APPLICATION TO MODIFY
NO. 4 COMBINATION BOILER
SMURFIT-STONE CONTAINER ENTERPRISES
PANAMA CITY MILL

Prepared For:
Smurfit-Stone Container Enterprises
One Everitt Avenue
Panama City, Florida 32402

Prepared By:
Golder Associates Inc.
6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653-1500

September 2005

0537542

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APPLICATION FORM

Department of Environmental Protection

Division of Air Resource Management

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit for a proposed project:

- subject to prevention of significant deterioration (PSD) review, nonattainment area (NAA) new source review, or maximum achievable control technology (MACT) review; or
- where the applicant proposes to assume a restriction on the potential emissions of one or more pollutants to escape a federal program requirement such as PSD review, NAA new source review, Title V, or MACT; or
- at an existing federally enforceable state air operation permit (FESOP) or Title V permitted facility.

Air Operation Permit – Use this form to apply for:

- an initial federally enforceable state air operation permit (FESOP); or
- an initial/revised/renewal Title V air operation permit.

Air Construction Permit & Revised/Renewal Title V Air Operation Permit (Concurrent Processing Option) – Use this form to apply for both an air construction permit and a revised or renewal Title V air operation permit incorporating the proposed project.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **Smurfit-Stone Container Enterprises, Inc.**	
2. Site Name: **Panama City Mill**	
3. Facility Identification Number: **0050009**	
4. Facility Location...: Street Address or Other Locator: **One Everitt Avenue** City: **Panama City** County: **Bay** Zip Code: **32402**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: **Tom Clements, Environmental Superintendent**
2. Application Contact Mailing Address... Organization/Firm: **Stone Container Corporation** Street Address: **One Everitt Avenue** City: **Panama City** State: **FL** Zip Code: **32402**
3. Application Contact Telephone Numbers... Telephone: **(850) 785-4311** ext.**470** Fax: **(850) 763-8530**
4. Application Contact Email Address: **tlclements@smurfit.com**

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	9-2-05
2. Project Number(s):	0050009-031-AC
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

FACILITY INFORMATION

Purpose of Application

This application for air permit is submitted to obtain: (Check one)

Air Construction Permit

☒ Air construction permit.

Air Operation Permit

☐ Initial Title V air operation permit.
☐ Title V air operation permit revision.
☐ Title V air operation permit renewal.
☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.
☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

☐ Air construction permit and Title V permit revision, incorporating the proposed project.
☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

☐ I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

This application is to modify the No. 4 Combination Boiler at the Panama City Mill in order to meet the Industrial Boiler MACT.

FACILITY INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee
016	No. 4 Combination Boiler		

Application Processing Fee

Check one: ☐ Attached - Amount: $_____ ☒ Not Applicable

FACILITY INFORMATION

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name :
   B.G. Sammons, General Manager

2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **Smurfit-Stone Container Enterprises, Inc.**
   Street Address: **One Everitt Avenue**
   City: **Panama City** State: **Florida** Zip Code: **32402**

3. Owner/Authorized Representative Telephone Numbers...
   Telephone: **(850) 785-4311** ext. Fax: **(850) 763-6290**

4. Owner/Authorized Representative Email Address: **bgsammons@smurfit.com**

5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the facility addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other requirements identified in this application to which the facility is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit.

B B Sammons — Signature

8/29/05 — Date

FACILITY INFORMATION

Application Responsible Official Certification

Complete if applying for an initial/revised/renewal Title V permit or concurrent processing of an air construction permit and a revised/renewal Title V permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name:

2. Application Responsible Official Qualification (Check one or more of the following options, as applicable):
   - ☐ For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C.
   - ☐ For a partnership or sole proprietorship, a general partner or the proprietor, respectively.
   - ☐ For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official.
   - ☐ The designated representative at an Acid Rain source.

3. Application Responsible Official Mailing Address...
   Organization/Firm:
   Street Address:
   City: State: Zip Code:

4. Application Responsible Official Telephone Numbers...
   Telephone: ( ) - ext. Fax: ( ) -

5. Application Responsible Official Email Address:

6. Application Responsible Official Certification:

   I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

   Signature Date

FACILITY INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: **David A. Buff**
   Registration Number: **19011**
2. Professional Engineer Mailing Address...
   Organization/Firm: **Golder Associates Inc.****
   Street Address: **6241 NW 23rd Street, Suite 500**
   City: **Gainesville** State: **FL** Zip Code: **32653**
3. Professional Engineer Telephone Numbers...
   Telephone: **(352) 336-5600** ext.**545** Fax: **(352) 336-6603**
4. Professional Engineer Email Address: **dbuff@golder.com**
5. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

David A. Buff — Signature

8/31/05 — Date

(seal)

* Attach any exception to certification statement.

** **Board of Professional Engineers Certificate of Authorization #00001670**

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application – For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application for air permit. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application – For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised/renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. **The air construction permitting classification must be used to complete the Emissions Unit Information Section of this application for air permit.** A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air construction permitting and insignificant emissions units are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

☐ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
No. 4 Combination Boiler

3. Emissions Unit Identification Number: **016**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A			**26**	☐ Yes ☒ No

9. Package Unit:
Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment:
The Batch Digester System and Multi-Effect Evaporator System may vent non-condensable gases (NCGs) to the No. 4 Combination Boiler as a backup control device. The No. 4 Combination Boiler may also act as a backup to the No. 3 Combination Boiler for condensate stripper off-gas (SOG) destruction.

EMISSIONS UNIT INFORMATION
Section [1]
No. 4 Combination Boiler

Emissions Unit Control Equipment

1. Control Equipment/Method(s) Description:

021 - Thermal destruction of TRS and HAP gases (as a backup to the Lime Kiln and the No. 3 Combination Boiler)

053 - Venturi Scrubber

2. Control Device or Method Code(s): **021, 053**

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **39.0** lb/hour **170.7** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.07 lb/MMBtu** Reference: **40 CFR 63, Subpart DDDDD**	7. Emissions Method Code: **0**

8. Calculation of Emissions:

Hourly: [(474 MMBtu/hr) (wood/bark) + (83 MMBtu/hr) (fuel oil)] x 0.07 lb/MMBtu = 39.0 lb/hr

Annual: 39.0 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 170.7 TPY

9. Pollutant Potential/Estimated Fugitive Emissions Comment:
Maximum emissions based on firing a combination of wood/bark and No. 6 fuel oil.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.3 lb/MMBtu**	4. Equivalent Allowable Emissions: **86.7** lb/hour **379.75** tons/year
5. Method of Compliance: **Annual test using EPA Method 5.**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 0050009-016-AC and Rule 62-296.410(1)(b)2; for carbonaceous fuel firing. Allowable emissions are 86.7 lb/hr (379.75 TPY) when any combination of fuel is utilized.**	

Allowable Emissions Allowable Emissions 2 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.1 lb/MMBtu**	4. Equivalent Allowable Emissions: **47.3** lb/hour **207.2** tons/year
5. Method of Compliance: **Annual test using EPA Test Method 5.**	
6. Allowable Emissions Comment (Description of Operating Method): **Rule 62-296.410(1)(b)2; for fossil fuel firing. Allowable emissions are 86.7 lb/hr (379.75 TPY) when any combination of fuel is utilized.**	

Allowable Emissions Allowable Emissions 3 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions: **09/13/2007**
3. Allowable Emissions and Units: **0.07 lb/MMBtu**	4. Equivalent Allowable Emissions: **39.0** lb/hour **170.7** tons/year
5. Method of Compliance: **EPA Method 5**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on 40 CFR 63, Subpart DDDDD.**	

PART B

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1.0 INTRODUCTION

Smurfit-Stone Container Enterprises (SSCE) is proposing changes to the No. 4 Combination Boiler at its Kraft pulp and paper mill located in Panama City, Bay County, Florida. The SSCE Panama City Mill consists of the following major plant areas: woodyard, digester system, brown stock washing system, bleaching system, chemical recovery area, paper drying/converting/warehousing, and power/ utilities area. The Panama City Mill is currently operating under Title V Permit No. 0050009-020-AV, issued July 29, 2005.

SSCE currently operates the No. 4 Combination Boiler to generate steam and electricity for the papermaking process. The boiler burns bark/wood, coal, No. 6 fuel oil, No. 2 fuel oil, and small quantities of natural gas (during start-up). In addition, the boiler serves as a destruction device for noncondensable gases (NCGs) and condensate stripper off-gas (SOG), which are generated by various process sources.

SSCE is requesting changes to the No. 4 Combination Boiler in order to allow the boiler to meet the Maximum Achievable Control Technology (MACT) standards for Industrial Boilers, promulgated under Title 40 of the Code of Federal Regulations, Part 63 (40 CFR 63), Subpart DDDDD. The compliance date for existing boilers under Subpart DDDDD is September 13, 2007. The changes will consist solely of improvements to the overfire air (OFA) system of the boiler and improvements to the existing wet venturi scrubber. No capacity increase (steam production) will result from the changes.

If the proposed project for the No. 4 Combination Boiler proves successful, SSCE will be able to meet the Boiler MACT limit for total select metals (TSM) or particulate matter (PM) prior to the compliance date of September 2007. The Boiler MACT limit for TSM is 0.001 pounds per million British thermal units (lb/MMBTU) or, alternatively, the Boiler MACT limit for PM is 0.07 pounds per million British thermal units (lb/MMBtu). This limit represents a reduction in PM emissions for the boiler- from the current emissions of approximately 0.084 lb/MMBtu (based on recent stack tests). If this proposed project moves forward at this time, but the project does not reach the goal of attaining the MACT TSM limit of 0.001 lb/MMBtu or PM limit of 0.07 lb/MMBtu, SSCE will still have time to make additional changes to the boiler and/or air pollution control system prior to September 2007 deadline.

This air construction permit application is organized into two additional sections, followed by an appendix. A description of the project, including air emission sources and pollution control equipment, is presented in Section 2.0. The regulatory applicability analysis for the proposed project is presented in Section 3.0.

Through this application, SSCE is requesting that a minor source construction permit be issued to allow the No. 4 Combination Boiler to move forward as quickly as possible with the planned changes.

2.0 PROJECT DESCRIPTION

SSCE is proposing to modify the No. 4 Combination Boiler to meet the Industrial Boiler MACT rules for TSM or PM. The Industrial Boiler MACT rules require that emissions from solid fuel-fired boilers be limited to TSM emissions of 0.001 lb/MMBtu or PM emissions of 0.07 lb/MMBtu of heat input.

The facility is currently operating under Title V Permit No. 0050009-020-AV, issued July 29, 2005. The facility is located at One Everitt Avenue, Panama City, Bay County, Florida. The following sections describe the proposed project in more detail.

2.1 NO. 4 COMBINATION BOILER'S EXISTING OPERATION

The No. 4 Combination Boiler is operated to provide steam to the papermaking process and the turbine generators that provide electricity for the facility. The boiler is a Combustion Engineering (CE) design installed in 1964, with a design steam rating of 330,000 lb/hr when burning a combination of wood/bark and coal. The No. 4 Combination Boiler is permitted to burn the following fuels and gases:

- Carbonaceous fuel (includes bark, wood, and primary clarified wood fibers);
- Bituminous coal, with a sulfur content not to exceed 1.7 percent by weight;
- No. 6 fuel oil, with a sulfur content not to exceed 2.4 percent by weight;
- No. 2 fuel oil;
- Natural gas;
- Non-condensable gases (NCGs) from the low-volume, high concentration (LVHC) gas collection system, as a backup to the No. 4 Lime Kiln; and
- Condensate stripper off-gas (SOG), as a backup to the No. 3 Combination Boiler.

The No. 4 Combination Boiler currently is permitted to operate up to a maximum heat input rate of 545 MMBtu/hr, based on a 24-hour average. For carbonaceous fuel burning, the maximum heat input is limited to 474 MMBtu/hr. Based on a minimum heat content of 7,900 Btu/lb, dry basis, this heat input rate is equivalent to a maximum bark/wood burning rate of 30.0 TPH (dry).

The maximum heat input for the boiler for coal firing is 395 MMBtu/hr. Based on a heating value for coal of 12,500 Btu/lb, this heat input rate is equivalent to 15.8 TPH of coal.

The maximum heat input for the boiler when firing No. 6 fuel oil is 472 MMBtu/hr. Based on a heating value for No. 6 fuel oil of 150,000 Btu/gal, this heat input rate is equivalent to 3,147 gal/hr of No. 6 fuel oil.

The maximum heat input for the boiler when firing No. 2 fuel oil is also 472 MMBtu/hr. Based on a heating value for No. 2 fuel oil of 136,000 Btu/gal, this heat input rate is equivalent to 3,471 gal/hr of No. 2 fuel oil. The boiler contains a total of four (4) oil burners.

The maximum heat input when firing natural gas is 512 MMBtu/hr. Based on a minimum heating value for natural gas of 1,000 Btu/scf, the maximum natural gas firing rate is 512,000 scf/hr. There are total of eight (8) gas ignitors installed in the boiler.

The No. 4 Combination Boiler also serves as the backup control device for the NCGs from the LVHC gas collection system and for the condensate SOG. HAPs and TRS emissions are controlled by injecting the gases into the boiler with the primary fuel or into the flame zone of the boiler, or with the combustion air. TRS gases are subject to a minimum of 1,200°F incineration temperature for at least 0.5 seconds.

SO_2 emissions from the boiler are controlled by limiting the sulfur content of the coal and fuel oil to a maximum of 1.7 percent and 2.4 percent by weight, respectively. SO_2 emissions are controlled, when firing 100 percent fuel oil and/or incinerating TRS or SOG gases, by maintaining the pH of the venturi scrubber scrubbing medium above 8.0, except during an unscheduled outage of the Lime Kiln. For an unscheduled switch of TRS gases from the Lime Kiln to the No. 4 Combination Boiler, an interim period of 30 minutes is allowed in order to achieve a scrubbing medium pH level of 8.0 or greater.

PM emissions are controlled by a fly ash arrestor (Process Equipment Model AR56UACB-8-7), followed by a wet venturi scrubber manufactured by FMC Link-Belt (model 200K dual-throat). The original design of the venturi scrubber incorporated a variable throat (moveable plate) to allow variation of the pressure drop across the scrubber. However, many years ago the throat adjustment mechanism failed, and the plate was welded at a fixed location.

The boiler is regulated under Rule 62-296.410, F.A.C., Carbonaceous Fuel Burning Equipment; Rule 62-296.404, F.A.C., Kraft Pulp Mills; and 40 CFR, Part 63, Subpart S. The boiler is also subject

to the requirements of 40 CFR 63 Subpart DDDDD; however, the unit is not required to be in full compliance with this subpart until September 13, 2007.

2.2 NO. 4 COMBINATION BOILER'S PROPOSED MODIFICATIONS

SSCE is proposing upgrading the biomass combustion air system and the scrubber to the No. 4 Combination Boiler solely to reduce PM emissions and meet the Boiler MACT rule. In order to attain the desired operation of the boiler, and meet the Industrial Boiler MACT standard for TSM or PM, SSCE is proposing the following changes to the No. 4 Combination Boiler:

- Upgrading the combustion air system, including the OFA system, to achieve the following under all firing conditions: reduce unburned carbon to 20 percent or less; provide stable combustion with a constant negative furnace pressure; and reduce PM emitted from the furnace to the multi-clone dust collector to less than 4.2 lbs/MMBtu and
- Return the existing fixed-throat venturi scrubber to its original design of variable-throat, with additional improvements to achieve TSM emissions of less than 0.001 lb/MMBtu or PM emissions of less than 0.07 lb/MMBtu at the outlet of the wet scrubber;

SSCE is proposing to upgrade the existing OFA system on the boiler. Such systems have been installed on a number of bark/wood boilers throughout the country, and have resulted in positive improvements to the boilers, including increased combustion efficiency and a reduction in the amount of excess air used in the boiler, while decreasing emissions of PM/PM_{10}, carbon monoxide (CO), and volatile organic compounds (VOC) on a lb/MMBtu basis. Emissions of nitrogen oxides (NO_x) can be maintained at the existing lb/MMBtu levels. Components of the OFA system which will be added or modified consist of OFA port locations, ductwork, velocity dampers, air nozzle assemblies, air flow measuring devices, and combustion controls. General information regarding the Alstom system is included in Appendix A.

SSCE has committed to installing an OFA system designed by Alstom on the Panama City No. 4 Combination Boiler. At the SSCE mill in Florence, South Carolina, a similar upgrade to their No. 3 Boiler OFA system was completed by Alstom last year that resulted in a 75% reduction of particulate emissions. As was expected, the No. 3 Boiler OFA system upgrade at our Florence mill resulted in reduced quantities of flyash leaving the furnace but also resulted in an unexpected increase in bottom ash that required subsequent upgrade to the bottom ash handling system. The South Carolina DHEC made the determination that NSR was not applicable to the No. 3 Boiler OFA system upgrade project at our Florence, South Carolina, mill.

The original design of the venturi scrubber incorporated a variable throat (moveable plate) to allow variation of the pressure drop across the scrubber. The system included a plate mounted on a set of gears, which allowed the plate to be adjusted to achieve the desired level of pressure drop. However, many years ago the throat adjustment mechanism failed, and the plate was welded at a fixed location, resulting in a fixed-throat venturi.

SSCE now desires the return the venturi to its original variable-throat design. This will provide more control over pressure drop through the scrubber and therefore over PM emissions. Through this upgrade and the changes to the boiler, SSCE believes it can meet the Boiler MACT standard for TSM or PM.

The proposed project will not result in any increase in steam rate for the boiler. The boiler has been able to achieve its design steam production rate of 330,000 lb/hr when burning a combination of bark/wood and fossil fuels. For example, during the last two compliance tests of the boiler, steam production rates of up to 323,000 lb/hr were attained.

Nor will the project result in any increase in annual steam production. The boiler currently operates at approximately a 72-percent capacity factor, and this will not change due to the project.

The current permitted maximum hourly heat input rates for the various fuels will not change as part of this project. The maximum heat input rate due to firing coal, No. 6 fuel oil, No. 2 fuel oil, or natural gas will not be affected by the proposed project.

2.3 AIR EMISSION ESTIMATES AND POLLUTION CONTROL EQUIPMENT

PM/PM_{10} emissions from the No. 4 Combination Boiler are currently controlled by a mechanical collector followed by a venturi scrubber. SSCE is proposing to upgrade the boiler OFA system and venturi scrubber to meet the Boiler MACT standards. This upgrade is expected to decrease emissions of PM/PM_{10}, CO, and VOC on a lb/MMBtu basis, while maintaining NO_x emissions on a lb/MMBtu basis.

PM emissions from the No. 4 Combination Boiler are currently limited to 0.3 lb/MMBtu for carbonaceous fuel and 0.1 lb/MMBtu for No. 6 fuel oil. Total mass PM emissions are limited to

109.5 lb/hr. SO_2 emissions are limited to 1,183 lb/hr when combusting NCG and SOG, and 772 lb/hr when not combusting NCG or SOG.

2.3.1.1 Future Potential Emissions

Future emissions from the No. 4 Combination Boiler will be limited to either 0.001 lbs of TSM/MMBtu or 0.07 lbs of PM/MMBtu, which is equivalent to the NESHAPs promulgated for Industrial Boilers under 40 CFR 63, Subpart DDDDD. This is a significant reduction from the current PM limit of 0.3 lb/MMBtu for wood/bark burning and 0.1 lb/MMBtu for fuel oil burning. The proposed emission limit is equivalent to a maximum PM emission rate of 39.0 lb/hr and 170.7 TPY for any fuel combination.

As described previously, no increase in NO_x emissions due to bark/wood firing is expected on a lb/MMBtu basis due to the proposed project. Future CO and VOC emissions in terms of lb/MMBtu will decrease due to the proposed project.

3.0 AIR QUALITY REVIEW REQUIREMENTS

Federal and State air regulatory requirements for a major new or modified source of air pollution are discussed in Sections 3.1 through 3.3. The applicability of these regulations to the proposed SSCE modification is presented in Section 3.4.

3.1 PSD REQUIREMENTS

The proposed project is solely for the purpose of meeting the Boiler MACT standards. Therefore, PSD review does not apply. However, if PSD review did apply, and a comparison of past actual to future potential emissions was conducted, the only pollutant of concern would be NO_x.

3.2 POTENTIALLY APPLICABLE EMISSION STANDARDS

3.2.1 NEW SOURCE PERFORMANCE STANDARDS

The NSPS are a set of national emission standards that apply to specific categories of new sources. As stated in the CAA Amendments of 1970, these standards "shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction the Administrator determines has been adequately demonstrated."

Existing non-NSPS sources may become subject to the NSPS if such sources undergo a "modification" or "reconstruction". "***Modification***" means any physical change in, or change in the method of operation of, an existing facility which increases the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or which results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted.

"***Reconstruction***" means the replacement of components of an affected facility to such an extent that:

(1) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility; and

(2) It is technologically and economically feasible to meet the applicable standards set forth in this part.

40 CFR 60.5 defines "***fixed capital cost***" as the capital needed to provide all the depreciable components. 40 CFR 60.2 defines "***capital expenditure***" as:

an expenditure for a physical or operational change to an existing facility which exceeds the product of the applicable "annual asset guideline repair percentage" specified in the latest edition of IRS Publication 534 and the existing facility's basis, as defined by Section 1012 of the IRS Code. However, the total expenditure for a physical or operational change to an existing facility must not be reduced by any "excluded additions" as defined in IRS Publication 534, as would be done for tax purposes.

Federal NSPS exist for fossil-fuel and wood-fired industrial-commercial-institutional steam boilers constructed or modified after June 19, 1984. The NSPS are contained in 40 CFR 60, Subpart Db. The NSPS contain emission limits for SO_2, PM, and NO_x for oil firing and emission limits for PM for wood firing. Wood is defined in the NSPS to include bark, wood, and wood residue. Subpart Db is potentially applicable to the No. 4 Combination Boiler project.

Federal NSPS also exist for Fossil-Fuel-Fired Steam Generators for which construction or modification occurs after August 17, 1971 (40 CFR 60, Subpart D). The NSPS contains emission limits for PM, SO_2, and NO_x for liquid fossil fuel and wood residue firing. However, 40 CFR 60, Subpart Db, contains a provision that any unit subject to Subpart Db is not subject to Subpart D.

The No. 4 Combination Boiler is not currently subject to any NSPS. The boiler was originally constructed prior to 1965, and has not been previously modified or reconstructed per the NSPS definitions.

The No. 4 Combination Boiler will not be undergoing any physical changes to the existing fuel oil, coal, or natural gas firing systems, except for the overfire air system improvements. No increase in the maximum fuel oil, coal, or natural gas firing rates will occur. In addition, no hourly increase in emissions of any pollutant due to fuel oil, coal, or natural gas firing, will occur as part of the proposed project. As a result, the NSPS will not be triggered by the proposed project in regards to fuel oil, coal, or natural gas firing.

The boiler will be potentially more efficient at burning bark/wood, in that the improved combustion of biomass will potentially allow firing more bark/wood on an hourly basis, and potentially increasing actual PM emissions on an hourly basis. Therefore, the proposed project could constitute a "modification", which would subject the No. 4 Combination Boiler to regulation under 40 CFR 60, Subpart Db. The NSPS limit for PM emissions due to bark/wood firing is 0.1 lb/MMBtu. However, SSCE is proposing to reduce the current PM emission limit on the boiler to 0.07 lb/MMBtu. At this

maximum emission rate, the maximum hourly PM emission rate for the No. 4 Combination Boiler is 39.0 lb/hr.

A summary of historical PM compliance test data for the No. 4 Combination Boiler is shown in Table 3-1. These historic compliance tests were conducted while burning a combination of bark/wood and fossil fuel, in order to achieve at least 90 percent of rated heat input capacity during the testing. Based on the historical PM test data, PM emissions from the No. 4 Combination Boiler have been as high as 38.1 lb/hr. The proposed maximum PM emission rate after the proposed project is implemented is 39.0 lb/hr. Statistically, this represents no increase above the highest tested value. Therefore, the proposed project will not result in an increase in hourly PM emissions, and Subpart Db will not apply to the No. 4 Combination Boiler in regard to wood/bark firing.

The emission limits for SO_2 and NO_x under Subpart Db will not apply to the No. 4 Combination Boilers because there are no emission limits for these pollutants for wood/bark firing. Furthermore, neither the fossil fuel firing capability nor the maximum emissions due to fossil fuel firing will increase due to the proposed project. Therefore, the emission limits for fossil fuel firing under Subpart Db will not apply.

SSCE has developed a budget for the proposed project based on internal cost estimates. The total installed capital cost of the modifications to the No. 4 Combination Boiler is approximately $1.6 million. The term "comparable entirely new facility" would consist of a new boiler with components identical to the repaired boiler. Reconstruction calculations do not include air pollution control equipment. Using previously developed costs for new boilers in Florida, the cost of a new biomass and coal fired boiler, comparable to the No. 4 Combination Boiler (i.e., 500 MMBtu/hr), would be on the order of $40,000,000, excluding air pollution control equipment. Therefore, the planned modifications for the No. 4 Combination Boiler represent only about 4 percent of the cost of a new boiler. As a result, reconstruction is not triggered under the NSPS definitions.

3.2.2 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

Maximum Achievable Control Technology (MACT) standards, codified in 40 CFR 63, were promulgated for industrial boilers on September 13, 2004, with an effective date of November 12, 2004. Subpart DDDDD, also known as the Industrial, Commercial, and Institutional Boiler and Process Heater MACT, regulates HAP metals (with PM as a surrogate), hydrogen chloride (HCl), and mercury (Hg) emissions from existing large solid fuel-fired industrial boilers. The compliance date for existing boilers is September 13, 2007.

Existing MACT sources may become subject to new source MACT if such sources are "reconstructed". In the General Provisions for the MACT Rules, 40 CFR 63, Subpart A, *reconstruction* is defined as follows:

> ***Reconstruction***, unless otherwise defined in a relevant standard, means the replacement of components of an affected or previously nonaffected source to such an extent that:
>
> (1) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable new source; and
>
> (2) It is technologically and economically feasible for the reconstructed source to meet the relevant standard(s) established by the Administrator pursuant to Section 112 of the Act. Upon reconstruction, an affected source, or a stationary source that becomes an affected source, is subject to relevant standards for new sources, including compliance dates, irrespective of any change in emission of hazardous air pollutants from that source.

The No. 4 Combination Boiler is in the large solid fuel-fired subcategory, and the applicable emission limits for bark/wood firing are 0.07 lb/MMBtu for PM (or 0.001 lb/MMBtu for total selected metals), 0.09 lb/MMBtu for HCl, and $9x10^{-6}$ lb/MMBtu for Hg. The compliance date for the boiler is September 13, 2007. SSCE will comply with the applicable standards by the compliance date. Based on the proposed project, the boiler will be able to comply with the PM (or total selected metals), HCl, and Hg limits by means of fuel analysis or stack testing.

As discussed above, the planned modifications to the boiler represent only about 4 percent of the cost of a new boiler. As a result, the No. 4 Combination Boiler will not be "reconstructed" for the purposes of the MACT rule.

3.2.3 FLORIDA RULES

The No. 4 Combination Boiler is subject to Rules 62-296.404 and 62-296.410, F.A.C. Rule 62-296.404, F.A.C., regulates Kraft Pulp Mills and contains a TRS emission standard for combustion equipment burning TRS gases. Rule 62-296.410, F.A.C., regulates carbonaceous fuel burning equipment and contains standards for opacity and PM. The standards applicable to the boiler are 30-percent opacity (except 40-percent opacity is allowed for up to 2 minutes per hour) and 0.3 lb PM/MMBtu for carbonaceous fuel plus 0.1 lb PM/MMBtu for fossil fuel. The modified No. 4 Combination Boiler will comply with these standards.

Table 3-1. Summary of PM Emissions from Historic Stack Tests Performed on No. 4 Combination Boiler , SSCE Panama City

	Test Date	
PM Emissions	October 2004	October 2003
Emission Rate, lb/hr	38.1	26.4
Emission Rate, lb/MMBtu	0.084	0.058

APPENDIX A

OVERFIRE AIR SYSTEM INFORMATION

TABLE A-1

CONTROL EQUIPMENT PARAMETERS [a]

NO. 4 COMBINATION BOILER VARIABLE THROAT SCRUBBER (VENTURI)

Manufacturer	FMC Link-Belt	
Model No.	200K Dual-Throat	
Date of Installation	1974	
Outlet Gas Temperature	140-150	°F
Outlet Gas Flow Rate	220,000-260,000	ACFM
Pressure Drop Across Device	8	inches of H_2O
Scrubber Media (b)	Water with caustic addition	
Scrubber Liquor Flow Rate (minimum)	1,096	gpm
Average Scrubbing liquor pH (c)	Variable	pH units
Control Efficiency - Particulate Matter (d)	90	%
- Sulfur Dioxide (e)	50-95	%
Maximum Permitted Particulate Matter Emission Rate (f)	39.0	lb/hr PM
Maximum Permitted Sulfur Dioxide Emission Rate (g)	1,183	lb/hr SO_2

(a) Control equipment parameters may vary according to process conditions.
(b) pH controlled with caustic
(c) SO_2 controlled by caustic addition to wet scrubber.
(d) Based on manufacturer's quote.
(e) Based on source test data.
(f) Based on 0.07 lb/MMBtu effective September 13, 2007 under the Maximum Achievable Control Technology (MACT) regulation for Industrial Boilers.
(g) From Permit No. 0050009-016-AC.

APPENDIX A

OVERFIRE AIR SYSTEM INFORMATION

3.1 COMBUSTION AIR SYSTEM UPGRADES – BASE SCOPE

3.1.1 HORIZONTAL MIXING ZONE (HMZ) OVERFIRE AIR (OFA) SYSTEM

To achieve the desired steam flow at an increased bark firing rate with reduced particulate and unburned carbon carryover levels, the existing OFA system will be replaced with new current day "state-of-the-art" technology and components. The Company recommends the addition of an HMZ OFA system, which will contribute to a significant improvement in the overall boiler, combustion system performance.

Introduction

A primary benefit of the HMZ OFA system will be a significant reduction in the amount of carryover. Carryover, essentially unburned fuel particles leaving the waterwall section of a burner, is a function of the drag coefficient of the particle, particle density, the upward furnace gas velocity and residence time. The available residence time for most units similar to the Purchaser's boiler is insufficient for all char particles to burn to completion without the aid of an effective OFA system. The Company's extensive R&D efforts have shown that char burnout becomes diffusion limited. That is, turbulence is required to dissipate the CO boundary layer around the char particle to further the combustion process. For a given furnace plan area, the gas velocity is a function of gas flow. By maximizing the quantity of effective OFA flow and minimizing the undergrate air (UGA) flow, the lower furnace gas velocity will be decreased. This will result in less carryover leaving the furnace. Carbon burnout is a function of a fuel's kinetic property, as well as residence time. Although the kinetic property of the fuel is relatively constant, the carbon burnout will improve due to increased furnace residence time resulting from lower furnace velocities.

All OFA systems attempt to provide the best combination of optimized mixing, uniform furnace velocity profile and effective use of excess air in the form of staging. The Company's HMZ OFA system is designed to optimize the stoichiometric mixing of unburned fuel particles above a stoker grate. By optimizing the air/fuel mixing just above the grate, the HMZ system can reduce carryover, improve combustion of volatiles, and provide more uniform gas temperatures and velocities at the furnace outlet. The HMZ OFA produces superior OFA mixing and a more uniform velocity distribution at the furnace outlet plane. The mixing zone is comprised of one row of single and double OFA nozzles situated along the front and rear walls of the furnace. The single and double nozzles alternate in a manner, which causes their respective airflows to create adjacent "shearing" surfaces within the depths of the furnace. These "shearing surfaces" are what enhance the mixing of air and char. An

additional benefit derived from incorporating the HMZ system is that the side to side temperature unbalance in the superheater is improved as a more uniform gas flow pattern is attained at the furnace outlet.

Referencing the test results for the existing Company application of an HMZ system at a paper mill in Louisiana gives a general idea of what might be expected if an HMZ were to be installed. With the installation of the HMZ OFA system on the Purchaser's power boiler, the bark firing capacity was increased almost forty percent (40%) over the design MCR bark firing rate. At the increased bark firing rate, it was found that all tests exhibited low unburned carbon content, which was directly attributable to the HMZ system by those running the tests. In addition, particulate emissions leaving the boiler were reduced by sixty percent (60%) with the installation of the HMZ system. The boiler was also able to operate at greatly reduced excess air levels.

The objectives and requirements of an effective OFA system, as provided by the HMZ design are summarized as follows:

- Provide Turbulence and Mixing
- Air streams must provide penetration.
- Air nozzle(s) positions, must provide coverage of the entire furnace plan area.
- Selections for uniform distribution of the OFA streams

The high velocity air streams from HMZ nozzles on the furnace sidewalls will provide the mixing momentum for completing the char combustion process. See Figures 2 and 3 for typical nozzle arrangement and flow pattern for five (5) nozzles per wall. Based on furnace dimensions at the Purchaser's facility, the Company is offering four (4) HMZ air nozzle assemblies per wall.

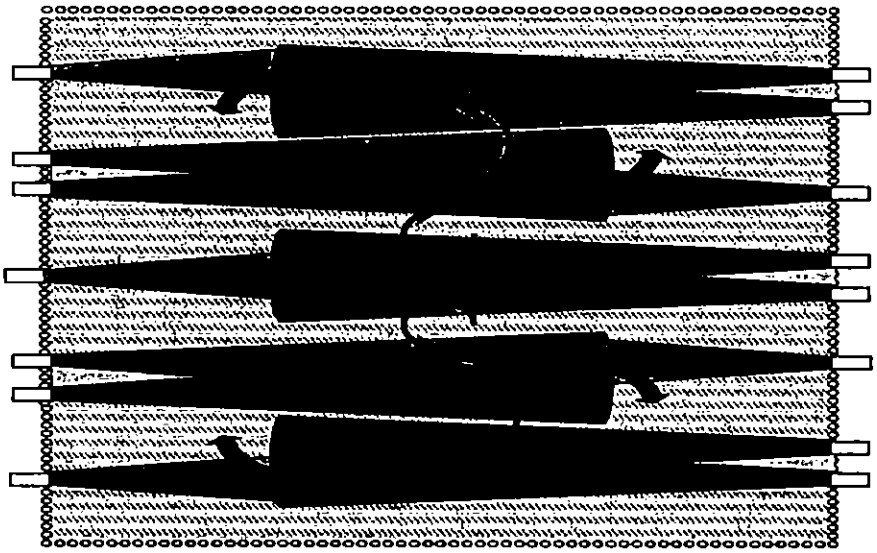

Figure 2 – Typical HMZ Nozzle Arrangement

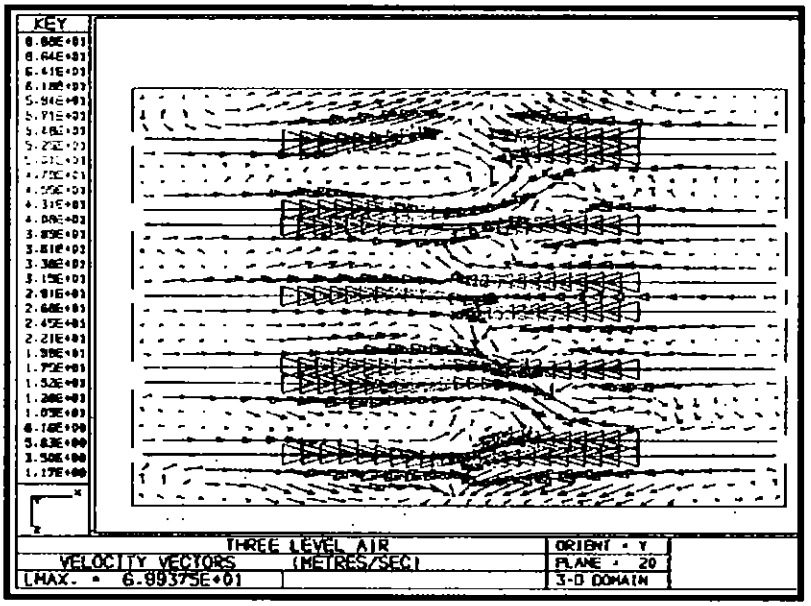

Figure 3 – HMZ Flow Pattern

The increase in the OFA system capacity will result in less available UGA flow while maintaining, or even reducing, the excess air. This reduced UGA quantity will result in lower gas velocities at the grate and fuel distributor levels, and thereby less entrainment of char and dry fuel. OFA system momentum will be increased to significantly enhance turbulence and burnout of solids and gaseous combustibles. This means combustible gases and particulate emissions will be reduced at the furnace outlet.

Minimizing the amount of UGA flow will also promote a thicker ash bed. A thicker ash bed will help insulate the grate, keeping operating temperatures lower. This will lead to potentially longer grate life. However, as UGA flow is minimized, care must be taken so that a good even side to side fuel bed is maintained. Fuel piling and side to side fuel maldistribution will create operational problems with reduced UGA flow, if not attended to by the operations personnel.

While an improved OFA system will reduce carryover and lower grate temperatures, its effectiveness will be enhanced by addressing other important areas such as optimizing excess air and furnace draft set points, ensuring proper fuel sizing and fuel distribution, providing proper UGA distribution and minimizing tramp air infiltration. ***Any boiler and air heater in-leakage should be minimized in order for the HMZ OFA system to operate at an optimum level.*** As an Option, the Company is offering a Fabric Stoker Seal to significantly reduce air in-leakage at the boiler to stoker interface.

Assumptions

Due to the lack of certain information and/or data, various assumptions had to be made when designing the equipment offered in this proposal. Following is a list of the assumptions made:

- All fans currently operate within the respective fan curves. Fan testing is recommended to confirm this.
- Since little to no current operating data was available, original design boiler data and fuel analysis were used as a basis for the Upgrade Predicted Performance.
- Bark supply and distribution on the grate is consistent and problem free
- Predicted airflow to the burner windbox includes leakage/cooling air. If the cooling air requirements are higher, this will affect the airflow distribution to the OFA level and affect overall performance.
- It is assumed that the existing burner air control dampers operate effectively to maintain minimum flow control to the existing burners.
- Indicated (Test Data) excess air levels are high 5 - 9%. It is unknown where the source of tramp air is. The Predicted Performance is based on 30% excess air in the gases leaving the furnace (O_2 - 4.87% vol. wet) at the Design Load of 300,000 lb/hr (Bark & Coal) and therefore the ability to distribute OFA & UGA flows as per design. If air leakage or cooling air flow at the undergrate or burner windbox is greater than predicted, this will impede the ability to provide the required air to the OFA level at the design excess air.
- No known operating problems re: excessive erosion, fouling etc.

- New airflow control dampers and flow devices are provided to replace the existing ones assuming the existing devices are inadequate.

Material Description

The HMZ OFA arrangement consists of single and double-opposed nozzle assemblies. The HMZ OFA nozzles will be located on the front and rear furnace walls above the burners at an elevation of approximately 30'. The nozzle arrangement is such that a single nozzle directly opposes a double nozzle located on the opposite furnace wall. The nozzles discharge horizontally at a high velocity to establish a high degree of penetration and mixing in the furnace. The single opposing nozzle prevents the strong double nozzle from impinging on the opposite wall. The HMZ nozzles will contain manual velocity dampers, which are set up to maintain constant jet velocity, or pressure, through a wide range of air flows (loads).

Four (4) sets of openings in each of the front and rear walls will be provided for installation of the nozzle assemblies. The openings for the nozzles will be formed by bent tube inserts, which will be installed in the field.

The front and rear wall oriented nozzles in the HMZ system arrangement will receive air through the existing hot air ducts currently used to supply the undergrate air. The Company's workscope will include two (2) overfire air supply ducts, which will connect the existing hot air ducts (from the tubular air heater), to the nozzles at the front and rear of the boiler.

The supply ducts will be supported off the existing undergrate air ducts, and the furnace walls. An expansion joint will be provided in each of the two (2) supply ducts, downstream from the connection with the existing hot air duct. An OFA control damper, including electric drive, will be installed in each of the supply ducts to optimize airflow distribution to the nozzles in the HMZ OFA System. See drawing G-MS-1117-01, in the Drawings Section of this proposal, for the HMZ OFA arrangement.

Airflow Measurement

The volume of combustion air being delivered to the HMZ OFA nozzles needs to be indicated to maintain optimum control and distribution of the air flow. The Company scope of supply includes two (2) airflow monitoring devices, including transmitters, to be installed in the OFA

ductwork, to accomplish this. Local pressure gauges, and pressure and temperature transmitters will be located in the OFA supply ducts.

A total of two (2) air flow measuring devices, one (1) per side, will also be installed in the existing hot air ducts from the air heater to measure the burner and the total bark combustion air flows. The existing air flow measuring devices which currently measure the undergrate and overfire air will be re-used and relocated, as required. ~~also be measured through the installation of two (2) air flow measuring devices, one (1) in each of the two (2) existing hot air ducts which supply the UGA and OFA systems.~~

New Burner and Undergrate Air Control Dampers

To achieve better airflow distribution and control, the existing burner air control and undergrate air control dampers will be replaced with new dampers. The existing burner air duct control dampers will each be replaced with a new damper arrangement. The existing damper drives will be reused.

The Company scope of supply will include new dampers to replace the existing undergrate air flow control dampers. The existing damper drives will be reused. It is anticipated that the new dampers will be inserted in the existing damper frame and the existing blades will be removed. The space between the dampers will be closed with plate to reduce the total free area.

The Company will also supply two (2) manual adjustable orifice plate dampers to be installed in the undergrate air duct. These dampers will also be supplied as part of the new undergrate air supply duct. The installation of these two (2) dampers will provide better control of airflow while maintaining the maximum pressure to the OFA ducts and nozzles.

Figure 4 provides airflows and duct sizes for the HMZ OFA duct arrangement. Figure 5 provides a flow schematic of the HMZ OFA arrangement.

ALSTOM CANADA INC., POWER

PERFORMANCE ENGINEERING

STD NO
STD DATE

New Bark Boiler Air System w/ HMZ Over Fire Air Design - Power Boiler #4

Fuel	**Bark @ 50%mc+Coal**		Elevation	100 asl	
Fuel Factor	n/a		Elevation Factor	1.005	
Air Moisture con.	1.01	(0.018 #H2O/#da)			
Steam Capacity	**300,000 #/hr**				
Note.	All New Ducts and Modified Equipment are Shown in **Bold**				

Item Description	Quantity Per Boiler	Total Weight (lb/hr)	Temp. (°F)	Total Volume (CFM)	Max. Velocity (ft/min)	Min Duct Area ** (ft^2)	Operating Pressure (in. w.g.)
Total Combustion Air (incl.Leakage Air)		514,100					
A Air from FD Fan	1	409,000	80	109,278	2,500	43.7	+16.0
B Hot air from Air Heaters	2	409,000	486	192,806	3,708	26.0	+13.0
B1 Total Comb. Air Flow Device.	**2**	**489,000**	**486**	**192,806**	**3,708**	**26.0**	**+13.0**
Aux Fuel / Coal Burner Air							
C Hot air to Burners	2	189,100	486	74,737	1,441	22.5	+12.0
C1 Brnr Air Dud Damper* **	**2**	**189,100**	**486**	**74,737**	**3,000**	**12.5**	**+11.0**
Bark Air							
D Total Bark AirFlow	2	279,900	486	110,624	1,856	29.8	+12.0
D1 Total Bark Air Flow Device	**2**	**279,900**	**486**	**110,624**	**1,856**	**29.8**	**+12.0**
E HMZ-1 Bark OverFireAir (OFA)	**2**	**139,950**	**486**	**55,444**	**3,000**	**9.2**	**+11.0**
E1 HMZ-1 Flow Device	**2**	**139,950**	**486**	**55,577**	**3,000**	**9.3**	**+10.0**
E2 HMZ-1 Control Damper	**2**	**139,950**	**486**	**55,577**	**3,000**	**9.3**	**+10.0**
E3 HMZ-1 Manifold Dud	**2**	**139,950**	**486**	**55,711**	**3,000**	**4.6**	**+9.0**
E4 HMZ-1 OFA (1X)-Nzl Feed	**4**	**139,950**	**486**	**55,980**	**3,000**	**1.6**	**+7.0**
E5 HMZ-1 OFA (2X)-Nzl Feed	**4**	**139,950**	**486**	**55,980**	**3,000**	**3.1**	**+7.0**
E6 HMZ-1 OFA (1X)-Nzl	**12**	**139,950**	**486**	**55,980**	**13,000**	**0.36**	**+7.0**
F Undergrate Air (UGA)	2	139,950	486	55,577	1,544	18.0	+10.0
F1 UGA Control Damper* **	**2**	**139,950**	**486**	**55,577**	**3,000**	**9.3**	**+10.0**
F2 UGA Orifice Damper	**2**	**139,950**	**486**	**55,577**	**5,000**	**5.6**	**+10.0**
Coal Pulverizer Air							
G Hot Air to Coal Pulverizer	1	20,000	486	7,942	1,588	5.0	+10.0

Furnace Leakage Air (incl Brnr Leakage)	25,100	Note: ** Air Duct Sizes shown are minimum
Bark Distributor Air	0	recommended duct sizes
Air for other Fuel Sources - NCG's	0	*** Existing Flow Control Dampers C-1
HMZ OFA Nozzle Locations		(Burner Air) & F1 (UGA) to be modified
HMZ - 1 Location - Front and Rear Wall above platform Elev. 28'-0"		

REVISIONS			Prop. No.		Cont. No.	30543514
Rev. 1	Removed HMZ 2 OFA Level	May 02/05 DRU	Customer:		Smurfit Stone Panama City	
			Eng'd By:	D Burton	Date:	22-Apr-04
			Chkd By		Date	

AIR DUCT DESIGN - DATA SHEET - #4 PB | **Bark/Coal/Oil/NCG - 300,000#/hr Steam** | **1**

Figure 4 – Air Duct Design

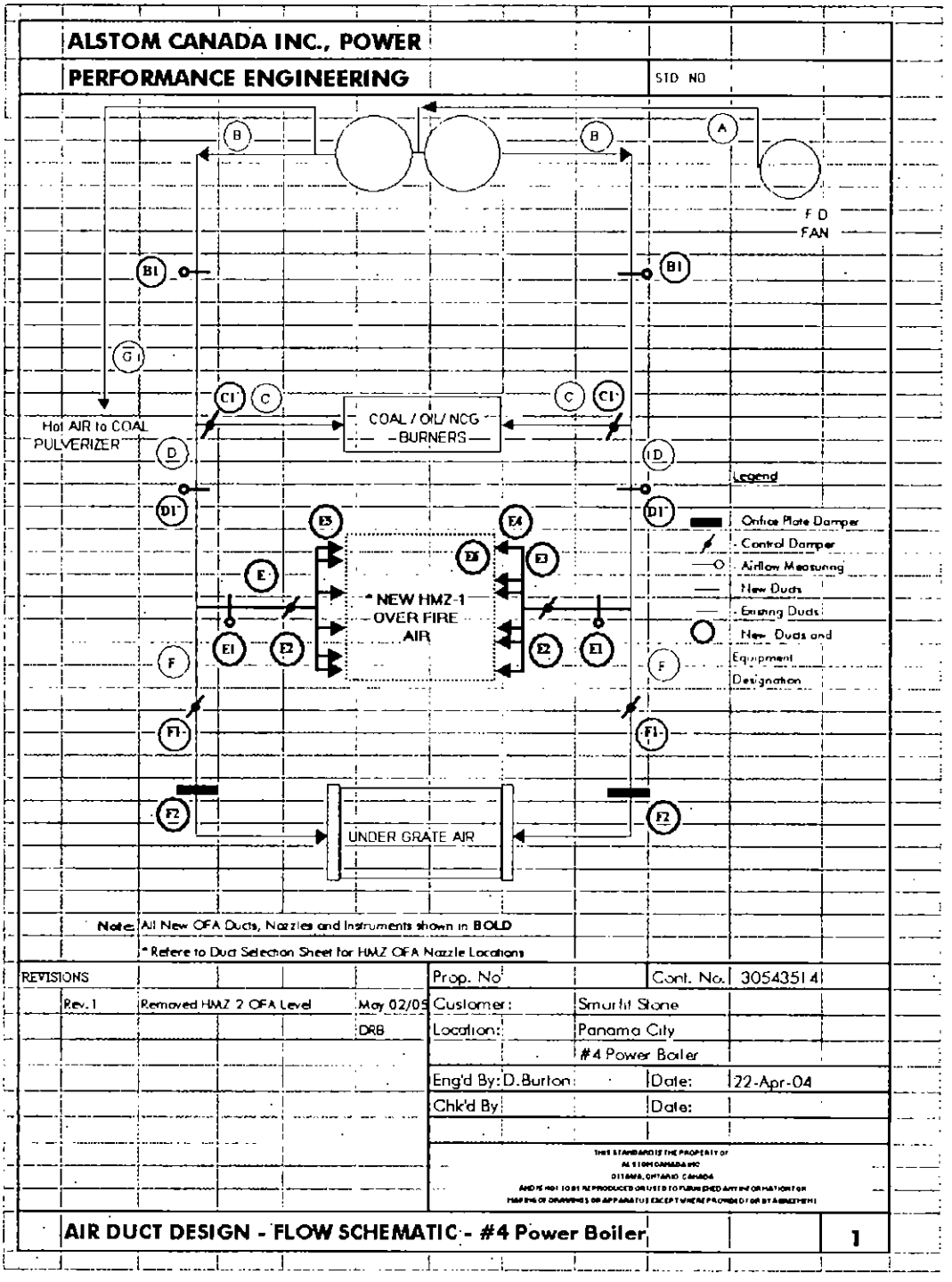

Figure 5 – New OFA System Flow Schematic

Forced Draft (FD) Fan

The HMZ OFA system is designed to provide up to fifty percent (50%) of the total stoker combustion air requirements. The design of this system is based upon the existing FD fan being capable of producing at least 10" wg pressure at the OFA nozzles, to increase the OFA discharge velocity to over 200 feet per second. Based upon a review of the FD fan curve, it appears that this fan has sufficient static pressure capacity to supply the static pressure and volumetric flow rates required for operation with the HMZ OFA System. However, this is based on the assumption that the fan is operating per the fan curve. It is strongly recommended that fan testing be conducted to confirm that the fan is operating per the curve. See the fan capacities provided below in Figure 6.

The Company has based this offering on the assumption that the ID fan is also capable of providing the rated static pressure and flow requirements.

Subject: #4 Power Boiler - Fan Capacities

FD Fan *

		Existing FD Fan		Upgrade Design - 300K		Notes:
		MCR	TestBlock	New MCR	Margin	
Flow	LB/HR	446,000	537,000	501,200	579,300	Fan Predicted Performances
	ACFM	101000	126250	113,500	136,200	are based on Upgrade Design
SP	"wg	10.1	15.2	16.0	20.0	Load - 300,000 #/hr Steam
Temp	F	80	100	80	100	Flow
RPM		940	1180			
BHP		186	348			

* Existing FD Fan Performance taken from Fan Data provided on American Standard Dwg #12924

ID Fan **

		Rebuilt ID Fan		Upgrade Design Operation	
		MCR	Testblock	New MCR	Margin
Flow	LB/HR		752,400	587,300	
	ACFM		285,000		
SP	"wg		34.0		
Temp	F				
RPM			820		
BHP			2200		

* Rebuilt ID Fan Performance taken from Fan Curve provided by Barron Ind. Feb 25/05

Figure 6 – Fan Capacities

Pressure Part Work

Installation of the eight (8) HMZ OFA nozzle assemblies will require new tube inserts to form the openings in the furnace walls. Two (2) tube insert section will be required for each nozzle opening. The tube inserts will be supplied as individual loose tubes, pre-bent, with edge bars and scarfed tube ends. Tube inserts will match or be equivalent to the existing waterwall tubing specification.

Existing OFA Ductwork and Openings

The existing OFA ductwork will be removed or blanked off, as required. Refractory and plate will be used to close off the existing overfire air port openings in the furnace walls.

Control Philosophy for the New Overfire Air System

The new HMZ OFA System consists of an interlaced arrangement of four (4) sets of damper assemblies (constant velocity dampers) on each of the front and rear walls. These damper assemblies are manually set based on local pressure readings.

The two (2) ducts that feed the OFA compartments each have an air flow device, a flow control duct damper (new Beck drives), and a pressure transmitter. Refer to the Air Duct Design Flow Schematic previously shown as Figure 4.

A Sama control diagram will be furnished in the contract stage.

For a list of new instrumentation supplied with the system, refer to the instrument list in Table 1 below.

Item	Tag	Description	Quantity	Make	Model No	Range (Design)
TOTAL AIR FLOW						
1	xx-FT-xxx	Coal/Oil/NCG Air Duct Flow Device (Left)	1	AMC	Voluprobe 1SS	238050 lbs/hr
2	xx-FT-xxx	Coal/Oil/NCG Air Duct Flow Device (Right)	1	AMC	Voluprobe 1SS	238050 lbs/hr
NEW HMZ OVER FIRE AIR						
5	xx-FT-xxx	Bark Air Duct Flow Device (Left)	1	AMC	Voluprobe 1SS	133500 lbs/hr
6	xx-FT-xxx	Bark Air Duct Flow Device (Right)	1	AMC	Voluprobe 1SS	133500 lbs/hr
7	xx-FT-xxx	Overfire Air Duct Flow Device (Left)	1	AMC	Voluprobe 1SS	66750 lbs/hr
8	xx-FT-xxx	Overfire Air Duct Flow Device (Right)	1	AMC	Voluprobe 1SS	66750 lbs/hr
9	xx-FZ-xxx	Overfire Air Duct Damper Actuator (Left)	1	Beck	Series 11	
10	xx-FZ-xxx	Overfire Air Duct Damper Actuator (Right)	1	Beck	Series 11	
11	xx-PI-xxx	Overfire Air Duct Pressure Gauge (Left#1)	1	Dwyer		
12	xx-PI-xxx	Overfire Air Duct Pressure Gauge (Left#2)	1	Dwyer		
13	xx-PI-xxx	Overfire Air Duct Pressure Gauge (Right#1)	1	Dwyer		
14	xx-PI-xxx	Overfire Air Duct Pressure Gauge (Right#2)	1	Dwyer		
15	xx-PT-xxx	Overfire Air Duct Pressure Transmitter (Left)	1	Rosemount		
16	xx-PT-xxx	Overfire Air Duct Pressure Transmitter (Right)	1	Rosemount		
17	xx-TT-xxx	Temperature Transmitter for Airflow Temperature Compensation	1	Rosemount		0-500°F

Table 1 – Instrument List

Note: Items number 5 and 6, air flow devices, in Table 1 – Instrument List, have been deleted from the scope of supply.

Air System Control:

a) Air Flow Calculations

The Under Grate airflow can be calculated by subtracting the Total Bark Air Flow from the HMZ OFA.

The Coal/Oil/NCG Burner airflow can be calculated by subtracting the Total Bark Air Flow from the Total Air Flow

b) Combustion Control

The Under Grate and OFA Systems are modulated based on total hog fuel feed. The Control room operator will be able to adjust the split between Under Grate and OFA Systems. The Company expects the air flow split to be fifty percent (50%) Under Grate Air (UGA) and fifty percent (50%) OFA, but final values will be determined during commissioning.

Predicted Performance

With the installation of the equipment supplied, the Company predicts the performance as shown below in Table 2:

#4 (CE) Power Boiler - Predicted Performances						
Conditions		Original Design	Upgrade Design -New HMZ OFA			
		Wood (45% moisture) + Coal	Wood (50% moisture) + Coal	Wood (45% moisture) + Coal	Max. Wood (50% Moisture) + Coal	Wood (50% moisture) + Coal + Oil + NCG
Steam Flow	Lbs/hr	300,000	300,000	300,000	300,000	300,000
Wood Steam Flow	Lbs/hr	180,000	180,000	215,200	210,900	180,000
Coal Steam Flow	Lbs/hr	120,000	120,000	84,800	89,100	70,000
Oil Steam Flow	Lbs/hr	0	0	0	0	30,000
NCG Steam Flow	Lbs/hr	n/a	0	0	0	20,000
Steam Temp/Press	F / psig	950 / 1275	950 / 1275	950 / 1275	950 / 1275	950 / 1275
Feedwater Temp	F	280	280	280	280	280
Excess Air @ TAH In	%	25%	30%	30%	30%	25.5%
Air Temps						
- to Fan	F	80	80	80	80	80
to Furn.	F	486	486	486	486	486
Bark Fuel Flow	Tons/hr	30.0	39.5	39.5	44.2	37.6
Bark Moist. Content	% m.c.	45.0	50.0	45.0	50.0	50.0
Coal Fuel Flow	Lbs/hr	15,160	12,379	9,420	9,920	7,770
Oil Flow	Lbs/hr	0	0	0	0	2,330
NCG Flow	scfh	0	0	0	0	99,000
Thermal Eff.	%	75.5%	72.9%	73.7%	71.7%	72.0%
Total Air Flow to Unit (incl.5%Leakage)	Lbs/hr	446,000	477,000	469,600	482,500	514,400
OFA / UOA Ratio	%	n/a	50 / 50	45 / 55	50 / 50	50 / 50
Exit Gas Flow @ TAH In	Lbs/hr	n/a	566,500	556,400	579,300	602,700
Exit Gas Temp	degF	382	385	385	390	380
Carbon Loss %			2.0	2.0	2.0	2.0
GHI (Wood) x 10^6	Btu/hr	283.8	339.7	373.7	380.5	323.4
GHI (Coal) x 10^6	Btu/hr	200.1	163.4	124.3	131.0	102.5
GHI (Oil) x 10^6	Btu/hr	0	0	0	0	42.6
GHI (NCG) x 10^6	Btu/hr	n/a	0	0	0	41.0
GHI (Total Fuel) x 10^6	Btu/hr	483.9	503.1	498.0	511.5	509.5
GHRR (Grate Heat Rate)	Btu/hr ft2	895,000	1,071,000	1,178,500	1,200,000	1,019,900

Table 2 – Predicted Performance

3.1.2 COMPUTATIONAL FLUID DYNAMICS (CFD) BOILER MODELING

As a tool to evaluate the current operation of the subject boiler and support performance guarantees for the equipment to be installed, the Company's scope of supply will include Computational Fluid Dynamics (CFD) Modeling. The scope of the CFD modeling study will include the following activities:

1. Establish the boiler's baseline conditions.
2. Evaluate the boiler's flow and mixing characteristics, and relative emission levels.
3. Produce a baseline model and tune to measurements obtained from field data collection at the site.
4. Check the modification design configurations and optimize the upgrade boiler's combustion air system design.

The baseline model will include generation of a three dimensional (3-D) CFD model of the boiler in its existing condition. To develop the most accurate representation of the subject boiler, a data collection phase will be conducted at the Panama City Mill to view the operation, and gather

necessary process, air, and fuel flow inputs required for the CFD models. The baseline conditions will be modeled and calibrated to available emissions data and field operating data.

The baseline simulations will include bark firing and combined firing of bark, coal, oil, and waste gases, to support the commercial guarantees. The CFD model will illustrate the 3-D flow, temperature, species and particulate patterns for a representation of the current and retrofit air system arrangements at two (2) steaming rates. Using CFD, a total of eleven (11) runs are proposed to understand the behavior of the baseline, and alternate operating conditions with both bark and bark/coal/oil firing. A number of operating conditions will be evaluated to represent nominal bark, coal and oil firing scenarios.

After calibrating the baseline case, the matrix of runs for the retrofit cases will be performed. The retrofit model will contain the new air system configuration and several possible options for nozzles in service to allow tuning of the design. The retrofit models will be generated with a new geometry that includes the new air system, current burners to be reused, and any other changes. A total of eleven (11) runs are included in the cost estimate. These CFD runs will evaluate the performance of the OFA design under a range of possible bias conditions that may occur.

A final report will serve as the deliverable for the CFD Modeling Study. The report will provide the study results on CD in electronic format and include both Word and PowerPoint presentations. These files will include color plots, animations, and charts. The documentation will describe the approach, modeled geometries, inputs and results specific to this boiler modeling study. The text will describe the CFD model assumptions, dimensions, flow rates, and tabulations of the results. This will also include charts and graphs to quantify the flow distribution, temperatures and species. The results for each of the runs will be described to clearly identify the differences. Color contour plots, isosurfaces of velocity and pressure and other useful graphics will be included with annotations to explain the relevant aspects of the modeling task.