Georgia-Pacific

Palatka Pulp and Paper Operations
**Consumer Products Division**
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March 14, 2007



Mr. Jeffery F. Koerner, Air Permitting North Section
Bureau of Air Regulation
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Project No. 1070005-038-AC PSD-FL-380
Modification of the No. 4 Recovery Boiler, No. 4 Lime Kiln and No. 4 Combination Boiler
Response to Request for Additional Information No. 3

Dear Mr. Koerner:

We are in receipt of your request for additional information, dated December 15, 2006, regarding our PSD permit application project to make modifications to the No. 4 Recovery Boiler, No. 4 Lime Kiln, and No. 4 Combination Boiler.

This response addresses questions 1, 3, 4 and 6 of the Department's December 15, 2006 request for additional information. A response to questions 2, 6 and 7 was submitted to FDEP on January 31, 2007. We are revising our January 31 response to question 6, which is why this question is addressed for a second time. GP will respond to question 5 in the near future, once it has determined all pertinent costs for the control of $NO_x$ emissions for the No. 4 Combination Boiler.

This response also addresses a number of questions posed by the Department during a telephone conference call held on February 8, 2007 between Messrs. Bruce Mitchell and Jeff Koerner of the FDEP and Wayne Galler and Mark Aguilar of GP. The conference call was held to discuss a number of issues related to GP's desire to incorporate "past actual" and "future potential" emissions from the No. 5 Power Boiler into the most current PSD netting analysis, as well as GP's strategy for Best Available Retrofit Technology (BART) implementation at the Mill.

For ease of following GP's responses, we have repeated the FDEP's questions prior to the answers.

**Sulfuric Acid Mist (SAM) Emissions**

1. **The project is significant for sulfuric acid mist emissions and requires a BACT determination. SAM emissions from the No. 4 Lime Kiln result from firing residual oil; however, overall emissions are very low (estimated < 2 tons/year) due to the natural scrubbing action of the lime kiln and possible additional reductions in the venturi scrubber. For the No. 4 Combination Boiler, the control technology review indicates the following technologies are available for the control of SAM emissions: Dry ESPs, wet ESPs and wet scrubbers. Your control technology review for the No. 4 Recovery Boiler also indicates mist eliminators in addition to this equipment. Dry ESPs, wet ESPs, wet scrubbers were eliminated from consideration due to expected high capital costs. Mist eliminators were eliminated from consideration because no actual installations were identified that reduced SAM emissions with mist**

**eliminators on a recovery boiler. However, this technology appears transferable. Please provide a cost effectiveness analysis for adding mist eliminators to the No. 4 Recovery Boiler and the No. 4 Combination Boiler.**

**As stated in the application for the No. 4 Recovery Boiler, reducing SO, emissions will also result in lower SAM emissions. For this reason, the Department will consider reducing the fuel sulfur content of the residual oil in making its BACT determination. Please provide a control technology review for lowering the fuel sulfur content of the residual oil currently being fired to include a cost effectiveness analysis.**

**Alternatively, provide a combination of fuel consumption/fuel sulfur limits that maintain the net emissions increases below the PSD significant emissions rate for SAM emissions (7 tons/year). Depending on future use, this may be readily achievable because the primary fuels are BI.S for the No. 4 Recovery Boiler and bark/wood for the No. 4 Combination Boiler. In fact, the stated purpose of the modifications to the No. 4 Combination Boiler is to more efficiently combust bark/wood and to displace oil firing.**

**Answer**: The Mill plans to eliminate the use of No. 6 fuel oil in the No. 5 Power Boiler by the end of 2007. The Mill would like to incorporate the No. 5 Power Boiler's "past actual" and "future potential" emission rates into the Netting Table being used in the PSD permit application for the Nos. 4 Lime Kiln, Recovery Boiler, and Combination Boiler. By incorporating the No. 5 Power Boiler's "past actual" and "future potential" emissions into the Netting Table (see attached copy of Table 1-1 from PSD Application and associated emission calculations for the No. 5 Power Boiler), the SAM emissions change for the combined projects will fall well below the PSD applicability threshold of 7 tons per year and as a result, PSD will not be triggered for SAM emissions.

**No. 4 Combination Boiler**

3. **Prior to our previous request for additional information, representatives from the Bureau of Air Regulation met with representatives from Georgia-Pacific on October 26th. At the meeting, Georgia-Pacific indicated plans to revise the application to show that the modifications to the No. 4 Combination Boiler would not result in any emissions increases over baseline emissions except for CO emissions. Your response did not include such a revision. Please verify that you no longer have such plans to revise the application.**

   **Answer**: GP no longer plans to revise the PSD application as described.

4. **Your first response to our request for additional information (Item #14) identified the design flow as 230,000 acfm. Item #15 of that response also identified corrected flow rate as 135,400 dscfm @ 10% $O_2$, which was used to calculate the TRS emissions (page 7 of 7 of the application. "Total Reduced Sulfur, Potential Emissions"). Your second response to our request for additional information (Item #3) identifies the preliminary design flow rate as 317,000 acfm. It appears that the flow rate has changed. Please verify design flow rate from the No. 4 Combination**

**Boiler in "acfm" and the corresponding flow rate in "dscfm @ 10% $O_2$. As necessary, recalculate the potential TRS mass emissions rates and update the applicable application pages.**

**Answer**: As FDEP is aware, the Mill has submitted an application for modifying the No. 4 Combination Boiler so that it will be able to burn larger quantities of wood/bark. As a result of the modifications, the heat input rating for the boiler will be increased from the current value of 512.7 MM Btu/hr to 564 MM Btu/hr, for an increase of about 10%. As a result of the larger heat input and larger fuel firing rates for bark, there will be a corresponding increase in the exhaust gas flow rate when the boiler is operated at its maximum steam load. Based on an assessment prepared by the GP's Utilities Engineering Department, the estimated flow rate of the boiler's exhaust gases under full load at the higher heat input rating will be approximately 317,000 acfm at a temperature of approximately 500 °F. The exhaust flow rate at standard conditions is estimated to be approximately 135,400 dscfm @ 10% oxygen, or no change from the current standard exhaust gas flow rate. Since this standard flow rate is the same value that was used to estimate the TRS emission rate in the PSD application, no changes in the TRS emission calculations or application forms are necessary.

6. **Based on your last submittal, a new ESP will be installed on the No. 5 Power Boiler. No vendor has yet been selected. As you are aware, the No. 5 Power Boiler has been identified as a "BART-eligible" unit. Please ensure that this new control equipment will be designed and selected in accordance with this upcoming regulatory requirement.**

**Answer**: Once the Mill starts burning 100% natural gas in the No. 5 Power Boiler, which is planned to occur by the end of 2007, there will be no need to install a new ESP for this unit or continue to use the existing ESP. The modifications to the No. 5 Power Boiler are tentatively scheduled to begin in September 2007. Within 60 days of completing construction, the facility will complete compliance testing of the source.

**Responses to Questions Posed by the Department during a Teleconference on February 8, 2007:**

**Question: The Department wants the Mill to describe the timing for putting the ESP into use to control particulate matter emissions during start-up for the No. 4 Recovery Boiler.**

**Answer:** The ESP for the No. 4 Recovery Boiler is not energized and put into use until the end of the start-up period. This is because during the start-up period, there is a possibility of a spark from an energized ESP starting a fire or causing an explosion inside of the ESP. This can occur because during the start-up period when the boiler is burning 100% No. 6 fuel oil. There is a combination of some uncombusted fuel oil and a higher than normal level of oxygen in the exhaust gases from the boiler which are carried into the ESP. The higher than normal level of oxygen is present in the boiler because it is important to purge combustible gases from the boiler during start-up periods by using large volumes of combustion air. The wire electrodes in the ESP can become coated with the fuel oil and if the ESP is energized, a spark could develop in the ESP, resulting in a fire or explosion. For these reasons, the ESP is not energized until conditions inside the boiler have

stabilized, meaning that the combustion temperature has risen to the proper level for steam to be produced and black liquor has begun to be used as a continuous source of fuel to the boiler. At this same time, the amount of fuel oil burned in the boiler is reduced until the boiler is firing 100% black liquor.

To minimize particulate emissions during the start-up period, the Mill utilizes good combustion practices such as maintaining the proper stoichiometric fuel-to-air ratio, monitoring of fuel quality and consistency, and proper temperature and combustion air distribution.

**Question: The Department has asked the Mill to specify the $SO_2$ and $NO_x$ emission limits the No. 4 Recovery Boiler can meet during start-up operations if the existing Title V Permit limits for normal operation are not sufficient.**

**Answer:** Since the No. 4 Recovery Boiler burns 100% No. 6 fuel oil during start-up (no black liquor), the Mill is requesting separate emission limits for $SO_2$, $NO_x$, and PM emissions during start-up, without the use of the ESP. These limits should be based on emission factors for a large (>250 MM Btu/hr heat input) fossil-fuel fired industrial boiler contained in Table 1.3-1 of AP-42 and assuming a maximum fuel oil firing rate of 80 gallons per minute with a sulfur content not to exceed 2.35% (wt.). The emission calculations are shown below:

$SO_2$ (lbs/hr) = (157 x 2.35 % S) lb $SO_2$/1,000 gal fuel oil fired x (80 gal fuel oil fired/min/1,000 gallons) x 60 minutes/hr = 1,771 lbs $SO_2$/hr

$NO_x$ (lbs/hr) = 47 lb $SO_2$/1,000 gal fuel oil fired x (80 gal fuel oil fired/min/1,000 gallons) x 60 minutes/hr = 225.6 lbs $NO_x$/hr

PM = [(9.19 x 2.35% S) + 3.22] lbs PM/1,000 gal fuel oil fired x (80 gal fuel oil fired/min/1,000 gallons) x 60 minutes/hr = 119.1 lbs PM/hr

$PM_{10}$ = 74.8% of PM (AP-42, Table 10.2-3) = 89.1 lbs/hr

**Question: The Department has requested the Mill to provide the number of hours per year that the waste gases from the pulp mill are incinerated in either the No. 4 Combination Boiler or the No. 5 Power Boiler.**

**Answer:** Following is a listing of the hours during 2004 through 2006 that the non-condensable gases (NCGs) and stripper off-gases (SOGs) from the pulp mill were incinerated in either the No. 4 Combination Boiler or the No. 5 Power Boiler. Effective April 2006, all high volume, low concentration (HVLC) gases, also referred to as dilute NCGs (DNCGs), must be burned in an incineration device. For the Palatka Mill, the primary incineration device for the DNCGs is the No. 5 Power Boiler with the No. 4 Combination Boiler as the back-up incineration device:

2004: No. 4 Combination Boiler NCGs-915 hours SOGs-886 hours

2005: No. 4 Combination Boiler NCGs-905 hours SOGs-763 hours
DNCGs-924 hours
No. 5 Power Boiler DNCGs-149 hours

2006 No. 4 Combination Boiler NCGs-1,174 hours SOGs-901 hours
DNCGs-3,436 hours
No. 5 Power Boiler DNCGs-4,920 hours

**Question: The Department has requested the Mill to provide the typical time period for a "warm" start up period for the No. 4 Recovery Boiler. The Department also wants the Mill to provide information on the number of actual start-ups during the last 2 years.**

**Answer:** A typical "warm" start-up period for the No. 4 Recovery Boiler is approximately 8 hours. This is opposed to a typical "cold" start up period that may last 24 hours or greater as explained to the FDEP in the response to RAI # 2, dated January 31, 2007. Start-up periods for the No. 4 Recovery Boiler:

| | 2005 | 2006 |
|---|---|---|
| Cold start-ups | 1 | 3 |
| Warm start-ups | 3 | 8 |

**Question: The Department has requested the Mill to provide a simplified process flow diagram (PFD) indicating the primary and back-up control devices used to control emissions from the facility's waste gas streams.**

**Answer:** A simplified PFD has been prepared and is attached as Figure 1.

In a recent teleconference the Department requested the specifications for the low-$NO_x$ natural gas burners proposed for the No. 5 Power Boiler. The Mill's engineering specification for the burners is attached. The manufacturer's specification will be provided when available.

If you have any questions regarding this response, please contact Michael Curtis at 386-329-0918.

I, the undersigned, am the responsible official of the source for which this document is being submitted. I hereby certify, based on the information and belief formed after reasonable inquiry, that the statements made and the data contained in this document are true, accurate, and complete.

Sincerely,

RL Kahler FOR KWW

Keith W. Wahoske
Vice President

Attachment

cc: W. Galler, T. Champion, T. Wyles, S. Matchett, R. Reynolds, M. Curtis - GP

## PART 1 - GENERAL

### 1.1 SCOPE

1.1.1 No. 5 Power Boiler at G-P's Palatka, Florida mill fires No. 6 fuel oil. It is a top hung field-erected boiler furnished by Babcock and Wilcox. It has a pressurized furnace. This boiler will be converted to natural gas firing. The boiler presently has its original burners, manufactured by Forney Engineering. Burner delivery is critical. All items specified in this document shall be at the jobsite no later than September 1, 2007.

1.1.2 Equipment shall be built to all applicable codes and standards including FM standards.

1.1.3 Two drawings are included:

- Front & Sectional Front View of No. 5 Power Boiler, B&W drawing no. 218 72 F-2
- Existing burner arrangement, Forney Engineering drawing 8901-1

### 1.2 REFERENCED AND INCLUDED GEORGIA PACIFIC SPECIFICATIONS

1.2.1 GE01011-002 General Conditions

1.2.2 GE01014-001 Drafting and Document Standards

1.2.3 ME09914-001 Equipment Balance

### 1.3 FURNISHED BY SELLER

The following is a list of items to be supplied by the Seller. This list is not intended to be all inclusive; it is only a general list. The Seller is to include all items which are required to constitute a complete unit and system.

1.3.1 Natural gas burner and igniter assemblies including:

1.3.1.1 Natural gas igniters and igniter scanners

1.3.1.2 Main flame scanners

1.3.1.3 All required flex hoses

1.3.1.4 Registers with automatic operators

1.3.1.5 Internal insulation (if required)

1.3.1.6 Tile template for throat (if required)

1.3.2 Factory assembled, rack-mounted burner valve train including:

1.3.2.1 All required safety shutoff valves and vent valves

1.3.2.2 All required limit switches and pressure switches

1.3.2.3 Gas pressure regulators and relief valves

1.3.2.4 All required pressure gauges

1.3.2.5 Included piping

1.3.3 If required, additional equipment to achieve specified NOx emissions

1.3.3.1 FGR fan and motor

1.3.3.2 FGR control damper

1.3.3.3 Flue gas ducting

1.3.3.4 Engineering

1.3.4 Windbox air flow modeling using CFD to optimize air flow

**1.4 DRAWINGS**

1.4.1 The Seller shall furnish the Engineers with all information, drawings, and instructions required for complete execution of the work. See attached Drawing and Document Requirement Sheet.

**1.5 PROPOSAL**

The proposal shall include the following information:

1.5.1 Full descriptive literature for each piece of equipment and a schematic outline drawing shall accompany the proposal. The weights of the major pieces of equipment shall also be included.

1.5.2 Normal delivery from date of purchase shall be provided along with options for improving that delivery date.

1.5.3 A listing of all motors furnished with their rated horsepowers and RPM.

1.5.4 The attached tabulation sheets shall be completed by the Seller.

1.5.5 Optional accessories recommended, if any.

1.5.6 Proposal shall include any exceptions to the specifications.

**1.6 OPTIONS**

1.6.1 Furnish an optional price for including flame rod detection of igniter flames rather than scanners.

## PART 2 – DESIGN & MATERIALS

**2.1 DESIGN CRITERIA**

2.1.1 Design heat input with all burners in operation at 100% Maximum Continuous Rating (MCR): 535.5 million Btu/hr

2.1.2 Steam generation at 100% MCR: 420,000 lb/hr

2.1.3 Individual burner turndown shall be 8:1

2.1.4 Normal boiler operating range is 10% to 100% of MCR

2.1.5 Natural gas HHV=1,050 Btu/CF

2.1.6 Nominal natural gas pressure = 120 psig

2.1.7 NOx Emissions shall not exceed 0.10 lb/$10^6$ Btu heat input over the specified burner turndown range with any number of burners in operation.

2.1.8 CO Emissions shall not exceed 0.185 lb/$10^6$ Btu heat input over the specified burner turndown range with any number of burners in operation.

2.1.9 Air leakage ("cooling air") through unused burners shall be minimized through materials of construction and other design features.

2.1.10 When operating, burners shall use a minimum of excess air.

## 2.2 MATERIALS & CONSTRUCTION

2.2.1 Number of burners: Six total, three rows of two burners per row.

2.2.2 Furnace pressure at 100% MCR is 9.8 inches water gage with the existing fuel oil burners.

2.2.3 Maximum flue gas temperature at the air heater outlet is $470^0$F.

2.2.4 Burners shall fit in place of the existing oil burners with minimum windbox modifications and no pressure part modifications.

2.2.5 Burners shall be started and stopped remotely.

2.2.6 Igniters

2.2.6.1 Igniters shall be natural gas, not spark.

2.2.6.2 Intermittent igniters are preferred.

2.2.6.3 Scanners shall be used to prove igniter flames.

2.2.7 Shop assembled valve racks with interconnecting piping shall be furnished.

2.2.7.1 Connections to each burner valve train shall be: gas inlet, gas out to burner, gas out to igniter, vent out.

2.2.7.2 The valve train for each burner shall contain safety valves, vent valves and control valves along with provisions for necessary instrumentation.

2.2.7.3 Two valve racks shall each contain two burners' valves with one burner valve train above the other train. These two racks shall be opposite hand.

2.2.7.4 Valve train shall include provisions for automated leak checking.

2.2.7.5 Each valve rack shall fit within these dimensions: 8' long, 2 ½' deep, 6' high.

2.2.8 Flex hoses shall be selected for a boiler movement shown on the included B&W drawings.

2.2.9 The flue gas recirculation (FGR) fan shall be direct driven. Its test block margins on capacity and pressure shall be large enough to ensure that the fans will meet their net conditions when installed.

2.2.9.1 Sleeve bearings and antifriction bearings are acceptable.

2.2.9.2 The first critical speed shall be 125% of the operating speed.

2.2.9.3 Fans with 3,600 rpm are not allowed

2.2.9.4 Fans with 1,800 rpm are permissible with drivers of 125 horsepower and less. Fans with drivers larger than 125 horsepower shall have a maximum speed of 1,200 rpm.

2.2.9.5 Fans shall have its rotor supported between the bearings (Arrangement 3). Independent bearing pedestal supports shall be provided with separate sole plates which may be permanently mounted in place.

2.2.9.6 Material handling fans shall have radial bladed wheels with stiffeners and sufficient strength to resist an unbalanced condition of the rotor caused by wear on the blades. Renewable blade, scroll, and side plate liners of 350 Brinell minimum abrasion resistant materials shall be furnished.

2.2.9.7 Fans shall be furnished with motor, coupling and approved coupling guard, installed and aligned when possible. 200 HP and larger motors shall be 4160 v. Smaller motors shall be 480 v.

2.2.10 FGR system design

2.2.10.1 FGR ductwork shall have a minimum wall thickness of 0.100". Round ductwork is preferred.

2.2.10.2 Nonmetallic expansion joints with material selected for the maximum flue gas temperature shall be used.

2.2.10.3 Control dampers shall be designed for the maximum flue gas temperature. Air cooled damper bearings are preferred.

2.2.11 All seller–furnished natural gas piping shall be painted yellow.

## PART 3 – EXECUTION

### 3.1. FURNISHED BY BUYER

3.1.1. Burner management system

3.1.2. Scanner cooling air supply

3.1.3. Installation

3.1.4. Wiring

3.1.5. Piping

3.1.6. Startup

## APPENDIX A

## OWNER TECHNICAL DATA SHEET

**Equipment Identification:**

Equipment Name: Low NOx Natural Gas Burners

Project Number: TBD

GP Equipment Number: TBD

Mill Location: Palatka, Florida

**Process Conditions:** Per Section 2.1 Design Criteria

**Equipment Requirements:** Per Section 2.2 Materials & Construction

**Paint Color:** Seller's Standard

**Comments:**

## APPENDIX B

## SELLER TECHNICAL DATA SHEET

All blanks in this Data Sheet must be filled in by the Seller. The completed form shall be submitted by the Seller with the equipment quote.

**General Equipment Information**

Seller: _____

Equipment Identification: _____

Georgia Pacific Project Number: _____

Georgia Pacific Equip Name & Number: _____

Georgia Pacific Millsite: _____

Drive Requirements: _____

Seal Water Requirements: _____

Lubrication Requirements: _____

Design Weights (Approximate, Pounds: _____

Shipping Weight (Incl Approx Wt Of Crate, Pounds: _____

Manufacturing / Assembly Location: _____

Quote Options: _____

Equipment Components: _____

## APPENDIX C

## COMMERCIAL OPTIONS

This form must be filled out by the Seller and be submitted with all quotes.

Seller: _____

Proposal Identification: _____

Georgia Pacific Project Number: _____

Georgia Pacific Equip Name & Number: _____

Georgia Pacific Millsite: _____

**Base Pricing Quotes:**

Equipment Proposal _____

Shipping Weight of all Materials _____

Freight Cost FOB Mill Site _____

Delivery Time (After PO) _____

**Optional Costs:**

Spare Parts Listing _____

Misc. Special Tools _____

Terms _____

## APPENDIX D
## PERFORMANCE AND OPERATIONAL GUARANTEE

The Seller guarantees that Process Conditions and Performance Measures called out in Appendix A shall be met. Also, the Seller guarantees the following:

- Guarantee the specified heat input based on the specified natural gas.
- Guarantee the specified emissions rates over the specified operating range.
- Predict and guarantee the excess air required in terms of percent oxygen, dry volumetric basis, measured at the generating bank outlet.
- Predict and guarantee the air leakage through idle burners in terms of $O_2$ in flue gas at 33% load with two burners operating and the remaining burners idle.
- If FGR is required, predict and guarantee NOx emissions without FGR in operation.
- Predict and guarantee the required windbox pressure ant 100% MCR.

PERFORMANCE WARRANTY

Warranties: The seller shall guarantee performance of the equipment in this specification. The seller shall have mechanical defects warranty for a period of 12 months from startup or 18 months after shipment, whichever occurs first.

In addition, Seller must demonstrate that the Equipment meets each element of the following Performance Warranty.

**TESTING PROCEDURES**

- Performance testing will be witnessed by the OWNER or by an OWNER appointed representative.
- Performance testing schedules will be approved by the OWNER.
- The SELLER will provide all testing documentation to the OWNER.
- If any test is unsuccessful, it will be repeated following evaluation and adjustments made as necessary on the Equipment. If still unsuccessful, SELLER to promptly and immediately correct any faults with all necessary steps that are needed, including manufacture or purchase of parts locally for delivery to mill site if deemed necessary.
- No third party will be present, nor given access to any test data without the written consent of the OWNER.
- The costs and expenses of SELLER'S personnel involved shall be borne by the SELLER.