also presented is the maximum annual geometric mean, which is based on the composite annual

TABLE 6-3

RECEPTOR ARRAY

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                                                                                                          HIGH
                                                                                                          24-HR
                                                                                                          SGROUP#  1
                                   *** SO2 BASE LINE RUN FOR ALL EXISTING SOURCES/CCA,ITT,GPC        ***


                                  * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)      *
                                                  * FROM SOURCES         10,  -180,
                                                    * FOR THE RECEPTOR GRID *

                                * MAXIMUM VALUE EQUALS      89.97929 AND OCCURRED AT (   -2750.0,   -3000.0) *

     Y-AXIS   /                                                   X-AXIS (METERS)
    (METERS)  /              1500.0                1750.0                 2000.0                 2500.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

      2500.0 /       29.61196 (243, 1)     23.69254 (243, 1)     17.68429 (243, 1)     17.95480 (166, 1)
      2000.0 /       23.65963 (243, 1)     18.88953 (243, 1)     15.49514 (243, 1)     27.55403 (137, 1)
      1750.0 /       22.22153 (243, 1)     18.25237 (243, 1)     19.07060 (137, 1)     45.73411 (137, 1)
      1500.0 /       21.80868 (243, 1)     23.12663 (137, 1)     41.37821 (137, 1)     61.15616 (137, 1)
      1250.0 /       27.77177 (137, 1)     50.61318 (137, 1)     64.73879 (137, 1)     60.80154 (137, 1)
      1000.0 /       59.99628 (137, 1)     71.61963 (137, 1)     65.37569 (137, 1)     41.26427 (137, 1)
       750.0 /       64.84318 (137, 1)     50.06166 (137, 1)     37.89352 (137, 1)     38.01807 (209, 1)
       500.0 /       34.52174 (209, 1)     43.00004 (209, 1)     50.02013 (209, 1)     54.07868 (209, 1)
       300.0 /       55.27671 (209, 1)     69.82605 (209, 1)     61.50562 (209, 1)     52.62941 (209, 1)
         0.0 /       51.66603 (166, 1)     51.31505 (166, 1)     46.22500 (166, 1)     39.15327 (137, 1)
      -300.0 /       69.23687 (166, 1)     64.37802 (166, 1)     54.73402 (166, 1)     38.07680 (166, 1)
      -500.0 /       37.82261 (166, 1)     38.95644 (166, 1)     39.97639 (166, 1)     38.89618 (166, 1)
      -750.0 /       14.34453 (137, 1)     11.27165 (166, 1)     15.45144 (166, 1)     23.71706 (166, 1)
     -1000.0 /       13.27911 (209, 1)     13.86761 (209, 1)     13.55794 (209, 1)     11.26817 (209, 1)
     -1250.0 /       15.58635 (209, 1)     14.12878 (137, 1)     14.46657 (137, 1)     12.57124 (137, 1)
     -1500.0 /       18.25468 (137, 1)     17.71880 (137, 1)     16.81365 (137, 1)     13.57550 (137, 1)
     -1750.0 /       16.00199 (137, 1)     16.51921 (243, 1)     17.53953 (243, 1)     13.47815 (137, 1)
     -2000.0 /       14.48752 (243, 1)     16.35404 (243, 1)     18.18724 (243, 1)     19.10810 (243, 1)
     -2250.0 /       16.94691 (243, 1)     19.43026 (243, 1)     21.52986 (243, 1)     25.87169 (243, 1)
     -2500.0 /       15.02897 (166, 1)     16.13312 (166, 1)     17.79263 (243, 1)     23.86853 (243, 1)
     -2750.0 /       11.23399 (166, 1)     14.38193 (166, 1)     14.34221 (166, 1)     15.74488 (243, 1)
     -3000.0 /        5.95630 (166, 1)      9.57002 (166, 1)     12.03062 (166, 1)     11.38410 (243, 1)
     -3500.0 /        2.76210 (137, 1)      4.29466 (137, 1)      5.28616 (137, 1)      7.69126 (166, 1)
     -4000.0 /        2.83872 (243, 1)      1.47132 (243, 1)      2.82148 (137, 1)      5.41738 (137, 1)
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TABLE 6-3 (Continued)

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                                                                                                        HIGH
                                                                                                        24-HR
                                                                                                        SGROUP#  1
                              *** SO2 BASE LINE RUN FOR ALL EXISTING SOURCES/CCA,ITT,GPC        ***

                              * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)      *
                                             * FROM SOURCES          10,   -180,
                                               * FOR THE RECEPTOR GRID *

                           * MAXIMUM VALUE EQUALS      89.97929 AND OCCURRED AT (   -2750.0,    -3000.0) *

 Y-AXIS   /                                                    X-AXIS (METERS)
(METERS)  /              300.0               500.0               750.0               1000.0              1250.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   2500.0 /      15.43701 (243, 1)    20.00968 (243, 1)    25.37690 (243, 1)    30.23796 (243, 1)    31.66743 (243, 1)
   2000.0 /      19.89786 (243, 1)    25.84063 (243, 1)    31.98868 (243, 1)    33.28578 (243, 1)    30.00907 (243, 1)
   1750.0 /      22.48035 (243, 1)    29.21327 (243, 1)    34.07805 (243, 1)    32.60350 (243, 1)    27.34286 (243, 1)
   1500.0 /      25.59410 (243, 1)    32.75044 (243, 1)    34.78990 (243, 1)    31.20968 (243, 1)    26.35850 (243, 1)
   1250.0 /      29.62352 (243, 1)    36.95975 (243, 1)    36.79441 (243, 1)    32.22338 (243, 1)    26.53015 (243, 1)
   1000.0 /      34.46907 (243, 1)    44.41091 (243, 1)    44.13328 (243, 1)    34.55092 (243, 1)    32.02183 (137, 1)
    750.0 /      39.19762 (243, 1)    53.51789 (243, 1)    45.76847 (243, 1)    32.88007 (137, 1)    63.08593 (137, 1)
    500.0 /      33.49641 (243, 1)    38.75982 (243, 1)    24.24873 (137, 1)    43.53775 (137, 1)    35.52999 (137, 1)
    300.0 /      13.07344 (243, 1)    10.21874 (243, 1)    18.82516 (166, 1)    27.47137 (209, 1)    43.15965 (209, 1)
      0.0 /      11.93490 (243, 1)    21.98003 (166, 1)    27.49109 (166, 1)    37.07444 (209, 1)    46.46714 (209, 1)
   -300.0 /      20.32572 (166, 1)    16.56084 (137, 1)    25.42321 (137, 1)    45.50185 (166, 1)    63.97440 (166, 1)
   -500.0 /      20.06945 (137, 1)    29.05801 (137, 1)    33.75402 (137, 1)    36.46913 (166, 1)    36.89754 (166, 1)
   -750.0 /      37.02871 (137, 1)    41.63524 (166, 1)    41.56414 (137, 1)    35.07058 (137, 1)    23.72933 (137, 1)
  -1000.0 /      45.98319 (137, 1)    39.25308 (137, 1)    25.79025 (137, 1)    18.14625 (243, 1)    17.29169 (243, 1)
  -1250.0 /      23.72685 (137, 1)    15.77452 (209, 1)    17.26569 (243, 1)    18.17657 (209, 1)    17.46699 (209, 1)
  -1500.0 /      25.54035 (209, 1)    24.05990 (209, 1)    20.68036 (209, 1)    17.14358 (209, 1)    18.13708 (137, 1)
  -1750.0 /      24.46093 (209, 1)    20.87154 (209, 1)    18.12635 (137, 1)    16.95565 (137, 1)    16.43621 (137, 1)
  -2000.0 /      18.05863 (137, 1)    17.06784 (137, 1)    15.20575 (137, 1)    13.43550 (137, 1)    13.05014 (166, 1)
  -2250.0 /      14.93065 (166, 1)    12.11708 (166, 1)    10.61100 (137, 1)    11.63175 (243, 1)    14.21761 (243, 1)
  -2500.0 /      14.10958 (166, 1)    13.29891 (166, 1)    11.80476 (166, 1)    10.64300 (166, 1)    11.67554 (166, 1)
  -2750.0 /       3.74942 (166, 1)     5.06388 (166, 1)     6.27756 (166, 1)     7.01107 (166, 1)     8.24019 (166, 1)
  -3000.0 /       3.34935 (243, 1)     1.93690 (243, 1)     1.43545 (166, 1)     2.71644 (137, 1)     4.25501 (137, 1)
  -3500.0 /      17.96730 (243, 1)    11.03521 (243, 1)     4.34172 (243, 1)     1.91430 (243, 1)     1.37179 (137, 1)
  -4000.0 /      12.24659 (243, 1)    15.13739 (243, 1)    18.34539 (243, 1)    15.20247 (243, 1)     7.56748 (243, 1)
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TABLE 6-3 (Continued)

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                                                                                                   HIGH
                                                                                                   24-HR
                                                                                                   SGROUP#  1
                          *** SO2 BASE LINE RUN FOR ALL EXISTING SOURCES/CCA,III,GPC       ***

                          * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)      *
                                          * FROM SOURCES         10,  -180,
                                            * FOR THE RECEPTOR GRID *

                        * MAXIMUM VALUE EQUALS     85.97929 AND OCCURRED AT (   -2750.0,   -3000.0) *

   Y-AXIS    /                                             X-AXIS (METERS)
  (METERS)   /          -1000.0             -750.0            -500.0             -300.0              0.0
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    2500.0 /      9.01179 (243, 1)    5.70246 (144, 1)    6.66682 (144, 1)    9.48381 (143, 1)    9.17451 (143, 1)
    2000.0 /     13.11610 (243, 1)    9.98862 (243, 1)    4.91124 (243, 1)    8.36064 (143, 1)   10.56272 (243, 1)
    1750.0 /     26.80167 (143, 1)   13.81778 (243, 1)    7.24460 (243, 1)    6.89919 (143, 1)   11.89847 (243, 1)
    1500.0 /     47.29372 (143, 1)   15.72564 (243, 1)   11.38477 (243, 1)    8.34095 (243, 1)   13.43099 (243, 1)
    1250.0 /     59.25004 (144, 1)   33.36074 (143, 1)   16.12924 (243, 1)   11.07021 (243, 1)   15.39844 (243, 1)
    1000.0 /     47.26319 (144, 1)   47.67774 (144, 1)   19.19302 (243, 1)   15.34027 (243, 1)   18.11349 (243, 1)
     750.0 /     16.48973 (143, 1)   35.35780 (144, 1)   24.93243 (143, 1)   20.80134 (243, 1)   21.47404 (243, 1)
     500.0 /     21.39263 (243, 1)   23.28348 (243, 1)   24.53836 (243, 1)   25.67280 (243, 1)   24.68692 (243, 1)
     300.0 /     23.69830 (243, 1)   28.65450 (243, 1)   31.20536 (243, 1)   32.34653 (243, 1)   25.56259 (243, 1)
       0.0 /     24.72446 (243, 1)   34.00271 (243, 1)   39.86349 (243, 1)   39.78740 (243, 1)   22.62175 (243, 1)
    -300.0 /     26.07730 (243, 1)   37.06668 (243, 1)   45.45784 (243, 1)   38.64103 (243, 1)   20.77188 (243, 1)
    -500.0 /     29.48323 (243, 1)   43.55528 (243, 1)   47.44002 (243, 1)   28.05606 (243, 1)   21.30281 (166, 1)
    -750.0 /     38.81152 (243, 1)   47.02124 (243, 1)   25.60099 (243, 1)   21.33430 (166, 1)   22.02298 (137, 1)
   -1000.0 /     45.41337 (243, 1)   28.06852 (243, 1)   21.87730 (166, 1)   26.08151 (166, 1)   43.54290 (137, 1)
   -1250.0 /     39.93544 (243, 1)   18.96301 (243, 1)   43.06133 (137, 1)   55.63767 (166, 1)   45.85023 (137, 1)
   -1500.0 /     35.58251 (243, 1)   59.41942 (137, 1)   57.58887 (137, 1)   42.09335 (166, 1)   23.97555 (209, 1)
   -1750.0 /     55.91747 (137, 1)   36.72476 (209, 1)   42.50208 (209, 1)   40.27991 (209, 1)   31.93867 (209, 1)
   -2000.0 /     51.52268 (209, 1)   46.94131 (209, 1)   36.20767 (209, 1)   29.07125 (209, 1)   21.50034 (209, 1)
   -2250.0 /     16.39055 (166, 1)   46.35183 (166, 1)   56.80996 (166, 1)   44.31508 (166, 1)   22.51685 (166, 1)
   -2500.0 /     11.77299 (243, 1)   17.35821 (166, 1)   25.61210 (166, 1)   21.66733 (166, 1)   14.95833 (166, 1)
   -2750.0 /     19.35702 (166, 1)   19.22742 (166, 1)   19.29267 (166, 1)   13.49086 (243, 1)    5.23563 (243, 1)
   -3000.0 /     19.61139 (166, 1)   25.32420 (166, 1)   23.75267 (243, 1)   21.86017 (243, 1)    8.62756 (243, 1)
   -3500.0 /     14.47374 (166, 1)   20.99508 (166, 1)   18.43749 (166, 1)   14.62202 (243, 1)   17.39086 (243, 1)
   -4000.0 /     14.09215 (166, 1)   14.01877 (166, 1)   11.24954 (166, 1)    9.06347 (243, 1)    9.63179 (243, 1)
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TABLE 6-3 (Continued)

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                                                                                                              HIGH
                                                                                                              24-HR
                                                                                                              SGROUP#  1
                        *** SO2 BASE LINE RUN FOR ALL EXISTING SOURCES/CCA,ITT,GPC        ***


                        * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)       *
                                      * FROM SOURCES          10,   -180,
                                         * FOR THE RECEPTOR GRID *

                   * MAXIMUM VALUE EQUALS     . 89.97929 AND OCCURRED AT (    -2750.0,    -3000.0) *

 Y-AXIS   /                                                X-AXIS (METERS)
(METERS)  /          -2250.0                 -2000.0                 -1750.0                 -1500.0                 -1250.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   2500.0 /     38.92382 (144, 1)      45.86976 (144, 1)      40.26677 (143, 1)      25.44210 (143, 1)      11.06481 (243, 1)
   2000.0 /     25.92240 (144, 1)      39.44496 (144, 1)      54.77531 (144, 1)      52.68237 (144, 1)      35.30196 (143, 1)
   1750.0 /     18.48650 (143, 1)      27.32788 (144, 1)      46.98548 (144, 1)      60.21022 (144, 1)      52.09132 (143, 1)
   1500.0 /     14.36788 (243, 1)      19.56137 (143, 1)      30.24300 (144, 1)      50.51986 (144, 1)      59.85266 (144, 1)
   1250.0 /     15.51384 (243, 1)      15.79725 (243, 1)      19.04527 (143, 1)      28.06071 (143, 1)      48.02557 (144, 1)
   1000.0 /     12.79890 (243, 1)      15.67890 (243, 1)      20.93608 (243, 1)      17.76920 (243, 1)      24.29202 (143, 1)
    750.0 /      8.79920 (243, 1)      12.34307 (243, 1)      19.65597 (243, 1)      20.02668 (243, 1)      17.51304 (243, 1)
    500.0 /      5.55399 (243, 1)       8.25048 (243, 1)      15.60093 (243, 1)      18.65665 (243, 1)      19.61210 (243, 1)
    300.0 /      7.50512 (311, 1)       6.02252 (311, 1)      11.92227 (243, 1)      15.97831 (243, 1)      19.03480 (243, 1)
      0.0 /     10.42334 (311, 1)       8.83255 (311, 1)       7.31742 (243, 1)      11.87342 (243, 1)      16.58284 (243, 1)
   -300.0 /     24.22628 (311, 1)      20.25330 (311, 1)      15.22676 (311, 1)       9.68267 (311, 1)      15.32969 (243, 1)
   -500.0 /     17.34877 (311, 1)      12.76026 (311, 1)       8.78786 (311, 1)       8.76770 (243, 1)      16.37772 (243, 1)
   -750.0 /     14.14727 (243, 1)      10.82282 (311, 1)       8.30276 (311, 1)      10.07775 (243, 1)      21.88693 (243, 1)
  -1000.0 /     33.97309 (143, 1)      15.79107 (243, 1)       7.45179 (311, 1)      16.89062 ( 26, 1)      32.20949 (243, 1)
  -1250.0 /     53.37051 (143, 1)      22.26457 (143, 1)      30.46335 ( 26, 1)      29.09540 ( 26, 1)      44.29492 (243, 1)
  -1500.0 /     31.65520 ( 26, 1)      57.59865 (143, 1)      36.68339 ( 26, 1)      26.09751 (243, 1)      63.62733 (243, 1)
  -1750.0 /     49.11279 ( 26, 1)      41.88860 ( 26, 1)      28.40559 ( 26, 1)      21.28269 (243, 1)      50.64666 (243, 1)
  -2000.0 /     44.99580 ( 26, 1)      32.08923 ( 26, 1)      23.84439 ( 26, 1)      17.29259 ( 26, 1)      21.06573 (209, 1)
  -2250.0 /     34.30574 ( 26, 1)      27.00914 ( 26, 1)      22.05838 ( 26, 1)      10.32766 ( 26, 1)       8.45291 (243, 1)
  -2500.0 /     54.38701 ( 26, 1)      39.76379 ( 26, 1)      16.55947 ( 26, 1)       4.38100 ( 26, 1)      12.47582 (166, 1)
  -2750.0 /     59.93637 ( 26, 1)      26.21552 ( 26, 1)      23.59503 (166, 1)       3.58665 (243, 1)       5.18651 (166, 1)
  -3000.0 /     44.58453 ( 26, 1)      16.78491 ( 26, 1)      23.42470 (166, 1)       4.77860 (243, 1)       4.62604 (166, 1)
  -3500.0 /     14.97243 ( 26, 1)      13.16583 (166, 1)      15.61163 (243, 1)       7.32909 ( 26, 1)       7.79071 (166, 1)
  -4000.0 /      9.03638 ( 26, 1)      14.02149 ( 26, 1)      10.93671 ( 26, 1)       7.99501 ( 26, 1)      10.08421 (166, 1)
```

TABLE 6-3 (Continued)

```
                                                                                                     HIGH
                                                                                                     24-HR
                                                                                                     SGROUP#  1
                        *** SO2 BASE LINE RUN FOR ALL EXISTING SOURCES/CCA,ITT,GPC        ***


                       * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)       *
                                            * FROM SOURCES          10,  -180,
                                              * FOR THE RECEPTOR GRID *

                     * MAXIMUM VALUE EQUALS      89.97929 AND OCCURRED AT (   -2750.0,    -3000.0) *

  Y-AXIS    /                                             X-AXIS (METERS)
 (METERS)   /          -4000.0              -3500.0              -3000.0              -2750.0              -2500.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   2500.0 /     13.41161 (143, 1)    13.39067 (243, 1)    18.21508 (144, 1)    24.31401 (144, 1)    30.84386 (144, 1)
   2000.0 /      9.02350 (144, 1)    12.76586 (243, 1)    15.31440 (243, 1)    12.88865 (143, 1)    17.14656 (143, 1)
   1750.0 /      8.73066 (144, 1)     8.33660 (243, 1)    15.16812 (243, 1)    15.62051 (243, 1)    13.39364 (143, 1)
   1500.0 /     10.56573 (144, 1)     6.33446 (143, 1)    11.59694 (243, 1)    14.44761 (243, 1)    15.64153 (243, 1)
   1250.0 /     13.81889 (144, 1)     6.55699 (144, 1)     7.87462 (243, 1)    10.71582 (243, 1)    13.59978 (243, 1)
   1000.0 /     17.20293 (143, 1)     9.63364 (144, 1)     5.39439 (243, 1)     7.31519 (243, 1)     9.71330 (243, 1)
    750.0 /     18.10655 (143, 1)    13.84177 (144, 1)     5.61638 (143, 1)     5.31382 (243, 1)     6.46512 (243, 1)
    500.0 /     15.97901 (143, 1)    18.61617 (144, 1)     8.66470 (311, 1)     7.71924 (311, 1)     6.51601 (311, 1)
    300.0 /     15.83199 (144, 1)    22.37605 (143, 1)    10.70467 (311, 1)     9.86417 (311, 1)     8.79449 (311, 1)
      0.0 /     15.47533 (144, 1)    19.80214 (143, 1)    19.75745 (144, 1)    12.78909 (311, 1)    11.74328 (311, 1)
   -300.0 /     28.11170 (311, 1)    29.50971 (311, 1)    29.73075 (311, 1)    28.82119 (311, 1)    27.04308 (311, 1)
   -500.0 /     32.96783 (311, 1)    32.18653 (311, 1)    28.84766 (311, 1)    31.65147 (143, 1)    21.85682 (311, 1)
   -750.0 /     27.18044 (311, 1)    23.55513 (311, 1)    22.15455 (144, 1)    32.95726 (143, 1)    34.17463 (143, 1)
  -1000.0 /     19.89072 (311, 1)    17.84793 (311, 1)    16.76263 (311, 1)    23.99412 (144, 1)    41.72224 (143, 1)
  -1250.0 /     19.28506 (311, 1)    18.67064 (311, 1)    17.31285 (311, 1)    15.13466 (311, 1)    24.62445 (144, 1)
  -1500.0 /     25.49531 (311, 1)    21.82126 (311, 1)    19.45883 (311, 1)    12.57357 (311, 1)    16.29580 ( 26, 1)
  -1750.0 /     28.35210 (311, 1)    24.80530 (311, 1)    21.91366 (311, 1)    27.84459 ( 26, 1)    43.06583 ( 26, 1)
  -2000.0 /     27.85009 (311, 1)    28.19830 (311, 1)    38.21703 ( 26, 1)    50.55791 ( 26, 1)    53.18700 ( 26, 1)
  -2250.0 /     38.87875 (311, 1)    46.47424 (311, 1)    54.88521 ( 26, 1)    55.28541 (311, 1)    49.43995 (311, 1)
  -2500.0 /     38.02135 (311, 1)    51.05763 ( 26, 1)    54.90045 ( 26, 1)    49.10570 (311, 1)    37.16588 ( 26, 1)
  -2750.0 /     44.84950 ( 26, 1)    57.18441 ( 26, 1)    47.60758 ( 26, 1)    55.23085 ( 26, 1)    84.90532 ( 26, 1)
  -3000.0 /     54.91623 ( 26, 1)    54.45607 ( 26, 1)    76.20858 ( 26, 1)    89.97929 ( 26, 1)    65.33971 ( 26, 1)
  -3500.0 /     64.04641 ( 26, 1)    84.57817 ( 26, 1)    62.57108 ( 26, 1)    55.87157 ( 26, 1)    31.38320 ( 26, 1)
  -4000.0 /     74.80187 ( 26, 1)    55.50322 ( 26, 1)    45.58198 ( 26, 1)    22.05328 ( 26, 1)    12.63049 ( 26, 1)
```

TABLE 6-4

ADDITIONAL RECEPTOR POINTS

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                    *** SO2 BASE LINE RUN FOR ALL EXISTING SOURCES/CCA,ITT,GPC          ***

                    * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)      *
                                      * FROM SOURCES          10,  -180,
                                    * FOR THE DISCRETE RECEPTOR POINTS *

   - X -       - Y -         CON.      (DAY,PER.)               - X -       - Y -         CON.      (DAY,PER.)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  -64237.0     -3187.0     3.10267    (311,  1)              -66258.0     -9677.0     3.05848    (311,  1)
  -63439.0      5749.0     1.67564    (311,  1)               15870.0     72238.0     1.37763    (209,  1)
  -20198.0    -31431.0     1.86856    ( 26,  1)              -17218.0    -32761.0     2.33336    ( 26,  1)
     192.0     -1101.0    46.05885    (137,  1)                -768.0     -1341.0    21.52796    (137,  1)
    -658.0     -3251.0    25.45273    (166,  1)                 892.0       479.0    38.16806    (137,  1)
     737.0      3749.0    13.05035    (243,  1)               -1258.0      4134.0     6.53545    (166,  1)
```

TABLE 6-5a

DAYS AND TIME PERIODS (HOUR OF THE DAY) OF MAXIMUM IMPACT AT DISCRETE RECEPTORS FOR SO_2 EMISSIONS

	ALL SOURCES				△ INCREASE				SHUTDOWN			
	3 Hr.		24 Hr.		3 Hr.		24 Hr.		3 Hr.		24 Hr.	
RECEPTOR (UTM Easting, Northing)	High	2nd High	High	2nd High	High	2nd High	High	2nd High	High	2nd High	High	2nd High
OKEFENOKEE												
(392.021E, 3391.064N)	121/8	264/8	264/1	311/1	121/8	264/8	121/1	264/1	121/8	264/8	264/1	121/1
(390.000E, 3384.574N)	48/6	48/7	311/1	48/1	48/6	48/7	48/1	311/1	48/6	48/7	48/1	311/1
(392.819E, 3400.000N)	121/8	311/8	121/1	311/1	121/5	311/8	311/1	121/1	121/5	311/8	311/1	121/1
WOLF ISLAND												
(472.128E, 3466.489N)	209/2	243/4	209/1	243/1	243/4	144/4	243/1	144/1	243/4	144/4	243/1	144/1
JACKSONVILLE												
(436.060E, 3362.820N)	26/2	26/8	26/1	311/1	26/2	311/1	26/1	311/1	26/2	311/1	26/1	311/1
(439.040E, 3361.490N)	26/8	26/7	26/1	243/1	26/7	26/2	26/1	311/1	26/7	26/2	26/1	311/1
CUMBERLAND ISLAND												
(456.995E, 3398.000N)	243/4	144/4	243/1	208/1	243/4	144/4	243/1	144/1	243/4	144/4	243/1	144/1
(455.000E, 3398.385N)	209/1	166/5	166/1	144/1	243/6	209/1	243/1	209/1	243/6	209/1	243/1	209/1

NOTE: Day of the Year/Hour of the Day.

TABLE 6-5b

DAYS AND TIME PERIODS (HOUR OF THE DAY) OF MAXIMUM IMPACT OF DISCRETE RECEPTORS FOR TSP EMISSIONS

RECEPTOR (UTM Easting, Northing)	All Sources 24 Hr. High	All Sources 24 Hr. 2nd High	△ Increase 24 Hr. High	△ Increase 24 Hr. 2nd High	Shutdown 24 Hr. High	Shutdown 24 Hr. 2nd High
OKEFENOKEE						
(392.021E, 3391.064N)	264/1	311/1	121/1	264/1	264/1	121/1
(390.000E, 3384.574N)	311/1	48/1	48/1	311/1	48/1	311/1
(392.819E, 3400.000N)	121/1	264/1	311/1	121/1	311/1	121/1
WOLF ISLAND						
(472.128E, 3466.489N)	209/1	243/1	243/1	144/1	243/1	144/1
JACKSONVILLE						
(436.060E, 3362.820N)	264/1	48/1	264/1	26/1	264/1	26/1
(439.040E, 3361.490N)	264/1	26/1	264/1	26/1	264/1	26/1
CUMBERLAND ISLAND						
(456.995E, 3398.000N)	243/1	144/1	243/1	144/1	243/1	144/1
(455.000E, 3398.385N)	144/1	209/1	209/1	243/1	209/1	243/1

NOTE: Day of the Year/Hour of the Day.

TABLE 6-6

MAXIMUM AND SECOND MAXIMUM PREDICTED TOTAL AMBIENT AIR QUALITY CONCENTRATIONS

		MAXIMUM CONCENTRATIONS PREDICTED				SECOND MAXIMUM CONCENTRATIONS PREDICTED			
Pollutants	Average Time	Concentrations From All Modeled Sources (ug/m^3)	Day/ Period	Receptor (UTM Easting, Northing)	Uninventoried Background Concentrations (ug/m^3)	Concentrations From All Modeled Sources (ug/m^3)	Day/ Period	Receptor (UTM Easting, Northing	Uninventoried Background Concentrations (ug/m^3)
SO_2	3-Hour	435.5	243/5	456.758, 3395.001	75.5	408.1	137/4	458.008, 3395.251	75.5
	24-Hour	169.8	26/1	453.508, 3391.251	75.5	161.9	137/1	453.508, 3391.251	75.5
	Annual Mean	40.2	1970	454.758, 3395.751	26.1				
TSP	24-Hour	111.2	26/1	455.958, 3393.951	86.7	105.1	137/1	458.001, 3395.251	86.7
	Annual Mean	61.0	1970	457.008 3394.751	56.7				
	Annual Geometric Mean	43.8*							
NO_2	Annual Mean	33.0	1970	453.758 3398.001	30.0				

*Based on a composite annual geometric mean from all state monitoring sites of 42.7 micrograms per cubic meter and a corresponding composite standard deviation of the geometric mean concentration of 1.4.

geometric mean from the monitoring sites, and a corresponding composite standard deviation. Finally, the maximum predicted annual concentration of nitrogen dioxide and the receptor at which it occurred is also presented.

Table 6-7 presents a summary of the maximum and second maximum predicted concentrations of sulfur dioxide and total suspended particulates from the increment-consuming and the increment expanding sources associated with CCA's modified mill, as well as the net change in predicted concentrations.

Also presented in Table 6-7 is the overall net change in the predicted peak concentrations of sulfur dioxide and total suspended particulates anticipated at the time the mill modifications are completed, at the receptor locations where the net change in the peak impact is expected to occur. As indicated in the table, under the theoretical worst case assumptions, there will be a minor degradation in the overall air quality in terms of sulfur dioxide concentration levels. However, even assuming the theoretical worst case conditions, the proposed modified mill configuration will contribute to a net improvement in air quality for total suspended particulate matter.

Tables 6-8 through 6-11 show the peak predicted impact, as well as the net change in air quality anticipated at discrete receptor locations at the leading edge of the Okefenokee and Wolf Island PSD Class I areas, the Jacksonville TSP non-attainment area, and Cumberland Island, Georgia. The selection of the receptor location at Cumberland Island demonstrates that the proposed modified mill configuration will consume less than 10% of any PSD increment. As can be seen in the tables, the peak predicted short term and annual concentration levels at these sensitive areas for the proposed increment consuming sources, i.e., the " increase" column, are well below the allowable increments for the respective pollutants.

The column for increment-expanding sources (i.e., the column designated "shut down") indicates that the net air quality impact at these sensitive receptor locations will be well below the established incremental values. With regard to total suspended particulates, peak impacts at these locations show a net improvement in air quality.

Finally, the modeling analyses has shown that the impact of the proposed modified mill configuration on carbon monoxide levels will be less than 1% of the appropriate standards, which is well below the significance levels for carbon monoxide.

6.5 AIR QUALITY RELATED VALUES

A facet of the PSD review is to assess the environmental impacts that may result from net changes in sulfur dioxide and particulate emissions. Six specific concerns have been examined relative to the potential impacts on the Fernandina Beach area: visibility, acidification of rainfall, soils, terrestrial ecology, aquatic ecology, and secondary impacts from associated growth. CCA's proposed project will result in slight increases of sulfur dioxide and particulate emissions from the Fernandina Beach mill. However, as shown in the previous section, increases in SO_2 and TSP emissions will result in only a fractional increase in SO_2 concentrations and a net decrease in TSP levels in the ambient air, and should not be deleterious to the surrounding environment.

TABLE 6-7

MAXIMUM AND SECOND MAXIMUM PREDICTED INCREMENTAL AMBIENT AIR QUALITY CONCENTRATIONS

		INCREMENT CONSUMING SOURCES PREDICTED						INCREMENT EXPANDING SOURCES PREDICTED						NET CHANGE PREDICTED					
Pollutant	Average Time	Max. Concentration (ug/m^3)	Day/ Period	Receptor (UTM Easting, Northing)	Second Max. Concentration (ug/m^3)	Day/ Period	Receptor (UTM Easting, Northing)	Max. Concentration (ug/m^3)	Day/ Period	Receptor (UTM Easting, Northing)	Second Max. Concentraton (ug/m^3)	Day/ Period	Receptor (UTM Easting Northing)	Max.	Day/ Period	Receptor	Sec. Max.	Day/ Period	Receptor
SO_2	3-Hour	195.2	243/5	456.758, 3395.001	184.4	137/4	458.008, 3395.251	171.9	243/5	456.758, 3395.001	135.5	137/4	457.758, 3395.001	23.4	243/5	457.508, 3395.001	60.4	137/4	458.008, 3395.251
	24-Hour	48.4	137/1	458.008, 3395.251	41.2	144/1	455.008, 3395.751	34.8	137/1	457.508, 3395.001	30.7	26/1	453.758, 3392.251	14.8	137/1	458.008, 3395.251	13.8		455.008, 3395.751
	Annual Average	4.3	1970	454.508, 3396.001				3.3	1970	454.758, 3395.758				0.99	1970	464.508, 3395.501			
TSP	24-Hour	2.5	137/1	458.008, 3395.251	2.5	26/1	455.958, 3393.951	6.7	243/1	456.558, 3394.751	6.1	137/1	457.508, 3395.001	-2.88	137/1	458.008, 3395.251	0.0	26/1	455.958, 3393.951
	Annual Average	0.22	1970	458.258, 3396.001				0.7	1970	457.008, 3395.001				-0.368	1970	458.258, 3396.001			

TABLE 6-8

PREDICTED 3 HOUR/24 HOUR SO_2 CONCENTRATIONS AT DISCRETE RECEPTORS
(ug/m^3)

RECEPTOR	ALL SOURCES				Δ INCREASE				SHUTDOWN			
	3 Hr.		24 Hr.		3 Hr.		24 Hr.		3 Hr.		24 Hr.	
(UTM Easting, Northing)	High	2nd High	High	2nd High	High	2nd High	High	2nd High	High	2nd High	High	2nd High
OKEFENOKEE												
(392.021E, 3391.064N)	19.04	11.73	3.21	3.10	10.94	6.96	1.37	1.11	5.75	5.17	0.76	0.72
(390.000E, 3384.574N)	10.21	9.28	3.06	2.85	6.28	4.49	1.50	1.17	2.96	2.34	0.73	0.54
(392.819E, 3400.000N)	17.86	5.93	2.89	1.68	2.80	2.39	0.58	0.39	1.27	1.12	0.27	0.18
WOLF ISLAND												
(472.128E, 3466.489N)	7.84	5.99	1.38	1.14	3.13	2.32	0.40	0.29	1.38	1.06	0.18	0.13
JACKSONVILLE												
(436.060E, 3362.820N)	6.35	5.74	1.87	0.46	4.01	2.36	0.66	0.29	1.98	1.13	0.33	0.14
(439.040E, 3361.490N)	13.26	5.32	2.33	0.45	3.00	0.06	0.38	0.0	1.46	0.03	0.19	0.00
CUMBERLAND ISLAND												
(456.995E, 3398.000N)	71.04	40.40	13.05	7.74	44.15	28.47	6.36	3.56	25.25	21.02	3.81	2.65
(455.000E, 3398.385N)	27.89	24.60	6.54	5.04	6.42	5.23	0.80	0.65	4.14	2.48	0.52	0.31

TABLE 6-9

PREDICTED AVERAGE ANNUAL SO_2 CONCENTRATIONS AT DISCRETE RECEPTORS
(ug/m^3)

RECEPTOR (UTM Easting, Northing)	CONCENTRATIONS DUE TO All Sources	△Increase	Shutdown
OKEFENOKEE			
(392.021W, 3391.064N)	1.347	0.371	0.217
(390.000E, 3384.574N)	1.124	0.317	0.184
(392.819E, 3400.000N)	1.504	0.375	0.218
WOLF ISLAND			
(472.128E, 3466.489N)	1.032	0.322	0.176
JACKSONVILLE			
(436.060E, 3362.820N)	1.069	0.260	0.161
(439.040E, 3361.490N)	1.171	0.252	0.157
CUMBERLAND ISLAND			
(456.995E, 3398.000N)	9.485	2,681	1,924
(455.000E, 3398.385N)	10.193	2.226	1.531

TABLE 6-10

PREDICTED 24 HOUR TSP CONCENTRATIONS AT DISCRETE RECEPTORS

(ug/m^3)

RECEPTOR (UTM Easting, Northing)	CONCENTRATIONS DUE TO All Sources 24 Hr. High	All Sources 24 Hr. 2nd High	Δ Increase 24 Hr. High	Δ Increase 24 Hr. 2nd High	Shutdown 24 Hr. High	Shutdown 24 Hr. 2nd High
OKEFENOKEE						
(392.021E, 3391.064N)	0.65	0.53	0.07	0.05	0.09	0.07
(390.000E, 3384.574N)	0.54	0.54	0.07	0.06	0.07	0.05
(392.819E, 3400.000N)	0.53	0.04	0.03	0.02	0.02	0.02
WOLF ISLAND						
(472.128E, 3466.489N)	0.23	0.19	0.02	0.01	0.01	0.01
JACKSONVILLE						
(436.060E, 3362.820N)	5.17	2.65	0.04	0.03	0.10	0.03
(439.040E, 3361.490N)	0.96	0.40	0.03	0.02	0.10	0.02
CUMBERLAND ISLAND						
(456.995E, 3398.000N)	2.52	2.12	0.31	0.19	0.33	0.31
(455.000E, 3398.385N)	2.35	0.70	0.05	0.04	0.08	0.05

TABLE 6-11

PREDICTED AVERAGE ANNUAL TSP CONCENTRATIONS AT DISCRETE RECEPTORS
($\mu g/m^3$)

RECEPTOR (UTM Easting, Northing)	CONCENTRATIONS DUE TO All Sources	ΔIncrease	Shutdown
OKEFENOKEE			
(392.021W, 3391.064N)	0.262	0.018	0.022
(390.000E, 3384.574N)	0.218	0.015	0.019
(392.819E, 3400.000N)	0.291	0.018	0.023
WOLF ISLAND			
(472.128E, 3466.489N)	0.196	0.016	0.018
JACKSONVILLE			
(436.060E, 3362.820N)	0.216	0.012	0.018
(439.040E, 3361.490N)	0.234	0.012	0.017
CUMBERLAND ISLAND			
(456.995E, 3398.000N)	2.518	0.141	0.343
(455.000E, 3398.385N)	2.564	0.113	0.270

6.5.1 Visibility

Generally, degradation of visibility is due to the combined effects of water vapor droplets and particulate aerosols in the atmosphere producing light scattering. The Fernandina Beach area has naturally occurring aerosols, primarily from the ocean, in addition to the introduction of manmade pollutants that effect visibility.

A certain size range of particulates contributes significantly to visibility degradation. This size range, 0.1 to 1.0 micron, coincides with the size range involved in hydroscopic growth. Hydroscopic nuclei such as sulfates form solutions with water droplets in the atmosphere. These hydroscopic aerosols continue to grow in size until they break up or fall out of the atmosphere. The scattering of light due to hydroscopic particulates within the 0.1 to 1.0 micron size range is a major factor in the deterioration of visibility.

Sulfates are thought to comprise approximately 50% of the aerosol mass in the 0.1 to 1.0 micron size range as SO_2 converts to SO_4. Quantitative assessment of the effects of SO_2 increments relative to visibility degradation via SO_4 formation is not clear and simple; it requires the incorporation of existing environmental factors such as temperature, relative humidity, and solar radiation, and the presence of other precursor constituents.

Climatic conditions in Florida are known to be conducive to aerosol sulfate formation. Meteorological conditions appropriate for sulfate formation are not so pronounced. The lack of stationary air masses and maritime influence tend to mitigate the potential for aerosol formation. Accumulation of SO_2 and TSP emissions from both Florida sources and sources outside the state contribute to the aerosol mass presently in Florida. The extent to which one source contributes to the problem as opposed to some other source is unknown. Increases in SO_2 concentrations due to the proposed project are so small that the project should not significantly alter visibility in the Fernandina Beach area.

6.5.2. Acidification of Rainfall

In the natural atmospheric removal process for sulfur dioxide, sulfuric acid may be formed and released as rainfall. The acidity levels of precipitation can be increased with this addition of hydrogen ions and may have a toxic impact on biotic communities. Particulate emissions from industrial sources can also be responsible for increases in acidity.

As previously indicated, even with the worst case assumptions, increases in concentrations of SO_2 are sufficiently small so that no significant degree of rainfall acidification is anticipated as a result of the proposed project. Again, TSP levels are anticipated to decrease, indicating no significant effect from TSP emissions.

6.5.3. Soils

Sulfur dioxide and certain particulates may increase the acidity of soil through wet deposition if concentrations of these pollutants are increased dramatically. Many soil types contain buffering agents that minimize the impacts of acid precipitation. To the other extreme are forest soils which tend to become acidic naturally. The inland area west of Fernandina Beach is typically poorly drained acid soils with a layer of hardpan and, in some areas, plastic clays. Again, SO_2 and TSP concentrations resulting from the proposed project should not contribute to any significant pH alteration of surrounding soils.

6.5.4. Terrestrial Ecology

Sulfur-containing material, in the presence of sufficient moisture, is known to damage plant communities through three major mechanisms:

- Change in the foliar nutrient leaching rates;
- Change in edaphic nutrient leaching rates; and
- General decrease in plant growth rate.

These effects are similar to the impacts resulting from acid mist and acid rain.

Plants demonstrate various susceptibility to SO_2 with regard to both species and individuals within the species. Using the percentage of foliar injury induced by SO_2 as a criterion, plants may show extreme sensitivity, intermediate sensitivity, or resistance to SO_2.

Two crops grown in Nassau County, tobacco and corn, show intermediate sensitivity and resistance to SO_2, respectively. Oaks and red maple, typical of the freshwater wetlands inland from Fernandina Beach, have shown intermediate sensitivity and resistance to SO_2, respectively.

Research of the impacts of SO_2 and TSP on terrestrial wildlife has been limited. Wildlife respiratory stress is believed to be one of the harmful effects of these air pollutants. In laboratory experiments, chronic exposure to SO_2 has shortened the life span and severe acute exposure has caused immediate death.

Predicted concentrations of SO_2 and TSP are sufficiently low to eliminate concern for deleterious effects on the terrestrial ecology of the Fernandina Beach area from operation of the proposed modified mill.

6.5.5. Aquatic Ecology

Organisms in an aquatic environment can also be affected by exposure to sulfur dioxide and particulates. Severe deposition of these pollutants into freshwater habitats may lower the pH, causing a marked reduction in compatibility of the "new" habitat with existing aquatic organisms. The Fernandina Beach area has extensive water resources which could fall into this acidic trend should the pollutants be excessive. However, the increase in emissions from the proposed mill modification are insignificant and would not pose a threat to the nearby aquatic communities.

6.5.6. Associated Growth

The land use pattern in a 30 kilometer radius around Fernandina Beach may be characterized by moderate growth and development on the coastal segments, with less developed land in the inland portion of the area. A major exception to the coastal pattern is the federally-protected reserve, Cumberland Island National Seashore, which is north of Fernandina Beach. Also north, adjacent to Cumberland Island, is the construction of a new division of the Kings Bay Naval Station. Northwest of the CCA mill, in Camden County, Georgia, there are timber plots. Most of the land in this area is owned by either Union Camp Corporation or ITT Rayonier, Inc. The Florida lands west of CCA's mill are largely privately owned and, according to the Coastal Zone Management Commission, should be considered preservation and/or conservation areas. South of CCA's mill is the city of Jacksonville and its associated development. Fernandina Beach is essentially an industrial area with moderate residential development. The proposed CCA project will not require additional personnel for operation, so there will be no associated growth impacts and no modifications made to current land use practices.