Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products
P.O. Box 919
Palatka, FL 32178-0919

March 10, 2011

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

RECEIVED
MAR 14 2011
BUREAU OF
AIR REGULATION

Re: Construction Permit Application
Modification of the No. 4 Lime Kiln (EU ID 017)
Multi-Fuel Burner (Fuel Oil and Natural Gas)

Dear Mr. Koerner:

Please find enclosed four (4) copies of the subject construction permit application.

If there are any questions regarding this application, please do not hesitate to contact Ron Reynolds at 386-329-0967.

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,

Gary Frost, Vice-President
Palatka Operations

cc: S.K. Bailey-GP-Atlanta
W.J Galler-GP-Atlanta
R.E. Reynolds-GP-Palatka

Application

NO. 4 LIME KILN BURNER MODIFICATION AIR CONSTRUCTION PERMIT APPLICATION

Georgia-Pacific Consumer Operations LLC

Prepared For: Georgia-Pacific Consumer Operations LLC
P.O. Box 919
Palatka, FL 32178 USA

Submitted By: Golder Associates Inc.
6026 NW 1st Place
Gainesville, FL 32607 USA

March 2011

103-87689

A world of capabilities delivered locally

Golder Associates

APPLICATION FOR AIR PERMIT

LONG 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 any required purpose at a facility operating under a federally enforceable state air operation permit (FESOP) or Title V air operation permit;
- For a proposed project subject to prevention of significant deterioration (PSD) review, nonattainment new source review, or maximum achievable control technology (MACT);
- To assume a restriction on the potential emissions of one or more pollutants to escape a requirement such as PSD review, nonattainment new source review, MACT, or Title V; or
- To establish, revise, or renew a plantwide applicability limit (PAL).

Air Operation Permit – Use this form to apply for:

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

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To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **Georgia-Pacific Consumer Operations LLC**	
2. Site Name: **Palatka Mill**	
3. Facility Identification Number: **1070005**	
4. Facility Location... Street Address or Other Locator: **215 County Road 216** City: **Palatka** County: **Putnam** Zip Code: **32177**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: **Ron Reynolds, Environmental Engineer – Air Quality**
2. Application Contact Mailing Address... Organization/Firm: **Georgia-Pacific Consumer Operations LLC** Street Address: **P.O. Box 919** City: **Palatka** State: **FL** Zip Code: **32178-0919**
3. Application Contact Telephone Numbers... Telephone: **(386) 329-0967** ext. Fax: **(368) 328-0014**
4. Application Contact E-mail Address: **ron.reynolds@gapac.com**

Application Processing Information (DEP Use)

1. Date of Receipt of Application: 3/14/11	3. PSD Number (if applicable):
2. Project Number(s): 1070005-067-AC	4. Siting Number (if applicable):

APPLICATION INFORMATION

Purpose of Application

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

Air Construction Permit

☒ Air construction permit.

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL).

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL), and separate air construction permit to authorize construction or modification of one or more emissions units covered by the PAL.

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 being submitted to replace the existing burner in the No. 4 Lime Kiln (EU ID 017) in order to add natural gas as a fuel, to be burned alone or in combination with residual fuel oil. The application is also requesting the authorization to replace the ID fan and primary air fan in the No. 4 Lime Kiln with equivalently sized fans.

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Processing Fee
017	No. 4 Lime Kiln	N/A	N/A

Application Processing Fee

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

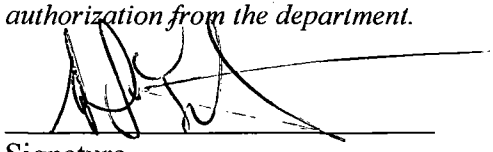
APPLICATION INFORMATION

Owner/Authorized Representative Statement

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

1. Owner/Authorized Representative Name :
   Gary L. Frost, Vice-President Operations
2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **Georgia-Pacific Consumer Operations LLC**
   Street Address: **P.O. Box 919**
   City: **Palatka** State: **FL** Zip Code: **32178**
3. Owner/Authorized Representative Telephone Numbers...
   Telephone: **(386) 329-0063** ext. Fax: **(386) 312-1135**
4. Owner/Authorized Representative E-mail Address: **gary.frost@gapac.com**
5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the corporation, partnership, or other legal entity submitting this air permit application. To the best of my knowledge, the statements made in this application are true, accurate and complete, and any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department.



Signature

11 MARZOII

Date

APPLICATION INFORMATION

Application Responsible Official Certification

Complete if applying for an initial, revised, or renewal Title V air operation permit or concurrent processing of an air construction permit and revised or renewal Title V air operation 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 or CAIR 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 E-mail 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

APPLICATION 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: **6026 NW 1st Place**
   City: **Gainesville** State: **FL** Zip Code: **32607**
3. Professional Engineer Telephone Numbers...
   Telephone: **(352) 336-5600** ext. Fax: **(352) 336-6603**
4. Professional Engineer E-mail 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

3/8/11 — Date

(seal)

Attach any exception to certification statement.

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

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone **17** East (km) **434.0** North (km) **3,283.4**		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) **29 / 41 / 00** Longitude (DD/MM/SS) **81 / 40 / 45**	
3. Governmental Facility Code: **0**	4. Facility Status Code: **A**	5. Facility Major Group SIC Code: **26**	6. Facility SIC(s): **2611** **2621**
7. Facility Comment :			

Facility Contact

1. Facility Contact Name: **Ron Reynolds, Environmental Engineer – Air Quality**
2. Facility Contact Mailing Address... Organization/Firm: **Georgia-Pacific Consumer Operations LLC** Street Address: **P.O. Box 919** City: **Palatka** State: **FL** Zip Code: **32178**
3. Facility Contact Telephone Numbers: Telephone: **(386) 329-0967** ext. Fax: **(386) 328-0014**
4. Facility Contact E-mail Address: **ron.reynolds@gapac.com**

Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name:
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Facility Primary Responsible Official Telephone Numbers... Telephone: ( ) ext. Fax: ( )
4. Facility Primary Responsible Official E-mail Address:

Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a "major source" and a "synthetic minor source."

1. ☐ Small Business Stationary Source	☐ Unknown
2. ☐ Synthetic Non-Title V Source	
3. ☒ Title V Source	
4. ☒ Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. ☐ Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. ☒ Major Source of Hazardous Air Pollutants (HAPs)	
7. ☐ Synthetic Minor Source of HAPs	
8. ☒ One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. ☐ One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. ☒ One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. ☐ Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	
12. Facility Regulatory Classifications Comment:	

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
Particulate Matter Total – PM	**A**	**N**
Particulate Matter – PM10	**A**	**N**
Particulate Matter – PM2.5	**A**	**N**
Sulfur Dioxide – SO2	**A**	**N**
Nitrogen Oxides – NOx	**A**	**N**
Carbon Monoxide – CO	**A**	**N**
Volatile Organic Compounds – VOC	**A**	**N**
Lead – Pb	**A**	**N**
Sulfuric Acid Mist – SAM	**A**	**N**
Total Reduced Sulfur – TRS	**A**	**N**
Benzene – H017	**A**	**N**
m-Cresol – H051	**A**	**N**
Formaldehyde – H095	**A**	**N**
Hexachlorocyclopentadiene – H100	**A**	**N**
Methanol – H115	**A**	**N**
Naphthalene – H132	**A**	**N**
Phenol – H144	**A**	**N**
Toluene – H169	**A**	**N**
1,2,4-Trichlorobenzene – H174	**A**	**N**
o-Xylene – H187	**A**	**N**
Hazardous Air Pollutants – HAPS	**A**	**N**

B. EMISSIONS CAPS

Facility-Wide or Multi-Unit Emissions Caps

1. Pollutant Subject to Emissions Cap	2. Facility-Wide Cap [Y or N]? (all units)	3. Emissions Unit ID's Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap

7. Facility-Wide or Multi-Unit Emissions Cap Comment:

C. FACILITY ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: GP-FI-C1 ☐ Previously Submitted, Date:_____
2. Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: GP-FI-C2 ☐ Previously Submitted, Date:_____
3. Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: GP-FI-C3 ☐ Previously Submitted, Date:_____

Additional Requirements for Air Construction Permit Applications

1. Area Map Showing Facility Location: ☐ Attached, Document ID:_____ ☒ Not Applicable (existing permitted facility)
2. Description of Proposed Construction, Modification, or Plantwide Applicability Limit (PAL): ☒ Attached, Document ID: Part B
3. Rule Applicability Analysis: ☒ Attached, Document ID: Part B
4. List of Exempt Emissions Units: ☐ Attached, Document ID:_____ ☒ Not Applicable (no exempt units at facility)
5. Fugitive Emissions Identification: ☐ Attached, Document ID:_____ ☒ Not Applicable
6. Air Quality Analysis (Rule 62-212.400(7), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable
7. Source Impact Analysis (Rule 62-212.400(5), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable
8. Air Quality Impact since 1977 (Rule 62-212.400(4)(e), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable
9. Additional Impact Analyses (Rules 62-212.400(8) and 62-212.500(4)(e), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable
10. Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for FESOP Applications

1. List of Exempt Emissions Units:
   ☐ Attached, Document ID:_____ ☐ Not Applicable (no exempt units at facility)

Additional Requirements for Title V Air Operation Permit Applications

1. List of Insignificant Activities: (Required for initial/renewal applications only)
   ☐ Attached, Document ID:_____ ☐ Not Applicable (revision application)

2. Identification of Applicable Requirements: (Required for initial/renewal applications, and for revision applications if this information would be changed as a result of the revision being sought)
   ☐ Attached, Document ID:_____
   ☐ Not Applicable (revision application with no change in applicable requirements)

3. Compliance Report and Plan: (Required for all initial/revision/renewal applications)
   ☐ Attached, Document ID:_____
   Note: A compliance plan must be submitted for each emissions unit that is not in compliance with all applicable requirements at the time of application and/or at any time during application processing. The department must be notified of any changes in compliance status during application processing.

4. List of Equipment/Activities Regulated under Title VI: (If applicable, required for initial/renewal applications only)
   ☐ Attached, Document ID:_____
   ☐ Equipment/Activities Onsite but Not Required to be Individually Listed
   ☐ Not Applicable

5. Verification of Risk Management Plan Submission to EPA: (If applicable, required for initial/renewal applications only)
   ☐ Attached, Document ID:_____ ☐ Not Applicable

6. Requested Changes to Current Title V Air Operation Permit:
   ☐ Attached, Document ID:_____ ☐ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Facilities Subject to Acid Rain, CAIR, or Hg Budget Program

1. Acid Rain Program Forms:

   Acid Rain Part Application (DEP Form No. 62-210.900(1)(a)):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable (not an Acid Rain source)

   Phase II NO_X Averaging Plan (DEP Form No. 62-210.900(1)(a)1.):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable

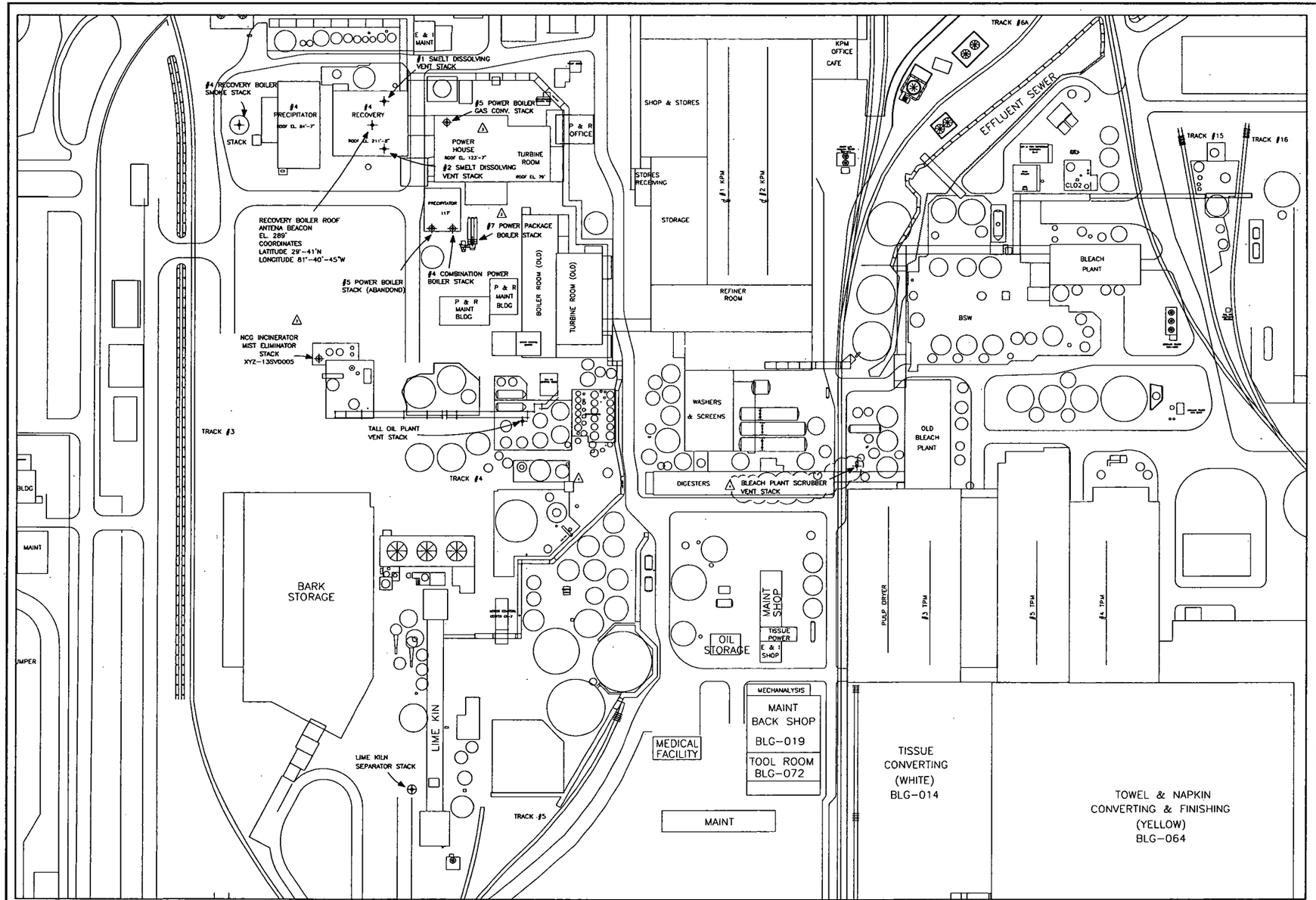
   New Unit Exemption (DEP Form No. 62-210.900(1)(a)2.):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable

2. CAIR Part (DEP Form No. 62-210.900(1)(b)):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable (not a CAIR source)

Additional Requirements Comment

ATTACHMENT GP-FI-C1

FACILITY PLOT PLAN



NOTES

MILL STACKS	EQUIP NO.	BASE EL.	HEIGHT	STACK EL.	ID.	REF. DWG.	REF. DWG.
NCG INCINERATOR MIST ELIMINATOR STACK	XYZ-13SVO005	20'	258'-1 1/2'	278'-1 1/2"	25.5"	G-P 291-8595ME-000-0039-002	
#4 COMBINATION BOILER STACK	BHP-2003	121'-6"	133'-8	255'-2"	8'	Research - Cottrell 291-5219/5220-1-03	
ABANDON #5 POWER BOILER STACK	BHP-2006	121'-6"	133'-8"	255'-2"	8'	Research - Cottrell 291-5219/5220-1-03	
#5 POWER BOILER GAS CONVERSION STACK	BHP-	123'-7 1/8"	50'-0"	173'-7 1/8"	9'	G-P 291-5220ME-002-0015-004, 005	
#4 RECOVERY BOILER SMOKE STACK	XYZ-5521	19'	230'	249'	12'	Rust Eng. 27-68-37	Peabody Dwg. 5170-2
#1 SMELT DISSOLVING VENT STACK	XYZ-5514	33'-3"	188'-9"	222'	4'-11"	Rust Eng. 27-68-51	Zurn Dwg. 6-750-DE1
#2 SMELT DISSOLVING VENT STACK	XYZ-5515	33'-3"	188'-9"	222'	4'-11"	Rust Eng. 27-68-51	Zurn Dwg. 6-750-DE2X
LIME KILN SEPARATOR STACK	SPR-5057	71'-6"	77'-6"	149'	4'-5 1/4"	Rust Eng. 27-16-50	Zurn Dwg. C-36470-2, D-39846
TALL OIL PLANT VENT STACK		19'-0"	64'-6"	83'-6"	1'-4"	G-P 297-7810-034	Wallace-Murray Dwg. File 297-7810-12-01
#7 POWER PACKAGE BOILER STACK	BHP-2007	36' ±	20'-4"	56' ±	6'	G-P 291-5220-001-0019-002	
BLEACH PLANT SCRUBBER VENT STACK	XYZ-	27'-1"	81'-8"	108'-9"	3'-7"	G-P 295-5614-302-05	

REV.	DATE	DESCRIPTION	DRN	CK'D	AP'D
4	8/1/99	ADDED BLEACH PLANT SCRUBBER STACK	WHT		
3	5/18/98	ADDED NO.5 POWER BLR GAS CONV. STACK	WHT		
2	11/18/95	NO. 7 POWER PACKAGE BOILER WAS NO.6	WHT		
1	6/14/95	ADDED NCG INCINERATOR MIST ELIM. STACK	AM	WHT	
		REPLACED BORDER	AM	WHT	

CROSS-REFERENCE NO.

HUDSON NO.

Georgia-Pacific

THE GROWTH COMPANY

PALATKA OPERATIONS

MILL STACKS
LOCATION PLAN
POLLUTION CONTROL

DRAWN	WHT	10/29/99	SCALE
CHECKED			RES NO.
APPROVED			FILENAME 00010363.dwg
APPROVED			AREA 83

G-P DRAWING NO.
290-8464MS-000-0016-001

CONSULTANT NO.

CONSULTANT: REV: 4

ATTACHMENT GP-FI-C2

PROCESS FLOW DIAGRAM

Purchased Chips
Chipyard
White Liquor
Digesters
NCGs
NCGs to No. 4 Combination Boiler as Backup
ADUP
Brown Stock Washers
Black Liquor
Pulp
Sulfuric Acid
Methanol
$NaClO_3$
ClO_2 Plant
ClO_2
Bleach Plant
Bleached Pulp
No. 1 Kraft Machine
No. 2 Kraft Machine
No. 3 Tissue Machine
No. 4 Tissue Machine
No. 5 Tissue Machine
Purchased Pulp
Thermal Oxidizer
Natural Gas
Pre-Scrubbers
NCGs
Evaporators and Concentrators
Tall Oil Plant
CTO
To No. 4 Combination Boiler as Backup
Black Liquor
Methanol (as stripper off-gas)
SOGs
Fuel Oil
No. 4 Recovery Boiler and No. 4 Smelt Dissolving Tanks
Steam
Turbine Generators
Steam
No. 5 Power Boiler
DNCGs (as backup)
Natural Gas
No. 4 Combination Boiler
NCGs, SOGs, & DNCGs (as backup)
Natural Gas
Wood/Bark
No. 7 Package Boiler
Natural Gas
Mill Condensates
Condensate Stripper
Clean Condensate to Process
Smelt
Steam to Process
Electricity
Steam to Process
Green Liquor System
Green Liquor
Lime (CaO)
Tissue Converting
Shipping or Storage
Lime Kiln
$CaCO_3$
Lime Mud Washer & Storage
White Liquor Clarifier
White Liquor
Slakers, Causticizers & Grit Washers
Natural Gas
Residual Oil
White Liquor to Digestors
Process Sewers
Wastewater Treatment System
Effluent Discharge

Attachment GP-FI-C2
Facility Process Flow Diagram
Georgia-Pacific Palatka Operations
Palatka, Florida

Notes:
ADUP = Air Dried Unbleached Pulp
CTO = Crude Tall Oil
Solid/Liquid ——→
Gas - - - - - →

Golder Associates

Y:\Projects\2010\103-87689 GP Palatka\Draft 4\Attachments\FI\GP-FI-C2.vsd

ATTACHMENT GP-FI-C3

PRECAUTIONS TO PREVENT EMISSIONS OF UNCONFINED PARTICULATE MATTER

ATTACHMENT GP-FI-C3

PRECAUTIONS TO PREVENT EMISSIONS OF UNCONFINED PARTICULATE MATTER

Reasonable precautions to prevent emissions of unconfined particulate matter at this facility include:

- Conveyors that are covered or enclosed where feasible and practical
- Paved roads entering and exiting the plant
- Limiting vehicle speeds
- Good housekeeping practices

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 an initial, revised or renewal 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. 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 an 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 or 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. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes 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.

EMISSIONS UNIT INFORMATION
Section [1]
No. 4 Lime Kiln

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 Lime Kiln

3. Emissions Unit Identification Number: **017**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:
A			**26**

8. Federal Program Applicability: (Check all that apply)

   ☐ Acid Rain Unit

   ☐ CAIR Unit

9. Package Unit:
   Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment:
    The No. 4 Lime Kiln recalcines spent lime cake (calcium carbonate) to produce quicklime (calcium oxide), which is used to convert green liquor to cooking liquor. The kiln burns residual fuel oil and natural gas, and has a maximum processing rate of 41.5 tons of lime mud solids per hour (24-hour average). Particulate matter emissions are controlled by a wet venturi scrubber.

EMISSIONS UNIT INFORMATION
Section [1]
No. 4 Lime Kiln

Emissions Unit Control Equipment/Method: Control **1** of **2**

1. Control Equipment/Method Description: **Venturi Scrubber**
2. Control Device or Method Code: **053**

Emissions Unit Control Equipment/Method: Control **2** of **2**

1. Control Equipment/Method Description: **Centrifugal Collector**
2. Control Device or Method Code: **007**

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:
2. Control Device or Method Code:

B. EMISSIONS UNIT CAPACITY INFORMATION
(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate: **41.5 TPH Lime Mud Solids (LMS)**	
2. Maximum Production Rate: **19.4 TPH quicklime (CaO)**	
3. Maximum Heat Input Rate: **130** million Btu/hr	
4. Maximum Incineration Rate: pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	
24 hours/day	**7** days/week
52 weeks/year	**8,760** hours/year
6. Operating Capacity/Schedule Comment:	

Maximum heat input rate based on maximum design capacity of the new fuel oil/natural gas burner. Maximum throughput rate of 41.5 TPH LMS corresponds to a production rate of 19.4 TPH CaO.

C. EMISSION POINT (STACK/VENT) INFORMATION
(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **017**		2. Emission Point Type Code: **1**
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:		
5. Discharge Type Code: **V**	6. Stack Height: **131** feet	7. Exit Diameter: **4.4** feet
8. Exit Temperature: **161**°F	9. Actual Volumetric Flow Rate: **52,328** acfm	10. Water Vapor: **32** %
11. Maximum Dry Standard Flow Rate: **54,200** dscfm		12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: East (km): North (km):		14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)
15. Emission Point Comment: **Maximum dry standard flow rate is corrected to 10-percent oxygen.** **Actual volumetric flow rate, exit temperature, and water vapor based on the April 13, 2010 stack test.**		

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 3

1. Segment Description (Process/Fuel Type): **Pulp and Paper and Wood Products; Sulfate (Kraft) Pulping, Lime Kiln: General**		
2. Source Classification Code (SCC): **3-07-001-06**	3. SCC Units: **Tons Air-Dried Unbleached Pulp Produced**	
4. Maximum Hourly Rate: **118**	5. Maximum Annual Rate: **675,250**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **Maximum annual rate is based on maximum daily rate of 1,850 tons per day of air-dried unbleached pulp (monthly average). Throughput is equivalent to 19.4 tons per hour lime production.**		

Segment Description and Rate: Segment 2 of 3

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use: Residual Oil, Lime Kiln**		
2. Source Classification Code (SCC): **3-90-004-03**	3. SCC Units: **Thousand Gallons Burned**	
4. Maximum Hourly Rate: **0.867**	5. Maximum Annual Rate: **7,592**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: **2.35**	8. Maximum % Ash:	9. Million Btu per SCC Unit: **150**
10. Segment Comment: **Maximum hourly rate based on 130 MMBtu/hr. Residual oil may include on-spec used oil. Residual oil may be fired alone, or in combination with natural gas.**		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment 3 of 3

1. Segment Description (Process/Fuel Type): **Industrial Processes; In-Process Fuel Use: Natural Gas, Lime Kiln**		
2. Source Classification Code (SCC): **3-90-006-03**	3. SCC Units: **Million Cubic Feet Burned**	
4. Maximum Hourly Rate: **0.13**	5. Maximum Annual Rate: **1,139**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit: **1,000**
10. Segment Comment: **Maximum hourly rate based on 130 MMBtu/hr. Natural gas may be fired alone or in combination with residual oil.**		

Segment Description and Rate: Segment _____ of _____

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
PM	007	053	EL
PM10	007	053	NS
PM2.5	007	053	NS
SO2	053		EL
NOX			EL
CO			EL
VOC			EL
TRS			EL
Pb			NS
SAM			NS
Benzene – H017			NS
m-Cresol – H051			NS
Formaldehyde – H095			NS
Hexachlorocyclopentadiene – H100			NS
Methanol – H115			NS
Naphthalene – H132			NS
Phenol – H144			NS
Toluene – H169			NS
1,2,4-Trichlorobenzene – H174			NS
o-Xylene – H187			NS
HAPS			NS
Hg			NS

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SO2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **9.13** lb/hour **40.01** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **16.9 ppmvd @ 10% O_2** Reference: **Permit No. 1070005-038-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): **3.77** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **4.55** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: 16.9 $ft^3/10^6$ ft^3 x 64 lb/lb-mol x 1/385.1 ft^3/lb-mol x 54,200 dscf/min x 60 min/hr = 9.13 lb/hr

Annual: 9.13 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 40.01 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions **1** of **1**

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **16.9 ppmvd @ 10% O_2**	4. Equivalent Allowable Emissions: **9.13** lb/hour **40.01** tons/year
5. Method of Compliance: **US EPA Method 8**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 1070005-038-AC**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **NOX**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **48.56** lb/hour **212.68** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **125 ppmvd @ 10% O_2** Reference: **Proposed Limit**	7. Emissions Method Code: **5**
8.a. Baseline Actual Emissions (if required): **105.51** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **154.27** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: 125 $ft^3/10^6$ ft^3 x 46 lb/lb-mol x 1/385.1 ft^3/lb-mol x 54,200 dscf/min x 60 min/hr = 48.56 lb/hr

Annual: 48.56 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 212.68 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions **1** of **1**

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **125 ppmvd @ 10% O_2**	4. Equivalent Allowable Emissions: **48.56** lb/hour **212.68** tons/year
5. Method of Compliance: **US EPA Method 7E**	
6. Allowable Emissions Comment (Description of Operating Method): **Proposed Limit**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **CO**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **16.31** lb/hour **71.46** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **69 ppmvd @ 10% O_2** Reference: **Permit No. 1070005-038-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): **12.99** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **51.84** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: 69 $ft^3/10^6$ ft^3 x 28 lb/lb-mol x 1/385.1 ft^3/lb-mol x 54,200 dscf/min x 60 min/hr = 16.31 lb/hr

Annual: 16.31 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 71.46 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **69 ppmvd @ 10% O_2**	4. Equivalent Allowable Emissions: **16.31** lb/hour **71.46** tons/year
5. Method of Compliance: **US EPA Method 10**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 1070005-038-AC**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **22.83** lb/hour **99.97** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.55 lb/ton LMS** Reference: **Permit No. 1070005-038-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): **49.06** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **59.13** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years
10. Calculation of Emissions: **Hourly: 0.55 lb/ton LMS x 41.5 TPH LMS = 22.825 lb/hr** **Annual: 22.825 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 99.97 TPY**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions **1** of **1**

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.55 lb/ton LMS**	4. Equivalent Allowable Emissions: **22.83** lb/hour **99.97** tons/year
5. Method of Compliance: **US EPA Method 5**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 1070005-038-AC**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **PM10**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **19.33** lb/hour **84.68** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **84.7% of PM Emissions** Reference: **NCASI CC 06-021 for Lime Kilns w/ Wet PM Control**	7. Emissions Method Code: **5**
8.a. Baseline Actual Emissions (if required): **41.55** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **50.09** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: 22.825 lb/hr PM x 0.847 lb PM_{10}/lb PM = 19.33 lb/hr

Annual: 19.33 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 84.68 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **PM2.5**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **17.53** lb/hour **76.78** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **76.8% of PM Emissions** Reference: **NCASI CC 06-021 for Lime Kilns w/ Wet PM Control**	7. Emissions Method Code: **5**
8.a. Baseline Actual Emissions (if required): **37.67** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **45.42** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: 22.825 lb/hr PM x 0.768 lb $PM_{2.5}$/lb PM = 17.53 lb/hr

Annual: 17.53 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 76.78 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **9.46** lb/hour **41.43** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **70 ppmvd @ 10% O_2 as methane** Reference: **Permit No. 1070005-038-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): **5.32** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **6.42** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: 70 $ft^3/10^6$ ft^3 x 16 lb/lb-mol x 1/385.1 ft^3/lb-mol x 54,200 dscf/min x 60 min/hr = 9.46 lb/hr

Annual: 9.46 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 41.43 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions **1** of **1**

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **70 ppmvd @ 10% O_2 as methane**	4. Equivalent Allowable Emissions: **9.46** lb/hour **41.43** tons/year
5. Method of Compliance: **US EPA Method 25A and 3A or 3B**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 1070005-038-AC**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **TRS**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **5.74** lb/hour **25.15** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **20 ppmvd @ 10% O_2** Reference: **Rule 62-296.404(e) and Permit No. 1070005-038-AC**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): **4.78** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **6.49** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: 20 $ft^3/10^6$ ft^3 x 34 lb/lb-mol x 1/385.1 ft^3/lb-mol x 54,200 dscf/min x 60 min/hr = 5.74 lb/hr

Annual: 5.74 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 25.15 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **20 ppmvd @ 10% O_2**	4. Equivalent Allowable Emissions: **5.74** lb/hour **25.15** tons/year
5. Method of Compliance: **US EPA Method 16 or 16A**	
6. Allowable Emissions Comment (Description of Operating Method): **Rule 62-296.404(e) and Permit No. 1070005-038-AC**	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SAM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.41** lb/hour **1.78** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **4.45% of SO_2 Emissions** Reference: **AP-42, Table 1.3-1**	7. Emissions Method Code: **5**
8.a. Baseline Actual Emissions (if required): **0.17** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **0.20** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: 9.13 lb/hr SO_2 x 5.7 lb SO_3/157 lb SO_2 x 98 lb H_2SO_4/80 lb SO_3 = 0.41 lb/hr

Annual: 0.41 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 1.78 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **Pb**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.0052** lb/hour **0.023** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **2.86×10^{-4} lb/ton CaO, 0.4 lb CaO/lb LMS** Reference: **NCASI TB 973, Table 4.27**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): **0.0169** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **0.0203** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: 2.86×10^{-4} lb/ton CaO x (1 + 10/100) x 0.4 lb CaO/lb LMS x 41.5 TPH LMS = 0.0052 lb/hr

Annual: 0.0052 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 0.023 TPY

11. Potential, Fugitive, and Actual Emissions Comment:

Emission factor increased by 10% to account for the increase in the flue gas flow rate when burning natural gas.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **Hg**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **$6.72x10^{-5}$** lb/hour **$2.94x10^{-4}$** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **$3.68x10^{-6}$ lb/ton CaO, 0.4 lb CaO/lb LMS** Reference: **NCASI TB 973, Table 4.27**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): **$2.28x10^{-4}$** tons/year	8.b. Baseline 24-month Period: From: **01/2005** To: **12/2006**
9.a. Projected Actual Emissions (if required): **$2.74x10^{-4}$** tons/year	9.b. Projected Monitoring Period: ☒ 5 years ☐ 10 years

10. Calculation of Emissions:

Hourly: $3.68x10^{-6}$ lb/ton CaO x (1 + 10/100) x 0.4 ton CaO/ton LMS x 41.5 TPH LMS = $6.72x10^{-5}$ lb/hr

Annual: $6.72x10^{-5}$ lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = $2.94x10^{-4}$ TPY

11. Potential, Fugitive, and Actual Emissions Comment:

Emission factor increased by 10% to account for the increase in the flue gas flow rate when burning natural gas.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: **VE**	2. Basis for Allowable Opacity: ☒ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment: **Due to moisture interference, the visible emission limiting standard pursuant to Rule 62-296.320(4), F.A.C. is not applicable and is deferred to Rule 62-296.404(2)(b), F.A.C.**	

Visible Emissions Limitation: Visible Emissions Limitation ____ of ____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor **1** of **2**

1. Parameter Code: **EM**	2. Pollutant(s): **TRS**
3. CMS Requirement:	☒ Rule ☐ Other
4. Monitor Information... Manufacturer: **Thermal Environmental Instruments, Inc.** Model Number: **N/A**	Serial Number: **N/A**
5. Installation Date: **Dec 2000**	6. Performance Specification Test Date:
7. Continuous Monitor Comment: **Rule 62-296.404(5), F.A.C. Monitor information describes equipment in operation. Georgia-Pacific reserves the right to replace this equipment as maintenance.**	

Continuous Monitoring System: Continuous Monitor **2** of **2**

1. Parameter Code: **O2**	2. Pollutant(s):
3. CMS Requirement:	☒ Rule ☐ Other
4. Monitor Information... Manufacturer: **Thermal Environmental Instrument, Inc.** Model Number: **320B**	Serial Number: **N/A**
5. Installation Date: **Dec 2000**	6. Performance Specification Test Date:
7. Continuous Monitor Comment: **Rule 62-296.404(5)(a), F.A.C. Monitor information describes equipment in operation. Georgia-Pacific reserves the right to replace this equipment as maintenance.**	

EMISSIONS UNIT INFORMATION
Section [1]
No. 4 Lime Kiln

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: GP-EU1-I1 ☐ Previously Submitted, Date _____

2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: GP-EU1-I2 ☐ Previously Submitted, Date _____

3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: GP-EU1-I3 ☐ Previously Submitted, Date _____

4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable (construction application)

5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable

6. Compliance Demonstration Reports/Records:
   ☐ Attached, Document ID: _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   ☐ Previously Submitted, Date: _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   ☐ To be Submitted, Date (if known): _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   ☒ Not Applicable
   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute:
   ☐ Attached, Document ID: _____ ☒ Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: _____ ☒ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Description of Stack Sampling Facilities: *(Required for proposed new stack sampling facilities only)* ☐ Attached, Document ID: _____ ☒ Not Applicable

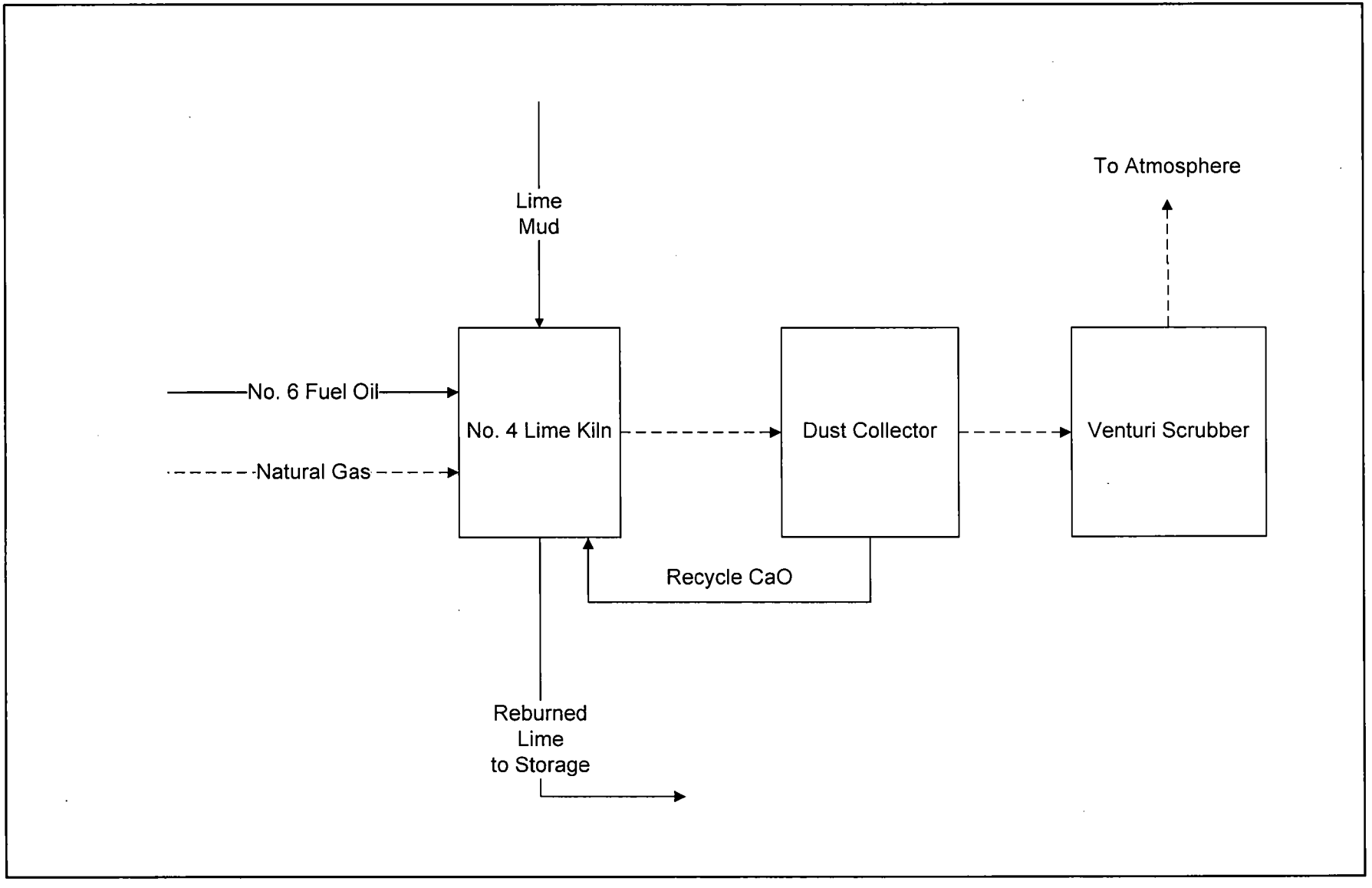
Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☐ Attached, Document ID: _____
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: _____ ☐ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: _____ ☐ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: _____ ☐ Not Applicable

Additional Requirements Comment

ATTACHMENT GP-EU1-I1

PROCESS FLOW DIAGRAM



Attachment GP-EU1-I1
No. 4 Lime Kiln Flow Diagram
Georgia-Pacific
Palatka, Florida

Process Flow Legend

Solid/Liquid ——→
Gas - - - →

Golder Associates

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ATTACHMENT GP-EU1-I2

FUEL ANALYSIS OR SPECIFICATIONS

ATTACHMENT GP-EU1-I2

LIME KILN
FUEL ANALYSIS

Fuel	Density (lb/gal)	Moisture (%)	Sulfur (Weight %)	Nitrogen (Weight %)	Ash (Weight %)	Heat Capacity
Residual Oil	8.33	--	2.35	0.08	0.067	145,000 – 150,000 Btu/gal 18,500 Btu/lb
Natural Gas	--	--	0.1	--	--	1,000 Btu/scf

Notes: scf = standard cubic feet
Residual oil may include on-spec used oil

ATTACHMENT GP-EU3-I3

DETAILED DESCRIPTION OF CONTROL EQUIPMENT

ATTACHMENT GP-EU1-I3
DETAILED DESCRIPTION OF CONTROL EQUIPMENT

CONTROL EQUIPMENT PARAMETERS
NO. 4 LIME KILN

Manufacturer	Zurn	
Control Device	Venturi Scrubber	
Date of Installation	1975	
Inlet Gas Flow Rate (Maximum)	54,200	dscfm @ 10% O_2
Outlet Gas Temp	164	°F
Pressure Drop Across Device (Minimum) [a]	26	in. H_2O
Scrubber Media	water	
Scrubber Liquor Flow Rate (Minimum) [a]		
Tangential Flow	634	gpm
Maximum Permitted Particulate Emission Rate [b]	0.55	lb/ton LMS
Maximum Permitted Lime Mud Solids Input Rate [b]	41.5	TPH LMS

[a] Based on CAM Plan indicator ranges.
[b] Based on Permit No. 1070005-064-AV.

Golder Associates

PART B

Table of Contents

List of Tables

1.0 INTRODUCTION

Georgia-Pacific Consumer Operations LLC (GP) operates a Kraft pulp and paper mill located in Palatka, Putnam County, Florida. The processes and systems at the Palatka mill include woodyard operations, pulp mill operations, chemical recovery processes, recausticizing processes, bleaching operations, utility operations, papermaking operations, and product converting systems. The Palatka mill is currently operating under Title V Operating Permit No. 1070005-064-AV, issued by the Florida Department of Environmental Protection (FDEP) on December 24, 2006, and revised January 4, 2010.

GP currently operates the No. 4 Lime Kiln as part of the recausticizing operations at the Palatka Mill. The No. 4 Lime Kiln currently is designed and permitted to burn No. 6 fuel oil to convert lime mud ($CaCO_3$) into reburned lime (calcium oxide, or CaO). GP is proposing to implement the following changes in the No. 4 Lime Kiln:

1. Replace the current No. 6 fuel oil burner in the No. 4 Lime Kiln with a multi-fuel burner that is capable of firing both No. 6 fuel oil and natural gas, either alone or in combination. This will provide the ability for GP to respond to fluctuations in fuel prices, and to burn the most economical fuel available. The new burner will be rated at a nominal capacity of 130 MMBtu/hr, which is smaller than the existing 140 MMBtu/hr burner (nominal capacity). As a result, the new burner will result in a slight decrease in the maximum heat input capacity to the kiln. Additionally, the new burner will not result in any increase in the processing rate through the kiln. Further, the current nitrogen oxides (NO_x) emission limit for the kiln will be reduced from 140 to 125 parts per million by volume, dry basis (ppmvd) corrected to 10% oxygen (O_2).
2. Replace the induced draft (ID) fan and primary air fan serving the No. 4 Lime Kiln. The current ID fan is not rated to withstand the higher exit temperatures resulting from natural gas firing and will be replaced with a unit of the same capacity, but with the required thermal rating. Neither of these replacements will increase the capacity of the No. 4 Lime Kiln, or result in an increase in emissions of any regulated pollutant.

The GP Palatka mill is an existing major source under the prevention of significant deterioration (PSD) new source review (NSR) regulations. GP has performed a PSD applicability analysis for the burner replacement project using the "baseline actual-to-projected actual" emission comparison allowed under Rule 62-212.400(2)(a)1 of the Florida Administrative Code (F.A.C.). Based on this comparison, emission increases due to the project are predicted for some pollutants; however, all emission increases are less than the PSD significant emission rates. Therefore, the project will not trigger PSD new source review under federal and state air regulations.

A more detailed description of the proposed project is presented in Section 2.0. Preconstruction review requirements are discussed in Section 3.0, and air emission estimates and the PSD applicability analysis of the project are presented in Section 4.0.

2.0 PROJECT DESCRIPTION

2.1 Existing Operations

The No. 4 Lime Kiln [Emissions Unit Identification (EU ID) No. 017] recalcines spent lime cake (calcium carbonate, $CaCO_3$) to produce quicklime (CaO), which in turn is used to convert green liquor to white liquor. The white liquor is used in the batch digesters where virgin wood chips are converted to pulp.

The No. 4 Lime Kiln is currently limited to a maximum input processing rate of 41.5 tons per hour (TPH) of lime mud solids (LMS) as a 24-hour average, based on Condition III.D.1. of Permit No. 1070005-064-AV. This LMS input rate corresponds to a maximum production rate of 19.4 TPH of CaO out of the kiln. At the permitted LMS input rate, the maximum design flue gas flow rate is 54,200 dry standard cubic feet per minute corrected to 10 percent oxygen (dscfm @ 10% O_2). The kiln typically operates in the range of 4 to 6 percent oxygen.

The kiln is permitted to burn No. 6 fuel oil with a maximum sulfur content of 2.35 percent by weight. On-specification used oil may be blended with the No. 6 fuel oil and fired at a rate of no more than 10 percent of the total fuel burned in the kiln. Natural gas is authorized as a startup and alternate fuel; however, natural gas has only been burned in the kiln as a startup fuel (as a pilot flame for the oil burner).

The permitted maximum heat input rate to the kiln is 140 million British thermal units per hour (MMBtu/hr), based on firing a maximum of 933 gallons per hour (gal/hr) of residual oil with a heating value of 150,000 British thermal units per gallon (Btu/gal). The Palatka Mill recently discovered that this permitted heat input rate is actually the nominal capacity rather than the maximum rated capacity. The maximum rated capacity of the existing burner is actually 150 MMBtu/hr. However, the current fuel usage limits were based on the permitted capacity of 140 MMBtu/hr and the Mill has maintained compliance with all such limits.

Particulate matter (PM) emissions from the No. 4 Lime Kiln are controlled by a wet venturi scrubber. The No. 4 Lime Kiln is limited to the following emission rates:

- PM – 0.55 pound per ton (lb/ton) LMS input; 22.9 pounds per hour (lb/hr)[1]
- Total reduced sulfur (TRS) – 25.1 tons per year (TPY), rolling 12-month average
- Sulfur dioxide (SO_2) – 16.9 ppmvd @ 10% O_2; 9.1 lb/hr
- Nitrogen oxides (NO_x) – 140 ppmvd @ 10% O_2; 54.2 lb/hr
- Carbon monoxide (CO) – 69 ppmvd @ 10% O_2; 16.3 lb/hr
- Volatile organic compounds (VOCs) – 70.0 ppmvd @ 10% O_2; 9.4 lb/hr

[1] PM emission limit is 22.9 lb/hr, but actual emissions calculation of 0.55 lb/ton LMS x 41.5 TPH LMS results in hourly PM emissions of 22.825 lb/hr.

The No. 4 Lime Kiln was originally constructed in 1975, with startup in 1976. In 2004, the lime kiln burner was replaced. The "hot end" of the kiln shell and all of the coolers were replaced in 2007; however, the replacement was a maintenance project and did not alter the basic operation of the kiln, or affect production rates or pollutant emission rates. In 2009, a dual orifice impingement plate scrubber and chevron mist eliminator were permitted to be added to the existing venturi scrubber system. However, due to funding considerations, this project was not implemented.

The No. 4 Lime Kiln has a continuous emissions monitoring system (CEMS) for TRS emissions. In addition, annual stack testing is required for PM, SO_2, NO_x, CO, and VOC emissions. The emissions unit is subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) contained in 40 CFR Part 63, Subpart MM. The NESHAP regulates PM emissions from lime kilns.

2.2 Proposed Operations

In this application, GP is proposing to implement the following changes in the No. 4 Lime Kiln:

1. Replace the current No. 6 fuel oil burner with a burner that is capable of firing No. 6 fuel oil alone, natural gas alone, or a combination of No. 6 fuel oil and natural gas during normal operation.
2. Replace the ID fan and primary air fan.

2.2.1 Burner Replacement

GP is requesting the authorization to replace the current No. 6 fuel oil burner with a burner that is capable of firing No. 6 fuel oil alone, natural gas alone, or a combination of No. 6 fuel oil and natural gas during normal operation. The maximum design heat input rate of the new burner will be 130 MMBtu/hr on either fuel or both fuels in combination. The new burner will be designed to accommodate the permitted LMS input rate of 41.5 TPH.

The maximum No. 6 fuel oil burning rate of the new burner will be 867 gal/hr, corresponding to a heat input rate of 130 MMBtu/hr. The maximum natural gas firing rate will be 130,000 standard cubic feet per hour (scfh), assuming a heat content of natural gas of 1,000 Btu/scf.

When burning No. 6 fuel oil in the new burner, no change in kiln exhaust gas flow rate is expected. However, when burning natural gas, the new burner will result in an increase in the actual exhaust gas flow rate of approximately 10 percent. The maximum design exhaust gas flow rate for the kiln of 54,200 dscfm @ 10% O_2 will not change as a result of the project.

No changes will be made to the existing air pollution control equipment serving the kiln.

2.2.2 *Fan Replacement*

GP is also proposing to replace the ID fan and primary air fan serving the No. 4 Lime Kiln. The current ID fan is not rated to withstand the higher exit temperatures resulting from natural gas firing and will be replaced with a unit of the same capacity, but with the required thermal rating. The primary air fan may be designed to a somewhat higher capacity to provide greater static pressure for gas combustion, which will be determined during the final project engineering and design work. The replacement of these fans will not increase the capacity of the No. 4 Lime Kiln, or result in an increase in emissions of any regulated pollutant.

3.0 AIR QUALITY REVIEW REQUIREMENTS

3.1 PSD Review Requirements

The Palatka Mill is located in an area of Florida that is in attainment with the National Ambient Air Quality Standards (NAAQS) for all regulated pollutants. Therefore, the proposed project is being evaluated under the PSD portion of the New Source Review (NSR) permitting program. A PSD review is used to determine whether significant air quality deterioration will result from a new major facility or a major modification at an existing facility. The Palatka Mill is considered to be an existing major stationary facility because potential emissions of at least one PSD-regulated pollutant exceed 100 TPY (for example, potential NO_x emissions currently exceed 100 TPY). Therefore, PSD review is required for any pollutant for which the net increase in emissions due to the modification is greater than the PSD significant emission rate (SER).

On January 2, 2011, greenhouse gas (GHG) emissions became subject to regulation under the Clean Air Act (CAA), triggering the need to evaluate GHG emissions under the PSD permitting program. The United States Environmental Protection Agency (U.S. EPA) is currently implementing GHG PSD permitting in the state of Florida, while FDEP maintains the permitting responsibility for all other regulated pollutants. Therefore, PSD permitting is addressed separately for GHGs and all other regulated pollutants in this section.

3.1.1 Florida DEP PSD Review Requirements for Non-Greenhouse Gas Emissions

Federal PSD requirements are contained in Title 40, Section 52.21 of the Code of Federal Regulations (40 CFR 52.21), Prevention of Significant Deterioration of Air Quality. The FDEP has adopted PSD regulations that are equivalent to the federal PSD regulations for all regulated pollutants except GHGs [Rule 62-212.400, Florida Administrative Code (F.A.C.)]. For an existing major stationary source for which a modification is proposed, the modification is subject to PSD review if it causes two types of emissions increases – a significant emissions increase and a significant net emissions increase. In the first step, emission increases from the project itself are computed and compared to the PSD SERs. If the increases are less than those levels, then no further analysis is necessary and PSD permitting is not required. If the increases for the project itself exceed those levels, then the second step involves additional analysis in order to determine if there will be a significant net emissions increase. The relevant PSD SERs are listed in Table 3-1.

The determination of whether a significant emissions increase will occur is based on comparison of "baseline actual emissions" to "projected actual emissions" for all emissions units affected by the proposed project. "Baseline actual emissions" and "projected actual emissions" are defined in Rules 62-210.200(36) and (244), F.A.C. "Baseline actual emissions" for an existing emissions unit other than an electric utility steam generating unit, is the average rate, in TPY, at which the emissions unit actually emitted the

pollutant during any consecutive 24-month period, selected by the owner/operator, within the 10-year period immediately preceding the date a complete permit application is received by FDEP. The average rate includes fugitive emissions to the extent quantifiable and emissions associated with startups and shutdowns. The average rate must be adjusted downward to exclude:

- Any non-compliant emissions that occurred while the emissions units were operating above an emissions limitation that was legally enforceable during the consecutive 24-month period
- Any emissions that would have exceeded an emission limitation with which the major stationary source must currently comply, had such major stationary source been required to comply with such limitations during the consecutive 24-month period

For projects involving multiple emissions units, only one consecutive 24-month period can be used for all the emissions units being changed. However, a different 24-month period can be used for each PSD pollutant.

Rule 62-210.370, F.A.C., establishes the methodology for computing baseline actual emissions and net emissions increases. In general, this rule sets forth a hierarchy of emission estimating methods, of which the most accurate method is to be used. CEMS are generally recognized as the most accurate method, followed by mass balance calculations, followed by emission factors. If stack test data are used, the emission factor must be based on the average emissions per unit of input, output, or gas volume, whichever is appropriate, of all valid tests conducted during at least a 5-year period encompassing the period over which the emissions are computed, provided all stack tests used shall represent the same operational and physical configuration of the unit.

"Projected actual emissions" is the highest annual rate, in TPY, at which an existing emissions unit is projected to emit a regulated air pollutant in any one of the 5 years following the date the unit resumes regular operation after the project, or in any one of the 10 years following that date, if the project increases the emissions unit's potential to emit that regulated air pollutant, and full utilization of the unit would result in a significant emissions increase or a significant net emissions increase at the facility.

In determining the projected actual emissions, the facility must consider all relevant information, including historical operating data, the company's own representations, the company's expected business activity, the company's filings with the state or federal regulatory authorities, and compliance plans or orders. Fugitive emissions, to the extent quantifiable, and emissions associated with startups and shutdowns shall be considered.

The projected actual emissions must exclude that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions, and that are also unrelated to the particular project, including any increased utilization due to demand growth (this is referred to as the "demand growth exclusion"). The

U.S. Environmental Protection Agency's (EPA's) final PSD rule revisions, promulgated on December 31, 2002, state:

> *That is, under today's new provisions for non-routine physical or operational changes to existing emissions units, rather than basing a unit's post-change emissions on its PTE, you may project an annual rate, in TPY, that reflects the maximum annual emissions rate that will occur during any one of the 5 years immediately after the physical or operational change. ...This projection of the unit's annual emissions rate following the change is defined as the "projected actual emissions", and will be based on your maximum annual rate in tons per year at which you are projected to emit a regulated NSR pollutant, less any amount of emissions that could have been accommodated during the selected 24-month baseline period and is not related to the change. Accordingly, you will calculate the unit's projected actual emissions as the product of: (1) The hourly emissions rate, which is based on the operational capabilities following the change(s), taking into account legally enforceable restrictions that could affect the hourly emissions rate following the change(s); and (2) the projected level of utilization, which is based on both the emissions unit's historical annual utilization rate and available information regarding the emissions units' likely post-change capacity utilization. ...From the initial calculation, you may then make the appropriate adjustment to subtract out any portion of the emissions increase that could have been accommodated during the unit's 24-month baseline period and is unrelated to the change. [Federal Register, Vol. 67, pg. 80196]*
>
> *Consequently, under today's new rules, when a projected increase in equipment utilization is in response to a factor such as the growth in market demand, you may subtract the emission increases from the unit's projected actual emissions if: (1) The unit could have achieved the necessary level of utilization during the consecutive 24-month period you selected to establish the baseline actual emission; and (2) the increase is not related to the physical or operational change(s) made to the unit. [Federal Register, Vol. 67, pg. 80203]*

Further explanation was provided in the preamble to EPA's proposed PSD rule revisions on September 14, 2006:

> *That is, the source can emit up to its current maximum capacity without triggering major NSR under the actual-to-projected-actual test, as long as the increase is unrelated to the change. [Federal Register, Vol. 71, pg. 54237]*
>
> *Post-change emissions are generally projected using the emissions unit's maximum annual rate, in tons per year, at which it is expected to emit a regulated NSR pollutant within 5 years following a change, less any amount of emissions that the unit could have accommodated during the selected 24-month baseline period and that are unrelated to the change. This final "projected actual" value, in tons per year, is the value you compare to the "baseline actual emissions" in order to determine...whether the proposed project will result in a "significant" emissions increase, as defined in the first step of the calculation. [Federal Register, Vol. 71, pg. 54238]*

If the proposed modification results in a significant emissions increase for any PSD pollutant, then all contemporaneous increases or decreases in emissions of that pollutant that have occurred at the facility in the last 5 years must also be considered to determine if a significant net emissions increase has occurred.

A PSD applicability analysis was conducted to demonstrate that the proposed project would not trigger PSD review under FDEP PSD rules. The analysis is presented in Section 4.0.

3.1.2 U.S. EPA PSD Review Requirements for Greenhouse Gas Emissions

On December 15, 2009, EPA issued an endangerment finding related to GHGs declaring that the combination of six GHGs [carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6)] endangers both the public health and welfare of current and future generations.[2] Specifically, EPA found that the combined emissions of these GHGs from new motor vehicles endangers public health and welfare clearing the way for the regulation of GHGs from new motor vehicles. EPA finalized such regulations on April 1, 2010 in a joint rulemaking with the National Highway Traffic Safety Administration (NHTSA) (the "Light-Duty Vehicle Rule") making the collection of six GHGs "subject to regulation" under the Clean Air Act (CAA).[3]

On April 2, 2010, EPA finalized its reconsideration of the memorandum issued by previous EPA Administrator Stephen Johnson titled, "EPA's Interpretation of Regulations that Determine Pollutants Covered by Federal Prevention of Significant Deterioration (PSD) Permit Program"[4] also known as the "PSD Interpretive Memo". In the reconsideration, EPA decided to continue to interpret the term "subject to regulation" to include each pollutant subject to either a provision in the CAA or regulation adopted by EPA under the CAA that requires actual control of emissions of that pollutant.[5] As a result of this interpretation, GHGs became subject to CAA permitting requirements under the NSR program, specifically the PSD portion of the NSR program, on January 2, 2011, which was the date the first control requirements in the LDV Rule took effect for GHGs.

In an attempt to reduce the permitting burden associated with triggering NSR and Title V for GHGs, EPA finalized the PSD Tailoring Rule on June 3, 2010 to limit applicability of CAA requirements to large stationary sources of GHG emissions.[6] In the final rule, EPA creates multiple steps to implement the PSD Tailoring Rule, the first of which began January 2, 2011 (when the LDV Rule took effect) and ends on June 30, 2011, and applies to "anyway sources" and "anyway modifications" that would be subject to PSD "anyway" based on emissions of pollutants other than GHGs. The No. 4 Lime Kiln burner replacement project is not subject to PSD permitting for any non-GHG pollutant as demonstrated in Section 4 of this permit application; therefore, Step 1 of the PSD Tailoring Rule does not apply to the project.

Step 2 of the PSD Tailoring Rule begins July 1, 2011 and requires that GHG emissions associated with each project be evaluated for PSD applicability regardless of the level of criteria pollutant emission rate

[2] 74 Fed Reg 66496 (December 15, 2009).
[3] 75 Fed Reg 25324 (May 7, 2010).
[4] Memorandum issued December 18, 2008 and noticed at 73 FR 80300 (December 31, 2008).
[5] 75 Fed Reg 17004 (April 2, 2010)
[6] 75 Fed Reg 31514 (June 3, 2010).

increases. While the minor NSR permit for the No. 4 Lime Kiln burner replacement project is anticipated to be received prior to July 1, 2011, actual construction of the project will not commence until the third or fourth quarter of 2011, after the date GHG emissions are to be analyzed for permitting in and of themselves; therefore, the Palatka Mill must analyze GHG emissions under Step 2 of the PSD Tailoring Rule. In both Step 1 and Step 2 of the Tailoring Rule, GHG emission increases are compared to a significant emission rate (SER) of 75,000 tons of carbon dioxide equivalents (CO_2e), and total mass-based GHG emission increases must also be greater than zero to trigger PSD permitting for GHGs. A PSD applicability analysis was conducted to demonstrate that the proposed project would not trigger PSD review under the PSD Tailoring Rule. The analysis is presented in Section 4.0.

3.2 New Source Performance Standards and NESHAP Applicability

There are no issues regarding the applicability of New Source Performance Standards, Subpart BB (40 CFR 60, Subpart BB), and National Emission Standards for Hazardous Air Pollutants, Subpart MM (40 CFR 63, Subpart MM) to the No. 4 Lime Kiln. The No. 4 Lime Kiln was constructed prior to the NSPS Subpart BB applicability date of September 24, 1976, and has not been modified or reconstructed, as defined under the NSPS rules (40 CFR60.14(a)), since it was originally constructed. The proposed project to replace the oil-fired burner with a natural gas and oil burner will not result in a "modification" to the No. 4 Lime Kiln, as there will not be an increase in the maximum hourly emission rate of any of the regulated pollutants under NSPS Subpart BB as described below:

The NSPS Subpart BB regulates PM and TRS emissions. The existing burner in the No. 4 Lime Kiln has a maximum design rating of 150 MMBtu/hr firing solely No. 6 fuel oil, and a maximum hourly particulate matter emission rate of 22.9 lb/hr as established in Section 3.C.9 of Permit No. PSD-FL-380. The proposed burner has a maximum design rating of 130 MMBtu/hr, resulting in a lower maximum hourly PM emission rate when firing No. 6 fuel oil. When the burner is firing natural gas, the maximum hourly emission rate will be lower than the existing burner firing No. 6 fuel oil since PM emissions from the burning of natural gas are much lower than those resulting from burning No. 6 fuel oil. The Mill is not requesting any changes in the maximum hourly PM emission rate of 22.9 lbs/hr for the No. 4 Lime Kiln. Similarly, no changes in TRS will occur due to natural gas firing versus No. 6 fuel oil firing in the kiln.

Additionally, the proposed project will not result in "reconstruction" of the No. 4 Lime Kiln, as defined under the NSPS rules (40 CFR 60.15(b)), as the project cost of approximately $3.3 million is well below 50 percent of the fixed capital cost to replace the lime kiln with an entirely new unit ($30 - $40 million). Therefore, as described above, the No. 4 Lime Kiln will not become subject to the NSPS Subpart B standard as a result of the proposed project.

The No. 4 Lime Kiln is already subject to the NESHAP Subpart MM standards, and will continue to comply with all applicable emission limits after the replacement of the kiln burner.

4.0 AIR EMISSIONS

4.1 Baseline Actual Emissions

The methodology utilized in determining baseline actual annual average emissions for the No. 4 Lime Kiln and the results of the determination are presented in this section. Based on Florida's PSD reform rules, the baseline actual emissions may be based on any consecutive 24-month period out of the last 10 years prior to submitting a complete application. Since complete data are not yet available for 2010, the baseline actual emissions were calculated based on a consecutive 24-month period out of the last 9 years (2002 – 2009). Actual emissions for each of these years were determined based on operating data, available stack test data, and emission factors. For each pollutant, the consecutive 2-year period with the highest average annual (TPY) emissions was selected as the baseline actual emissions for the No. 4 Lime Kiln. The 2-year periods used for each pollutant are as follows:

Pollutant	2-Year Average Baseline
Sulfur Dioxide – SO_2	2005 to 2006
Nitrogen Oxides – NO_x	2005 to 2006
Carbon Monoxide – CO	2005 to 2006
Particulate Matter – PM	2005 to 2006
Particulate Matter under 10 microns in diameter – PM_{10}	2005 to 2006
Particulate Matter under 2.5 microns in diameter – $PM_{2.5}$	2005 to 2006
Volatile Organic Compounds – VOCs	2005 to 2006
Total Reduced Sulfur – TRS	2005 to 2006
Sulfuric Acid Mist – SAM	2005 to 2006
Lead – Pb	2005 to 2006
Mercury – Hg	2005 to 2006
Greenhouse Gases - GHGs	2004 to 2005

The baseline actual emissions for the No. 4 Lime Kiln may differ from the annual emissions shown in the Annual Operating Reports (AORs) submitted to FDEP by GP, for the reasons described below.

The emission factors used for determining the baseline actual emissions are shown in Table 4-1. The Florida rules require that, if stack test data are used, the emission factor shall be based on the average emissions per unit of input, output, or gas volume, whichever is appropriate, of all valid tests conducted during at least a 5-year period encompassing the period over which the emissions are computed, provided all stack tests used shall represent the same operational and physical configuration of the unit. To determine the operational and physical configuration of the No. 4 Lime Kiln for each year during the past 10 years, the permitting files were researched. It was concluded that the No. 4 Lime Kiln has had the same operational/physical configuration over all the years for which stack tests are used to determine the baseline emissions (2002 – 2009). Stack test data for the No. 4 Lime Kiln used to determine baseline actual emissions are presented in Table 4-2. For each annual testing event, the stack test data were used to calculate an emission factor in terms of pound of pollutant per ton of LMS processed. Factors

from every year analyzed for baseline emissions (2002 – 2009) were averaged to determine the appropriate baseline emission factor that was then used to calculate baseline actual emissions.

The resulting baseline actual emissions for each pollutant for each year, based on the calculated average emission factors, are presented in Tables 4-3 through 4-5. The highest 2-year average for each pollutant represents the baseline actual emissions (see Table 4-5). The following sections describe in more detail the development of the baseline actual emissions for each PSD pollutant.

4.1.1 Sulfur Dioxide

Baseline actual SO_2 emissions were calculated based on annual SO_2 compliance test data (see Table 4-2). The compliance test averages, in lb/ton LMS input, were determined for each year. The current maximum permitted SO_2 emission rate for the No. 4 Lime Kiln, as required by Permit No. 1070005-064-AV, is 9.1 lb/hr and 16.9 ppmvd @ 10% O_2. All stack tests resulted in SO_2 emission rates below 9.1 lb/hr and 16.9 ppmvd @ 10% O_2; therefore, no adjustments were necessary to the reported emission rates. Using the SO_2 emission factors in lb/ton LMS, an overall average emission factor was determined from the annual lb/ton emission factors from 2002 through 2009 (see Table 4-2).

Using the annual LMS input rate for the No. 4 Lime Kiln for each year and the overall average emission factor, the annual emissions for each year were determined (see Table 4-3). The 2-year annual average SO_2 emissions were then calculated (see Table 4-4) and the highest 2-year average SO_2 emissions were selected as the baseline actual emissions (see Table 4-5).

4.1.2 Nitrogen Oxides

Baseline actual NO_x emissions were calculated based on annual NO_x compliance test data (see Table 4-2). The compliance test averages, in lb/ton LMS, were determined for each year. The current maximum permitted NO_x emission rate for the No. 4 Lime Kiln, as required by Permit No. 1070005-064-AV, is 54.2 lb/hr and 140.0 ppmvd @ 10% O_2. All stack tests resulted in NO_x emission rates below 54.2 lb/hr and 140.0 ppmvd @ 10% O_2; therefore, no adjustments were necessary to the reported emission rates. Using the NO_x emission factors in lb/ton LMS, an overall average emission factor was determined from the annual lb/ton emission factors from 2002 through 2009 (see Table 4-2).

Using the annual LMS input rate for the No. 4 Lime Kiln for each year and the overall average emission factor, the annual emissions for each year were determined (see Table 4-3). The 2-year annual average NO_x emissions were then calculated (see Table 4-4) and the highest 2-year average NO_x emissions were selected as the baseline actual emissions (see Table 4-5).

4.1.3 Carbon Monoxide

Baseline actual CO emissions were calculated based on annual CO compliance test data (see Table 4-2). The compliance test averages, in lb/ton LMS, were determined for each year. The current maximum

permitted CO emission rate for the No. 4 Lime Kiln, as required by Permit No. 1070005-064-AV, is 16.3 lb/hr and 69 ppmvd @ 10% O_2. All stack tests resulted in CO emission rates below 16.3 lb/hr and 69 ppmvd @ 10% O_2; therefore, no adjustments were necessary to the reported emission rates. Using the CO emission factors in lb/ton LMS, an overall average emission factor was determined from the annual lb/ton emission factors from 2002 through 2009 (see Table 4-2).

Using the annual LMS input rate for the No. 4 Lime Kiln for each year and the overall average emission factor, the annual emissions for each year were determined (see Table 4-3). The 2-year annual average CO emissions were then calculated (see Table 4-4) and the highest 2-year average CO emissions were selected as the baseline actual emissions (see Table 4-5).

4.1.4 Particulate Matter/PM_{10}/$PM_{2.5}$

Baseline actual PM emissions were calculated based on annual PM compliance test data (see Table 4-2). The compliance test averages, in lb/ton LMS, were determined for each year. The current maximum permitted PM emission rate for the No. 4 Lime Kiln, as required by Permit No. 1070005-064-AV, is 22.9 lb/hr and 0.55 lb/ton LMS. All stack tests resulted in PM emission rates below 22.9 lb/hr and 0.55 lb/ton LMS; therefore, no adjustments were necessary to the reported emission rates. Using the PM emissions in lb/ton LMS, an overall average emission factor was determined from the annual lb/ton emission factors from 2002 through 2009 (see Table 4-2). Using the annual LMS input rate for the No. 4 Lime Kiln, the annual emissions for each year were determined (see Table 4-3).

PM_{10} and $PM_{2.5}$ emission factors were based on 84.7 percent and 76.8 percent of PM emissions, respectively. These emission factors are based on National Council for Air and Stream Improvement (NCASI) Corporate Correspondence No. 06-021 for lime kilns with wet particulate control devices. These factors were applied to the PM emission factor for each year to obtain PM_{10} and $PM_{2.5}$ emission factors (see Table 4-1).

These emission factors coupled with the annual LMS input rates were used to calculate annual PM, PM_{10}, and $PM_{2.5}$ emissions (see Table 4-3). The 2-year annual average PM, PM_{10}, and $PM_{2.5}$ emissions were then calculated (see Table 4-4) and the highest 2-year average PM, PM_{10}, and $PM_{2.5}$ emissions were selected as the baseline actual emissions (see Table 4-5).

4.1.5 Volatile Organic Compounds

Baseline actual VOC emissions were calculated based on annual VOC compliance test data (see Table 4-2). The compliance test averages, in lb/ton LMS, were determined for each year. The current maximum permitted VOC emission rate for the No. 4 Lime Kiln, as required by Permit No. 1070005-064-AV, is 9.4 lb/hr and 70.0 ppmvd @ 10% O_2. All stack tests resulted in VOC emission rates below 9.4 lb/hr and 70.0 ppmvd @ 10% O_2; therefore, no adjustments were necessary to the reported emission rates. Using

the VOC emission factors in lb/ton LMS, an overall average emission factor was determined from the annual lb/ton emission factors from 2002 through 2009 (see Table 4-2).

Using the annual LMS input rate for the No. 4 Lime Kiln for each year and the overall average emission factor, the annual emissions for each year were determined (see Table 4-3). The 2-year annual average VOC emissions were then calculated (see Table 4-4) and the highest 2-year average VOC emissions were selected as the baseline actual emissions (see Table 4-5).

4.1.6 Total Reduced Sulfur

Baseline actual TRS emissions were calculated based on annual TRS compliance test data conducted over the 10-year period, as well as CEMS data (see Table 4-2).

CEMS data for TRS were not available for years prior to 2003; therefore, annual compliance test data from 1998 – 2002 were used to determine an appropriate emission factor for 2002. Using the LMS input rates during the annual compliance tests, lb/ton LMS emission factors were determined for each year. Using the TRS emissions in lb/ton LMS, an average of the lb/ton LMS emission for 1998 – 2002 was determined in order to obtain the minimum 5-year average (see Table 4-2).

TRS CEMS data were available for the years 2003 through 2009. A lb/ton LMS TRS emission factor for each year was determined by using the annual average TRS CEMS data for that year, and the flue gas flow rate and LMS input rate during that year's compliance test.

The current maximum permitted TRS emission rate for the No. 4 Lime Kiln, as required by Permit No. 1070005-064-AV, is 25.1 TPY based on a 12-month rolling CEMS total. All stack tests and CEMS data resulted in TRS emission rates below the permit limit; therefore, no adjustments were necessary.

Using the annual LMS input rate for the No. 4 Lime Kiln for each year and the emission factor, the annual emissions for each year were determined (see Table 4-3). The 2-year annual average TRS emissions were then calculated (see Table 4-4) and the highest 2-year average TRS emissions were selected as the baseline actual emissions (see Table 4-5).

4.1.7 Sulfuric Acid Mist

SAM emissions can be estimated from a method similar to fuel oil combustion where the ratio of sulfur trioxide (SO_3) to SO_2 emissions from AP-42, Table 1.3-1 (5.7/157) is used, and then multiplied by the ratio of the molecular weight of sulfuric acid (H_2SO_4) to SO_3 (98/80). The resulting SAM emission factor is approximately 4.45 percent of the SO_2 emission factor (Table 4-1).

Using the annual SO_2 emission factors and the 4.45 percent factor, the annual SAM emissions for each year were determined (refer to Table 4-1). The 2-year annual average SAM emissions were then

calculated (see Table 4-4) and the highest 2-year average SAM emissions were selected as the baseline actual emissions (see Table 4-5).

4.1.8 Lead

The Pb emission factor used was $1.14x10^{-4}$ lb/ton LMS from the NCASI Technical Bulletin No. 973, Table 4.27, median value, for lime kilns with wet scrubbers (see Table 4-1 and Appendix A). The NCASI emission factors are given in units of pounds per ton of lime (lb/ton CaO) produced. The lb/ton CaO emission factor was multiplied by the ratio of 19.4 tons CaO output to 41.5 tons LMS input in order to obtain the lb/ton LMS input emission factor.

These emission factors, coupled with the annual LMS input rates, were used to calculate annual Pb emissions (see Table 4-1). The 2-year annual average Pb emissions were then calculated (see Table 4-4) and the highest 2-year average Pb emissions were selected as the baseline actual emissions (see Table 4-5).

4.1.9 Mercury

The Hg emission factor used was $1.47x10^{-6}$ lb/ton LMS from the NCASI Technical Bulletin No. 973, Table 4.27, median value, for lime kilns with wet scrubbers (see Table 4-1 and Appendix A). The NCASI emission factors are given in units of lb/ton CaO produced. The lb/ton CaO emission factor was multiplied by the ratio of 19.4 tons CaO output to 41.5 tons LMS input in order to obtain the lb/ton LMS emission factor.

These emission factors, coupled with the annual LMS input rates, were used to calculate annual Hg emissions (see Table 4-1). The 2-year annual average Hg emissions were then calculated (see Table 4-4) and the highest 2-year average Hg emissions were selected as the baseline actual emissions (see Table 4-5).

4.1.10 Greenhouse Gases

The greenhouse gases (GHGs) emitted by the No. 4 Lime Kiln consist of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Baseline actual GHG emissions from No. 4 Lime Kiln were determined using the annual No. 6 fuel oil usage rate and the GHG emission factors set forth in EPA's Mandatory Reporting Rule for GHGs (GHG MRR) in Subpart C, Table C-1 for CO_2, and Subpart AA, Table AA-2 for CH_4 and N_2O. Specifically, GHG emissions were estimated both on an individual GHG basis (*i.e.*, emissions of CO_2, CH_4, and N_2O) as well as in terms of total carbon dioxide equivalents (CO_2e), as determined by multiplying emissions of each GHG by its respective global warming potential (GWP).

Process-based CO_2 emissions also result from the lime kiln as the calcium carbonate lime mud solids ($CaCO_3$) is converted to lime (CaO), thereby liberating CO_2. These process CO_2 emissions are biogenic in nature because the carbon in the lime mud solids originated in the pulpwood; a fact recognized by EPA

in the annual inventory of U.S. GHG emissions and sinks. The GHG MRR also acknowledges the biogenic nature of process emissions from the lime kiln and includes such emissions in the emission factor for chemical recovery furnaces. As EPA has recently announced regulation of biogenic CO_2 emissions under the PSD permitting program will be deferred for three years, biogenic CO_2 emissions from the lime kiln process have not been considered in the emissions analysis, but would not alter the PSD applicability conclusion for GHGs as presented in Table 4-10.

4.2 Projected Actual Emissions

"Projected actual emissions" for the No. 4 Lime Kiln were developed considering the Mill's projected future operation of the recovery process based on expected business projections of future market conditions and the corresponding LMS input rate. The emission factors used to calculate the projected actual emissions for all pollutants, except NO_x, CO, and GHGs, were obtained by increasing the baseline actual emission factors, in lb/ton LMS, by 10 percent. This 10 percent increase corresponds to the projected actual increase in the flue gas flow rate when burning natural gas as a result of the burner replacement. No change in pollutant concentration or exhaust gas flow rate is expected when burning No. 6 fuel oil with the new burner.

Projected actual NO_X emissions are calculated using a vendor guaranteed parts per million (ppm) concentration for the new natural gas-fired burner. While a final burner manufacturer has not yet been selected, GP has received data on the range of emissions expected for the various designs being considered. The pollutant concentration used to determine projected actual NO_X emissions, 125 ppmvd @ 10% O_2, will be the maximum guaranteed rate for the new burner. Projected actual CO emissions are based on the past BACT limit of 69 ppmvd @ 10% O_2, which will still be in effect after the burner replacement.

These pollutant concentrations were used in combination with the highest baseline flue gas flow rate (see Table 4-2) and the projected 10 percent increase in the actual flue gas flow rate to determine the projected hourly NO_x and CO emission rates (in lb/hr). The hourly emission rates were used along with the average historical LMS input rate (38.22 TPH; see Table 4-2) in order to determine the projected lb/ton LMS emission factors (see Table 4-6).

The operating factor for lime mud solids used to calculate the projected actual emissions for all pollutants except GHGs from the No. 4 Lime Kiln was based on the Mill's projection of the black liquor solids (BLS) processing rate for the 5-year period following the burner replacement, the typical conversion ratio of lime to BLS, and the typical conversion ratio of lime produced per ton of LMS input to the kiln. The resulting projected actual annual LMS input rate of 323,166 TPY LMS was used along with the projected actual emission factors described above to calculate the projected actual annual emissions (see Table 4-7).

For GHG emissions, the emission factors used to determine projected actual emissions are the same as the baseline emission factors and are shown in Table 4-6. The projected actual fossil fuel firing rate was based on projections by the Palatka mill of future LMS input and the energy required to convert LMS to CaO. Projected actual emissions of GHGs were determined using the worst case fuel firing scenario between burning No. 6 fuel oil and natural gas. As discussed in Section 4.1.10, biogenic emissions from the lime kiln have not been considered in the GHG PSD permitting analysis.

4.3 Emissions That Could Have Been Accommodated

According to Florida PSD regulations, the definition of "projected actual emissions" states the following:

> *In determining the projected actual emissions, the Department:*
>
> *(c) Shall exclude that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions and that are also unrelated to the particular project including any increased utilization due to product demand growth [Rule 62-210.200(244)(c), F.A.C.]*

To determine the emissions that the No. 4 Lime Kiln "could have accommodated" during the baseline period, the monthly LMS input rate and No. 6 fuel oil firing rate were evaluated during the baseline period. As shown in Section 4.1, the baseline period for GHGs was 2004 – 2005, and for all other pollutants was 2005 – 2006. The monthly LMS input and No. 6 fuel oil firing rates in the lime kiln during the baseline period are shown in Table 4-8. These monthly input rates were divided by the number of days in each month and then by 24 hours per day to determine the average hourly LMS input and No. 6 fuel oil firing rates for each month. The highest average hourly LMS input and No. 6 fuel oil firing rates were:

- LMS input rate (2005 – 2006): 39.226 TPH
- No. 6 fuel oil firing rate (2004 – 2005): 0.913×10^3 gal/hr

The No. 4 Lime Kiln operated for 7,688 hours in 2004; 8,198 hours in 2005; and 7,906 hours during 2006. The highest annual hours of operation during the baseline period are as follows:

- 2004 – 2005 Baseline: 8,198 hours per year (hr/yr)
- 2005 – 2006 Baseline: 8,198 hr/yr

The baseline hours of operation (8,198 hours per year) were used in combination with the highest average hourly LMS input rate and No. 6 fuel oil firing rates in order to determine the highest total annual LMS input rate and fuel oil firing rates that the No. 4 Lime Kiln could have accommodated during the baseline period. The resulting could have accommodated values are:

- Total annual LMS input rate: 321,572 TPY LMS input

- Total No. 6 fuel oil firing rate: $7,482.647 \times 10^3$ gal/yr

GP believes this annual LMS input rate can be used as a conservative approximation of that portion of the No. 4 Lime Kiln's projected LMS input rate that could have been accommodated during the 24-month baseline period, and could be accommodated in the future, separate and apart from the changes proposed in this application. The "could have accommodated" total annual No. 6 fuel oil firing rate shown above is higher than the projected actual fossil fuel firing rate, therefore the No. 6 fuel oil firing rate used to determine the emissions that could have been accommodated during the baseline period was reduced to the projected actual fossil fuel firing rate.

The amount of emissions required to be excluded under the definition of "projected actual emissions" provided above is difficult to assess, and the rules contain no specific guidance. The rule does not say, and GP is not attempting to claim, that the full amount of a unit's permit-allowable emissions can be excluded. There are, for example, practical operating reasons why a unit cannot or does not emit at its full permit-allowable rate. However, the rule does not set any limits on the excludable amount; therefore, it is reasonable to state that the excludable amount is the level of emissions that could reasonably and legally have been accommodated by the unit during the 24-month baseline period, before (in the absence of) the particular project. The rules clearly do not limit this excludable amount to the amount actually emitted (i.e., the highest demonstrated/documented level of emissions) during the 24-month baseline period. Rather, the rules state that an applicant must exclude that portion of any projected emissions increase that the unit "could" have emitted during the 24-month baseline period, before implementation of the project (i.e., if its ability or reason to emit at that level in the future is not related to the project).

GP believes the No. 4 Lime Kiln could have accommodated a higher LMS input rate during the 24-month baseline period had there been a higher product demand resulting in more LMS generation in the recovery process. However, this one-month period is being used as a convenient and conservative measure because it can be easily documented that this level of LMS input, in fact, occurred and was accommodated by the existing equipment in the absence of any factor related to the proposed project. In addition, this methodology for determining "could have accommodated" emissions has been reviewed and approved by the U.S. EPA.[7]

It should also be noted that future market conditions, entirely unrelated to the burner/fans replacement project, could result in additional product demand and, therefore, additional utilization of the recovery process and LMS generated. As such, the GP Palatka Mill is not limited to the projected actual LMS input rate for the No. 4 Lime Kiln, which is based on the best business and analysis of the future market. Similarly, the Palatka Mill is not limited to the high-monthly "could have accommodated" LMS input rate used in the PSD applicability analysis.

[7] Letter from Mr. Gregg Worley, Chief, Air Permits Section, Region 4, U.S. EPA to Mr. Mark Robinson, Plant Manager, Georgia-Pacific Wood Products LLC, dated March 18, 2010.

The annual "could have accommodated" LMS input rate and the baseline emission factors were used to determine the annual emissions that could have been accommodated during the baseline period (see Table 4-9). As stated above, since the burner/fan replacement will not affect LMS input rate, all "could have accommodated" emissions are unrelated to the project and, therefore, are excluded from projected actual emissions.

4.4 Records of Excluded Emissions

According to Florida PSD regulations, each applicant for an air construction permit for an emissions unit subject to this (permitting) rule shall provide the Department, at a minimum, the following information:

> *"the applicant shall also provide a record of the amount of excluded emissions, and an explanation as to why these emissions were excluded, for any projected actual emissions calculations that exclude that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions and that are unrelated to the particular project including any increased utilization due to product demand growth."*
> *[Rule 62-212.300(3)(a)1., F.A.C.]*

Therefore, the FDEP rules require that the applicant identify any emissions that have been excluded from the projected actual emissions due to demand growth. The emissions that can be excluded from the PSD applicability analysis due to growth in demand for the No. 4 Lime Kiln, and not due to the project, are a subset of the "could have accommodated" emissions and are determined by subtracting the baseline actual emissions (see Table 4-7) from the "could have accommodated" emissions (see Table 4-9). The amount of excluded emissions is identified in Table 4-10.

4.5 Effects on Other Emissions Units

No other emissions units at the Palatka Mill will be affected by this project. The purpose of the project is solely to allow the Mill the flexibility to burn natural gas or No. 6 fuel oil in the No. 4 Lime Kiln as opposed to solely No. 6 fuel oil, which is the case currently. No increase in emissions from other emissions units will result from the proposed modifications to the No. 4 Lime Kiln

4.6 PSD Review

The net increase in emissions due to the proposed burner replacement project is summarized in Table 4-10. As shown in Table 4-10, no emission increases exceed the PSD significant emissions rate. Therefore, PSD review does not apply to the proposed project.

TABLES

Table 3-1: PSD Significant Emission Rates and *De Minimis* Monitoring Concentrations

Pollutant	Regulated Under	Significant Emission Rate (TPY)	*De Minimis* Monitoring Concentration [a] ($\mu g/m^3$)
Sulfur Dioxide	NAAQS, NSPS	40	13, 24-hour
Nitrogen Dioxide	NAAQS, NSPS	40	14, annual
Carbon Monoxide	NAAQS, NSPS	100	575, 8-hour
Particulate Matter [PM(TSP)]	NSPS	25	NA
Particulate Matter (PM_{10})	NAAQS	15	10, 24-hour
Particulate Matter ($PM_{2.5}$) [b]	NAAQS	10, or	NA
	NAAQS	40 of SO_2, or	NA
	NAAQS	40 of NO_x	NA
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40	100 TPY [c]
Total Reduced Sulfur	NSPS	10	10, 1-hour
Reduced Sulfur Compounds	NSPS	10	10, 1-hour
Hydrogen Sulfide	NSPS	10	0.2, 1-hour
Sulfuric Acid Mist	NSPS	7	NM
Lead	NAAQS	0.6	0.1, 3-month
Mercury	NESHAP	0.1	0.25, 24-hour
Total Fluorides	NSPS	3	0.25, 24-hour

Note: Ambient monitoring requirements for any pollutants may be exempted if the impact of the increase is less than *de minimis* monitoring concentrations.

NA = not applicable
NM = no ambient measurement method established; therefore, no *de minimis* concentration has been established
$\mu g/m^3$ = micrograms per cubic meter

[a] Short-term concentrations are not to be exceeded

[b] Any emission rate of these pollutants.

[c] No *de minimis* concentration; an increase in VOC emissions of 100 TPY or more requires a monitoring analysis for ozone

Source: 40 CFR 52.21
Rule 62-212.400, F.A.C.

Table 4-1: Emission Factors Used to Determine Baseline Actual Annual Emissions (2002 - 2009)
No. 4 Lime Kiln, Georgia-Pacific, Palatka

Source Description	Operating Hours	Annual Process / Fuel Usage	Emission Factor Units	Pollutant Emission Factors													
				SO_2 [A]	NO_x [A]	CO [A]	PM [A]	PM_{10} [B]	$PM_{2.5}$ [B]	VOC [A]	TRS [C]	SAM [D]	Lead [E]	Mercury [E]	CO_2 [F]	CH_4 [G]	N_2O [G]
2002 Actual Emission Factors																	
- No. 4 Lime Kiln (EU 017)	8,145	279,395 TPY LMS	lb/ton LMS	0.0256	0.7156	0.0881	0.3327	0.2818	0.2555	0.0361	0.0158	0.00114	1.14E-04	1.54E-06	--	--	--
- No. 6 Fuel Oil		6,134.597 10^3 gal/yr	lb/10^3 gal	--	--	--	--	--	--	--	--	--	--	--	24,835	0.89	0
2003 Actual Emission Factors																	
- No. 4 Lime Kiln (EU 017)	7,763	276,884 TPY LMS	lb/ton LMS	0.0256	0.7156	0.0881	0.3327	0.2818	0.2555	0.0361	0.0280	0.00114	1.14E-04	1.54E-06	--	--	--
- No. 6 Fuel Oil		6,118.136 10^3 gal/yr	lb/10^3 gal	--	--	--	--	--	--	--	--	--	--	--	24,835	0.89	0
2004 Actual Emission Factors																	
- No. 4 Lime Kiln (EU 017)	7,688	279,328 TPY LMS	lb/ton LMS	0.0256	0.7156	0.0881	0.3327	0.2818	0.2555	0.0361	0.0296	0.00114	1.14E-04	1.54E-06	--	--	--
- No. 6 Fuel Oil		6,335.145 10^3 gal/yr	lb/10^3 gal	--	--	--	--	--	--	--	--	--	--	--	24,835	0.89	0
2005 Actual Emission Factors																	
- No. 4 Lime Kiln (EU 017)	8,198	294,008 TPY LMS	lb/ton LMS	0.0256	0.7156	0.0881	0.3327	0.2818	0.2555	0.0361	0.0365	0.00114	1.14E-04	1.54E-06	--	--	--
- No. 6 Fuel Oil		6,182.484 10^3 gal/yr	lb/10^3 gal	--	--	--	--	--	--	--	--	--	--	--	24,835	0.89	0
2006 Actual Emission Factors																	
- No. 4 Lime Kiln (EU 017)	7,906	295,773 TPY LMS	lb/ton LMS	0.0256	0.7156	0.0881	0.3327	0.2818	0.2555	0.0361	0.0283	0.00114	1.14E-04	1.54E-06	--	--	--
- No. 6 Fuel Oil		6,103.313 10^3 gal/yr	lb/10^3 gal	--	--	--	--	--	--	--	--	--	--	--	24,835	0.89	0
2007 Actual Emission Factors																	
- No. 4 Lime Kiln (EU 017)	7,181	276,389 TPY LMS	lb/ton LMS	0.0256	0.7156	0.0881	0.3327	0.2818	0.2555	0.0361	0.0236	0.00114	1.14E-04	1.54E-06	--	--	--
- No. 6 Fuel Oil		5,747.154 10^3 gal/yr	lb/10^3 gal	--	--	--	--	--	--	--	--	--	--	--	24,835	0.89	0
2008 Actual Emission Factors																	
- No. 4 Lime Kiln (EU 017)	7,694	265,826 TPY LMS	lb/ton LMS	0.0256	0.7156	0.0881	0.3327	0.2818	0.2555	0.0361	0.0221	0.00114	1.14E-04	1.54E-06	--	--	--
- No. 6 Fuel Oil		5,372.052 10^3 gal/yr	lb/10^3 gal	--	--	--	--	--	--	--	--	--	--	--	24,835	0.89	0
2009 Actual Emission Factors																	
- No. 4 Lime Kiln (EU 017)	7,425	235,700 TPY LMS	lb/ton LMS	0.0256	0.7156	0.0881	0.3327	0.2818	0.2555	0.0361	0.0268	0.00114	1.14E-04	1.54E-06	--	--	--
- No. 6 Fuel Oil		4,615.255 10^3 gal/yr	lb/10^3 gal	--	--	--	--	--	--	--	--	--	--	--	24,835	0.89	0

LMS = lime mud solids, TPY = tons per year

[A] Based on average of 2001-2009 stack tests (see Table 4-2).

[B] Based on NCASI CC 06-021 for Lime Kilns with Wet Particulate Control Devices. PM_{10} and $PM_{2.5}$ emissions are 84.7 percent and 76.8 percent of PM emissions, respectively.

[C] Based on annual average CEM values (see Table 4-2).

[D] Based on a similar method for fuel oil combustion (from AP-42, Table 1.3-1), where the SO_2 emission factor is multiplied by the ratio of SO_3 emissions to SO_2 emissions (5.7/157) and the ratio of H_2SO_4 to SO_3 (98/80).

[E] Based on NCASI TB No. 973, Table 4.27 for lime kilns with wet scrubbers, median values. The lb/ton CaO emission factors are multiplied by the ratio of 0.4 ton CaO per ton LMS.

[F] Based on Greenhouse Gas Reporting Rule for (40 CFR 98 Subpart C - General Stationary Fuel Combustion Sources). Emission factor: Non-Biogenic CO_2 = 75.1 kg/MMBtu. No. 6 Fuel Oil heating value is 150,000 Btu/gal.
Ex: Factor (kg/MMBtu) x 2.20462 lb/kg x 150,000 Btu/gal x MMBtu/10^6 Btu x 1,000 gal/10^3 gal = lb/10^3 gal.

[G] Based on Greenhouse Gas Reporting Rule for (40 CFR 98 Subpart AA - Pulp and Paper Manufacturing). Emission factors: CH_4 = 0.0027 kg/MMBtu, N_2O = 0 kg/MMBtu. No. 6 Fuel Oil heating value is 150,000 Btu/gal.

Table 4-2: No. 4 Lime Kiln Stack Tests and Emissions Data
Georgia-Pacific, Palatka

Test Date	LMS Input Rate (TPH)	Stack Conditions: Flow Rate (dscfm)	Stack Conditions: Oxygen (%)	Stack Conditions: Corrected Flow (dscfm) [a]	Emission Rate: ppmvd or gr/dscf @ 10% O_2 [b]	Emission Rate: lb/hr [c]	Emission Factor lb/ton LMS	Baseline Average Factor: Reporting Year	Baseline Average Factor: Averaging Period	Baseline Average Factor: Emission Factor (lb/ton LMS)
Sulfur Dioxide (SO_2)										
07/03/02	36.56	29,399	--	--	2.1	1.0558	0.0289	2002	2002 - 2009	0.0256
01/14/03	38.80	33,759	--	--	10.8	4.28	0.1103	2003	2002 - 2009	0.0256
02/26/04	39.26	37,067	--	--	1.0	0.1	0.0025	2004	2002 - 2009	0.0256
09/08/05	42.43	34,923	--	--	--	0	0.0000	2005	2002 - 2009	0.0256
07/25/06	38.60	27,823	--	--	3.9	1	0.0259	2006	2002 - 2009	0.0256
09/14/07	38.57	29,374	--	--	1.5	0.6	0.0156	2007	2002 - 2009	0.0256
09/10/08	37.07	33,146	--	--	1.4	0.6	0.0162	2008	2002 - 2009	0.0256
07/21/09	37.37	31,992	--	--	0.5	0.2	0.0054	2009	2002 - 2009	0.0256
Nitrogen Oxides (NO_x)										
07/03/02	36.56	29,399	--	--	59	18.88	0.5164	2002	2002 - 2009	0.7156
01/14/03	38.80	33,759	--	--	116	32.03	0.8255	2003	2002 - 2009	0.7156
02/26/04	39.26	37,067	--	--	93	33.7	0.8585	2004	2002 - 2009	0.7156
09/08/05	42.43	34,679	--	--	49	17.88	0.4214	2005	2002 - 2009	0.7156
07/25/06	38.60	27,823	--	--	57	16.8	0.4352	2006	2002 - 2009	0.7156
09/14/07	38.57	29,374	--	--	121	36.3	0.9412	2007	2002 - 2009	0.7156
09/10/08	37.07	33,146	--	--	124	38.4	1.0360	2008	2002 - 2009	0.7156
07/21/09	37.37	31,992	--	--	75	25.8	0.6905	2009	2002 - 2009	0.7156
Carbon Monoxide (CO)										
07/03/02	36.56	29,399	--	--	6	1.04	0.0284	2002	2002 - 2009	0.0881
01/14/03	38.80	33,759	--	--	10	1.8	0.0464	2003	2002 - 2009	0.0881
02/26/04	39.26	37,067	--	--	7	1.4	0.0357	2004	2002 - 2009	0.0881
09/08/05	42.43	34,923	--	--	9	1.96	0.0462	2005	2002 - 2009	0.0881
07/25/06	38.60	27,823	--	--	39	7	0.1813	2006	2002 - 2009	0.0881
09/14/07	38.57	29,374	--	--	24	4.5	0.1167	2007	2002 - 2009	0.0881
09/10/08	37.07	33,146	--	--	27	5.2	0.1403	2008	2002 - 2009	0.0881
07/21/09	37.37	31,992	--	--	19	4.1	0.1097	2009	2002 - 2009	0.0881
Particulate Matter (PM)										
07/03/02	36.56	29,399	--	--	0.0284	9.51	0.2601	2002	2002 - 2009	0.3327
01/14/03	38.90	33,560	--	--	0.033	11.94	0.3069	2003	2002 - 2009	0.3327
02/26/04	39.47	38,100	--	--	0.0135	4.40	0.1114	2004	2002 - 2009	0.3327
08/26/04	38.60	37,869	--	--	0.0262	11.54	0.2990			
09/08/05	42.43	34,923	--	--	0.0391	17.56	0.4138	2005	2002 - 2009	0.3327
07/25/06	38.60	27,823	--	--	0.040	14.5	0.3756	2006	2002 - 2009	0.3327
09/14/07	38.57	29,374	--	--	0.047	16.97	0.4400	2007	2002 - 2009	0.3327
09/10/08	37.07	33,146	--	--	0.035	12.9	0.3480	2008	2002 - 2009	0.3327
07/21/09	37.37	31,992	--	--	0.040	16.4	0.4389	2009	2002 - 2009	0.3327
Volatile Organic Compounds (VOC) [d]										
07/03/02	36.56	29,399	--	--	4	0.58	0.0159	2002	2002 - 2009	0.0361
01/14/03	38.80	33,759	--	--	2	0.69	0.0178	2003	2002 - 2009	0.0361
02/26/04	39.26	37,067	--	--	4	0.6	0.0153	2004	2002 - 2009	0.0361
09/08/05	42.43	34,679	--	--	2	0.63	0.0148	2005	2002 - 2009	0.0361
07/25/06	38.60	27,823	--	--	1	0.1	0.0026	2006	2002 - 2009	0.0361
09/14/07	38.57	29,374	--	--	7	0.9	0.0233	2007	2002 - 2009	0.0361
09/10/08	37.07	33,146	--	--	19	3.075	0.0830	2008	2002 - 2009	0.0361
07/21/09	37.37	31,992	--	--	23	4.35	0.1164	2009	2002 - 2009	0.0361
Total Reduced Sulfur (TRS) [e]										
05/12/98	38.03	26,540	--	--	1.5	0.28	0.0074			
05/12/99	--	29,065	--	--	3.0	0.5	--			
04/12/00	36.08	34,862	5.15	50,233	3.4	0.892	0.0247			
07/13/01	35.30	34,086	6.21	45,830	2.8	0.606	0.0172			
07/03/02	36.56	29,399	6.63	38,406	2.5	0.516	0.0141	2002	1998 - 2002	0.0158
01/14/03	38.80	33,749	7.64	40,990	5.0	1.088	0.0280	2003	2003	0.0280
03/03/04	40.27	37,100	6.20	49,916	4.5	1.192	0.0296	2004	2004	0.0296
09/08/05	42.43	35,435	4.55	52,991	5.5	1.547	0.0365	2005	2005	0.0365
07/25/06	38.60	27,823	4.37	42,063	4.9	1.094	0.0283	2006	2006	0.0283
09/14/07	38.57	29,374	5.33	41,845	4.1	0.910	0.0236	2007	2007	0.0236
09/10/08	37.47	33,203	7.00	42,258	3.7	0.830	0.0221	2008	2008	0.0221
07/21/09	37.67	31,992	4.66	47,523	4.0	1.009	0.0268	2009	2009	0.0268
Minimum: [f]	**37.47**	**27,823**					**0.0221**			**0.0221**
Average: [f]	**39.11**	**32,668**					**0.0279**			**0.0278**
Maximum: [f]	**42.43**	**37,100**					**0.0365**			**0.0365**

[a] Flow rate corrected to 10 percent O_2 in order to accurately estimate the annual TRS emissions.

[b] PM emissions based on gr/dscf at 10 percent O_2, all other pollutant emissions based on ppmvd at 10 percent O_2. TRS emissions for 1997 through 2002 were based on annual stack test data. TRS emissions for 2003 through 2009 were based on annual average CEMS data.

[c] Current (Permit No. 1070005-064-AV) maximum permitted emission rates are as follows:

CO - 69 ppmvd @ 10% O_2 | NO_x - 140.0 ppmvd @ 10% O_2 | PM - 0.081 gr/dscf @ 10% O_2
SO_2 - 16.9 ppmvd @ 10% O_2 | TRS - 20 ppmvd @ 10% O_2 | VOC - 70.0 ppmvd @ 10% O_2

All reported stack test emission rates were below the current permitted rate, therefore no adjustments were made.

[d] VOC emissions (ppm and lb/hr) are reported as carbon.

[e] Emission factors based on annual average CEMS data. The lb/hr values were determined using the stack flow rate during the annual stack tests. The lb/ton LMS emission factors are determined using the lime mud solids processing rate during the annual stack tests. A 5-year average is not required when using CEMS data to determine the baseline actual emissions. No CEMS data was available for the years 2001 and 2002, therefore stack tests during the 5-year period around those years were used.

Table 4-3: Baseline Actual Annual (2002 - 2009) Emissions
No. 4 Lime Kiln, Georgia-Pacific, Palatka

Source Description	Pollutant Emission Rate (TPY)													
	SO_2	NO_x	CO	PM	PM_{10}	$PM_{2.5}$	VOC	TRS	SAM	Lead	Mercury	CO_2	CH_4	N_2O
2002 Actual Emissions														
- No. 4 Lime Kiln (EU 017)	3.58	99.97	12.31	46.48	39.37	35.69	5.04	2.21	0.159	0.0160	2.16E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	76,176	2.74	0.00
- Total	**3.58**	**99.97**	**12.31**	**46.48**	**39.37**	**35.69**	**5.04**	**2.21**	**0.159**	**0.0160**	**2.16E-04**	**76,176**	**2.74**	**--**
2003 Actual Emissions														
- No. 4 Lime Kiln (EU 017)	3.54	99.07	12.20	46.06	39.01	35.37	5.00	3.88	0.158	0.0158	2.14E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	75,972	2.73	0.00
- Total	**3.54**	**99.07**	**12.20**	**46.06**	**39.01**	**35.37**	**5.00**	**3.88**	**0.158**	**0.0158**	**2.14E-04**	**75,972**	**2.73**	**--**
2004 Actual Emissions														
- No. 4 Lime Kiln (EU 017)	3.58	99.94	12.30	46.47	39.36	35.69	5.04	4.13	0.159	0.0160	2.16E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	78,667	2.83	0.00
- Total	**3.58**	**99.94**	**12.30**	**46.47**	**39.36**	**35.69**	**5.04**	**4.13**	**0.159**	**0.0160**	**2.16E-04**	**78,667**	**2.83**	**--**
2005 Actual Emissions														
- No. 4 Lime Kiln (EU 017)	3.76	105.20	12.95	48.91	41.43	37.56	5.31	5.37	0.167	0.0168	2.27E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	76,771	2.76	0.00
- Total	**3.76**	**105.20**	**12.95**	**48.91**	**41.43**	**37.56**	**5.31**	**5.37**	**0.167**	**0.0168**	**2.27E-04**	**76,771**	**2.76**	**--**
2006 Actual Emissions														
- No. 4 Lime Kiln (EU 017)	3.79	105.83	13.03	49.20	41.67	37.79	5.34	4.19	0.168	0.0169	2.28E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	75,788	2.72	0.00
- Total	**3.79**	**105.83**	**13.03**	**49.20**	**41.67**	**37.79**	**5.34**	**4.19**	**0.168**	**0.0169**	**2.28E-04**	**75,788**	**2.72**	**--**
2007 Actual Emissions														
- No. 4 Lime Kiln (EU 017)	3.54	98.89	12.17	45.98	38.94	35.31	4.99	3.26	0.157	0.0158	2.13E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	71,365	2.57	0.00
- Total	**3.54**	**98.89**	**12.17**	**45.98**	**38.94**	**35.31**	**4.99**	**3.26**	**0.157**	**0.0158**	**2.13E-04**	**71,365**	**2.57**	**--**
2008 Actual Emissions														
- No. 4 Lime Kiln (EU 017)	3.40	95.11	11.71	44.22	37.45	33.96	4.80	2.94	0.151	0.0152	2.05E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	66,708	2.40	0.00
- Total	**3.40**	**95.11**	**11.71**	**44.22**	**37.45**	**33.96**	**4.80**	**2.94**	**0.151**	**0.0152**	**2.05E-04**	**66,708**	**2.40**	**--**
2009 Actual Emissions														
- No. 4 Lime Kiln (EU 017)	3.02	84.33	10.38	39.21	33.21	30.11	4.25	3.16	0.134	0.0135	1.82E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	57,310	2.06	0.00
- Total	**3.02**	**84.33**	**10.38**	**39.21**	**33.21**	**30.11**	**4.25**	**3.16**	**0.134**	**0.0135**	**1.82E-04**	**57,310**	**2.06**	**--**

Table 4-4: Summary of Baseline 2-Year Average Actual Annual Emissions
No. 4 Lime Kiln, Georgia-Pacific, Palatka

Source Description	Pollutant Emission Rate (TPY)													
	SO_2	NO_x	CO	PM	PM_{10}	$PM_{2.5}$	VOC	TRS	SAM	Lead	Mercury	CO_2	CH_4	N_2O
2002 - 2003 Average Emissions														
- No. 4 Lime Kiln (EU 017)	3.56	99.52	12.25	46.27	39.19	35.53	5.02	3.04	0.158	0.0159	2.15E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	76,074	2.74	0.00
- Total	**3.56**	**99.52**	**12.25**	**46.27**	**39.19**	**35.53**	**5.02**	**3.04**	**0.158**	**0.0159**	**2.15E-04**	**76,074**	**2.74**	**--**
2003 - 2004 Average Emissions														
- No. 4 Lime Kiln (EU 017)	3.56	99.51	12.25	46.26	39.18	35.53	5.02	4.01	0.158	0.0159	2.15E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	77,319	2.78	0.00
- Total	**3.56**	**99.51**	**12.25**	**46.26**	**39.18**	**35.53**	**5.02**	**4.01**	**0.158**	**0.0159**	**2.15E-04**	**77,319**	**2.78**	**--**
2004 - 2005 Average Emissions														
- No. 4 Lime Kiln (EU 017)	3.67	102.57	12.63	47.69	40.39	36.62	5.17	4.75	0.163	0.0164	2.21E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	77,719	2.79	0.00
- Total	**3.67**	**102.57**	**12.63**	**47.69**	**40.39**	**36.62**	**5.17**	**4.75**	**0.163**	**0.0164**	**2.21E-04**	**77,719**	**2.79**	**--**
2005 - 2006 Average Emissions														
- No. 4 Lime Kiln (EU 017)	3.77	105.51	12.99	49.06	41.55	37.67	5.32	4.78	0.168	0.0169	2.28E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	76,280	2.74	0.00
- Total	**3.77**	**105.51**	**12.99**	**49.06**	**41.55**	**37.67**	**5.32**	**4.78**	**0.168**	**0.0169**	**2.28E-04**	**76,280**	**2.74**	**--**
2006 - 2007 Average Emissions														
- No. 4 Lime Kiln (EU 017)	3.66	102.36	12.60	47.59	40.31	36.55	5.16	3.72	0.163	0.0164	2.21E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	73,577	2.65	0.00
- Total	**3.66**	**102.36**	**12.60**	**47.59**	**40.31**	**36.55**	**5.16**	**3.72**	**0.163**	**0.0164**	**2.21E-04**	**73,577**	**2.65**	**--**
2007 - 2008 Average Emissions														
- No. 4 Lime Kiln (EU 017)	3.47	97.00	11.94	45.10	38.20	34.64	4.89	3.10	0.154	0.0155	2.09E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	69,036	2.48	0.00
- Total	**3.47**	**97.00**	**11.94**	**45.10**	**38.20**	**34.64**	**4.89**	**3.10**	**0.154**	**0.0155**	**2.09E-04**	**69,036**	**2.48**	**--**
2008 - 2009 Average Emissions														
- No. 4 Lime Kiln (EU 017)	3.21	89.72	11.05	41.71	35.33	32.04	4.53	3.05	0.143	0.0143	1.94E-04	--	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	62,009	2.23	0.00
- Total	**3.21**	**89.72**	**11.05**	**41.71**	**35.33**	**32.04**	**4.53**	**3.05**	**0.143**	**0.0143**	**1.94E-04**	**62,009**	**2.23**	**--**
Highest Consecutive 2-Year Average	**'05 - '06** ***3.77***	**'05 - '06** ***105.51***	**'05 - '06** ***12.99***	**'05 - '06** ***49.06***	**'05 - '06** ***41.55***	**'05 - '06** ***37.67***	**'05 - '06** ***5.32***	**'05 - '06** ***4.78***	**'05 - '06** ***0.168***	**'05 - '06** ***0.0169***	**'05 - '06** **2.28E-04**	**'04 - '05** **77,719**	**'04 - '05** **2.79**	**--** **--**

Table 4-5: Summary of Baseline Actual Annual Emissions
No. 4 Lime Kiln, Georgia-Pacific, Palatka

Source Description	Year 1			Year 2			2-Year Average (TPY)
	Activity Factor	Emission Factor	Emissions (TPY) [a]	Activity Factor	Emission Factor	Emissions (TPY) [a]	
Sulfur Dioxide - SO_2		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	0.0256 lb/ton LMS	3.76	295,773 TPY LMS	0.0256 lb/ton LMS	3.79	**3.77**
Nitrogen Oxides - NO_x		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	0.7156 lb/ton LMS	105.20	295,773 TPY LMS	0.7156 lb/ton LMS	105.83	**105.51**
Carbon Monoxide - CO		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	0.0881 lb/ton LMS	12.95	295,773 TPY LMS	0.0881 lb/ton LMS	13.03	**12.99**
Particulate Matter Total - PM		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	0.3327 lb/ton LMS	48.91	295,773 TPY LMS	0.3327 lb/ton LMS	49.20	**49.06**
Particulate Matter - PM_{10}		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	0.2818 lb/ton LMS	41.43	295,773 TPY LMS	0.2818 lb/ton LMS	41.67	**41.55**
Particulate Matter - $PM_{2.5}$		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	0.2555 lb/ton LMS	37.56	295,773 TPY LMS	0.2555 lb/ton LMS	37.79	**37.67**
Volatile Organic Compounds - VOC		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	0.0361 lb/ton LMS	5.31	295,773 TPY LMS	0.0361 lb/ton LMS	5.34	**5.32**
Total Reduced Sulfur - TRS		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	0.0365 lb/ton LMS	5.37	295,773 TPY LMS	0.0283 lb/ton LMS	4.19	**4.78**
Sulfuric Acid Mist - SAM		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	0.0011 lb/ton LMS	0.17	295,773 TPY LMS	0.0011 lb/ton LMS	0.17	**0.17**
Lead - Pb		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	1.14E-04 lb/ton LMS	0.0168	295,773 TPY LMS	1.14E-04 lb/ton LMS	0.0169	**0.0169**
Mercury - Hg		**2005**			**2006**		**'05 - '06**
- No. 4 Lime Kiln (EU 017)	294,008 TPY LMS	1.54E-06 lb/ton LMS	2.27E-04	295,773 TPY LMS	1.54E-06 lb/ton LMS	2.28E-04	**2.28E-04**
Non-Biogenic Carbon Dioxide - CO_2		**2004**			**2005**		**'04 - '05**
- No. 6 Fuel Oil	6,335.145 10^3 gal/yr	24,835 lb/10^3 gal	78,667	6,182.484 10^3 gal/yr	24,835 lb/10^3 gal	76,771	**77,719**
Methane - CH_4		**2004**			**2005**		**'04 - '05**
- No. 6 Fuel Oil	6,335.145 10^3 gal/yr	0.89 lb/10^3 gal	2.83	6,182.484 10^3 gal/yr	0.89 lb/10^3 gal	2.76	**2.79**
Nitrous Oxide - N_2O		--			--		--
- No. 6 Fuel Oil	-- --	0 lb/10^3 gal	--	-- --	0 lb/10^3 gal	--	--

[a] Activity Factor (TPY LMS) x Emission Factor (lb/ton LMS) x 1 ton/2,000 lb = Annual Emissions (TPY)
Activity Factor (10^3 gal/yr) x Emission Factor (lb/10^3 gal) x 1 ton/2,000 lb = Annual Emissions (TPY)

Table 4-6: Emission Factors Used to Determine Projected Actual Annual Emissions
No. 4 Lime Kiln, Georgia-Pacific, Palatka

Pollutant	Baseline Emission Factor [a]	Average Baseline LMS Input [a] (TPH)	Maximum Baseline Flow Rate [a] (dscfm)	Increase Over Baseline [b] (%)	Projected			
					Flow Rate (dscfm)	Emission Rate (ppmvd @ 10% O_2) [c]	Emission Rate (lb/hr)	Emission Factor
Sulfur Dioxide - SO_2								
- No. 4 Lime Kiln (EU 017)	0.0256 lb/ton LMS	--	--	10	--	--	--	0.0282 lb/ton LMS
Nitrogen Oxides - NO_x								
- No. 4 Lime Kiln (EU 017)	-- --	38.22	37,067	10	40,773	125	36.49	0.9548 lb/ton LMS
Carbon Monoxide - CO								
- No. 4 Lime Kiln (EU 017)	-- --	38.22	37,067	10	40,773	69	12.26	0.3208 lb/ton LMS
Particulate Matter Total - PM								
- No. 4 Lime Kiln (EU 017)	0.3327 lb/ton LMS	--	--	10	--	--	--	0.3660 lb/ton LMS
Particulate Matter - PM_{10}								
- No. 4 Lime Kiln (EU 017)	0.2818 lb/ton LMS	--	--	10	--	--	--	0.3100 lb/ton LMS
Particulate Matter - $PM_{2.5}$								
- No. 4 Lime Kiln (EU 017)	0.2555 lb/ton LMS	--	--	10	--	--	--	0.2811 lb/ton LMS
Volatile Organic Compounds - VOC								
- No. 4 Lime Kiln (EU 017)	0.0361 lb/ton LMS	--	--	10	--	--	--	0.0397 lb/ton LMS
Total Reduced Sulfur - TRS								
- No. 4 Lime Kiln (EU 017)	0.0365 lb/ton LMS	--	--	10	--	--	--	0.0402 lb/ton LMS
Sulfuric Acid Mist - SAM								
- No. 4 Lime Kiln (EU 017)	0.0011 lb/ton LMS	--	--	10	--	--	--	0.0013 lb/ton LMS
Lead - Pb								
- No. 4 Lime Kiln (EU 017)	1.14E-04 lb/ton LMS	--	--	10	--	--	--	1.26E-04 lb/ton LMS
Mercury - Hg								
- No. 4 Lime Kiln (EU 017)	1.54E-06 lb/ton LMS	--	--	10	--	--	--	1.70E-06 lb/ton LMS
Non-Biogenic Carbon Dioxide - CO_2								
- No. 6 Fuel Oil	24,835 lb/10^3 gal	--	--	0	--	--	--	24,835 lb/10^3 gal
Methane - CH_4								
- No. 6 Fuel Oil	0.89 lb/10^3 gal	--	--	0	--	--	--	0.89 lb/10^3 gal
Nitrous Oxide - N_2O								
- No. 6 Fuel Oil	0 lb/10^3 gal	--	--	0	--	--	--	0 lb/10^3 gal

[a] See Table 4-2 for values during past stack tests. TRS lb/ton LMS values based on CEMS data during the years 2003 through 2009. See Table 4-1 for emission factors for PM_{10}, $PM_{2.5}$, SAM, Pb, and Hg.

[b] Emission factors in lb/ton LMS for SO_2, PM, VOC, TRS, Pb, and Hg increased by the projected increase in stack flow rate (10 percent). Emission factors for NO_x and CO based on vendor guarantees and the increase in stack air flow rate.

[c] NO_x and CO emission rates based on the highest amounts that would avoid PSD review (up to current emission limits).

Table 4-7: Projected Actual Annual Emissions
No. 4 Lime Kiln, Georgia-Pacific, Palatka

Pollutant	Emission Factor [a]	Activity Factor [b]	Annual Emissions (TPY) [c]
Sulfur Dioxide - SO_2			
- No. 4 Lime Kiln (EU 017)	0.0282 lb/ton LMS	323,166 TPY LMS	4.55
Nitrogen Oxides - NO_x			
- No. 4 Lime Kiln (EU 017)	0.9548 lb/ton LMS	323,166 TPY LMS	154.27
Carbon Monoxide - CO			
- No. 4 Lime Kiln (EU 017)	0.3208 lb/ton LMS	323,166 TPY LMS	51.84
Particulate Matter Total - PM			
- No. 4 Lime Kiln (EU 017)	0.3660 lb/ton LMS	323,166 TPY LMS	59.13
Particulate Matter - PM_{10}			
- No. 4 Lime Kiln (EU 017)	0.3100 lb/ton LMS	323,166 TPY LMS	50.09
Particulate Matter - $PM_{2.5}$			
- No. 4 Lime Kiln (EU 017)	0.2811 lb/ton LMS	323,166 TPY LMS	45.42
Volatile Organic Compounds - VOC			
- No. 4 Lime Kiln (EU 017)	0.0397 lb/ton LMS	323,166 TPY LMS	6.42
Total Reduced Sulfur - TRS			
- No. 4 Lime Kiln (EU 017)	0.0402 lb/ton LMS	323,166 TPY LMS	6.49
Sulfuric Acid Mist - SAM			
- No. 4 Lime Kiln (EU 017)	0.0013 lb/ton LMS	323,166 TPY LMS	0.20
Lead - Pb			
- No. 4 Lime Kiln (EU 017)	1.26E-04 lb/ton LMS	323,166 TPY LMS	0.0203
Mercury - Hg			
- No. 4 Lime Kiln (EU 017)	1.70E-06 lb/ton LMS	323,166 TPY LMS	2.74E-04
Non-Biogenic Carbon Dioxide - CO_2			
- No. 6 Fuel Oil	24,835 $lb/10^3$ gal	7,192.380 10^3 gal/yr	89,312
- Natural Gas	116,889 $lb/10^6$ ft^3	1,078.857 10^6 ft^3/yr	
Methane - CH_4			
- No. 6 Fuel Oil	0.89 $lb/10^3$ gal	7,192.380 10^3 gal/yr	3.21
- Natural Gas	5.95 $lb/10^6$ ft^3	1,078.857 10^6 ft^3/yr	
Nitrous Oxide - N_2O			
- No. 6 Fuel Oil	0 $lb/10^3$ gal	-- --	--
- Natural Gas	0 $lb/10^6$ ft^3	-- --	

[a] Refer to Table 4-6 for derivation of emission factors for LMS. No. 6 Fuel Oil and natural gas emission factors based on Greenhouse Gas Reporting Rule for (40 CFR 98 Subpart C for CO_2; Subpart AA for CH_4 and N_2O). Emission factors for are: Non-Biogenic CO_2 = 75.1 kg/MMBtu, CH_4 = 0.0027 kg/MMBtu, N_2O = 0 kg/MMBtu. Heat input rate to the No. 4 Lime Kiln due to No. 6 Fuel Oil firing is based on highest annual ratio of heat input to LMS input. Heat input rate to the No. 4 Lime Kiln due to Natural Gas firing is based on a 5-percent increase in required heat input when burning natural gas.

No. 6 Fuel Oil heating value is 150 MMBtu/10^3 gal, and natural gas heating value is 1,000 MMBtu/10^6 ft^3.
Emission Factor (kg/MMBtu) x 2.20462 lb/kg x 150 MMBtu/10^3 gal = $lb/10^3$ gal.

[b] Projected actual activity factors are based on mill projections of future LMS throughput and the energy required to convert LMS to CaO.

[c] Annual Emissions (TPY) = Emissions Factor x Activity Factor x 1 ton/2,000 lb. GHG emissions based on the fuel that produced the highest annual emissions.

Emission factor (lb/ton LMS) x Activity Factor (TPY LMS) x 1 ton/2,000 lb = Annual Emissions (TPY)
Emission factor ($lb/10^3$ gal) x Activity Factor (10^3 gal/yr) x 1 ton/2,000 lb = Annual Emissions (TPY)
Emission factor ($lb/10^6$ ft^3) x Activity Factor (10^6 ft^3/yr) x 1 ton/2,000 lb = Annual Emissions (TPY)

Table 4-8: Determination of Operating Rate that Could Have Been Accommodated during the Baseline Period
No. 4 Lime Kiln, Georgia-Pacific, Palatka

Date	Monthly		Number of Days in Month	Average Hourly	
	LMS Input Rate (Tons)	No. 6 Fuel Firing Rate (10^3 gal)		LMS Input (Tons) [a]	No. 6 Fuel Firing Rate (10^3 gal) [a]
January 2004	--	633.494	31	--	0.851
February 2004	--	544.559	29	--	0.782
March 2004	--	544.051	31	--	0.731
April 2004	--	452.019	30	--	0.628
May 2004	--	293.544	31	--	0.395
June 2004	--	508.494	30	--	0.706
July 2004	--	655.271	31	--	0.881
August 2004	--	546.805	31	--	0.735
September 2004	--	472.387	30	--	0.656
October 2004	--	679.079	31	--	0.913
November 2004	--	530.720	30	--	0.737
December 2004	--	474.722	31	--	0.638
January 2005	24,720	628.572	31	33.23	0.845
February 2005	22,676	516.432	28	33.74	0.769
March 2005	26,504	506.646	31	35.62	0.681
April 2005	25,821	533.946	30	35.86	0.742
May 2005	11,780	309.666	31	15.83	0.416
June 2005	24,373	492.660	30	33.85	0.684
July 2005	25,670	609.252	31	34.50	0.819
August 2005	25,618	475.692	31	34.43	0.639
September 2005	27,863	496.398	30	38.70	0.689
October 2005	27,262	628.866	31	36.64	0.845
November 2005	26,946	485.562	30	37.43	0.674
December 2005	24,776	498.792	31	33.30	0.670
January 2006	24,789	--	31	33.32	--
February 2006	15,830	--	28	23.56	--
March 2006	26,625	--	31	35.79	--
April 2006	26,138	--	30	36.30	--
May 2006	10,952	--	31	14.72	--
June 2006	25,879	--	30	35.94	--
July 2006	26,788	--	31	36.01	--
August 2006	27,163	--	31	36.51	--
September 2006	26,860	--	30	37.30	--
October 2006	29,184	--	31	39.23	--
November 2006	27,682	--	30	38.45	--
December 2006	27,882	--	31	37.48	--
Highest Average Hourly LMS Input Rate:				**39.226**	**--**
Highest Average Hourly No. 6 Fuel Firing Rate:				**--**	**0.913**
Operating Hours (2004 - 2005): [b]				**8,198**	**8,198**
Operating Hours (2005 - 2006): [b]				**8,198**	**8,198**
Could Have Accommodated Total Annual LMS Input Rate: [c]				**321,572**	**--**
Could Have Accommodated Total No. 6 Fuel Oil Firing Rate: [c]				**--**	**7,482.647**

[a] Based on monthly totals divided by number of days per month and 24 hours per day.

[b] See Table 4-1. Highest annual operating hours during baseline period (2005 - 2006).

[c] Highest average hourly LMS input rate multiplied by the highest annual hours of operation during the baseline period. This represents the LMS input rate that could have been accommodated during the baseline period. The burner replacement project does not affect the LMS input rate, and therefore LMS input rate is unrelated to the change, and emissions associated with LMS input rate are allowed to be excluded from the projected actual emissions.
Highest Average Hourly LMS Input Rate (tons/hr) x Operating Hours (hr/yr) = Could Have Accommodated Total Annual LMS Input Rate (TPY)

Table 4-9: Emissions That Could Have Been Accommodated During Baseline Period
No. 4 Lime Kiln, Georgia-Pacific, Palatka

Pollutant	Emission Factor [a]	Activity Factor [b]	Annual Emissions (TPY) [c]
Sulfur Dioxide - SO_2			
- No. 4 Lime Kiln (EU 017)	0.0256 lb/ton LMS	321,572 TPY LMS	4.12
Nitrogen Oxides - NO_x			
- No. 4 Lime Kiln (EU 017)	0.7156 lb/ton LMS	321,572 TPY LMS	115.06
Carbon Monoxide - CO			
- No. 4 Lime Kiln (EU 017)	0.0881 lb/ton LMS	321,572 TPY LMS	14.17
Particulate Matter Total - PM			
- No. 4 Lime Kiln (EU 017)	0.3327 lb/ton LMS	321,572 TPY LMS	53.49
Particulate Matter - PM_{10}			
- No. 4 Lime Kiln (EU 017)	0.2818 lb/ton LMS	321,572 TPY LMS	45.31
Particulate Matter - $PM_{2.5}$			
- No. 4 Lime Kiln (EU 017)	0.2555 lb/ton LMS	321,572 TPY LMS	41.08
Volatile Organic Compounds - VOC			
- No. 4 Lime Kiln (EU 017)	0.0361 lb/ton LMS	321,572 TPY LMS	5.80
Total Reduced Sulfur - TRS			
- No. 4 Lime Kiln (EU 017)	0.0324 lb/ton LMS	321,572 TPY LMS	5.21
Sulfuric Acid Mist - SAM			
- No. 4 Lime Kiln (EU 017)	0.0011 lb/ton LMS	321,572 TPY LMS	0.183
Lead - Pb			
- No. 4 Lime Kiln (EU 017)	1.14E-04 lb/ton LMS	321,572 TPY LMS	0.0184
Mercury - Hg			
- No. 4 Lime Kiln (EU 017)	1.54E-06 lb/ton LMS	321,572 TPY LMS	2.48E-04
Non-Biogenic Carbon Dioxide - CO_2			
- No. 6 Fuel Oil	24,835 lb/10^3 gal	7,192.380 10^3 gal/yr	89,312
Methane - CH_4			
- No. 6 Fuel Oil	0.89 lb/10^3 gal	7,192.380 10^3 gal/yr	3.21
Nitrous Oxide - N_2O			
- No. 6 Fuel Oil	0 lb/10^3 gal	-- --	--

[a] Emission factors based on the average factor during the baseline period (2004 - 2005 for GHGs, 2005 - 2006 for all the remainder of the the pollutants; see Table 4-1).

[b] See Table 4-8 for derivation of the activity factor. Represents what could have been accommodated during the baseline period. Because the No. 6 fuel oil firing rate that could have been accommodated during the baseline period is higher than the projected actual fuel oil firing rate, the fuel oil firing rate was reduced to the projected actual fuel oil firing rate (7,329.386 10^3 gal/yr).

[c] Represents the actual emissions that the unit could have accommodated prior to the project.
Emission factor (lb/ton LMS) x Activity Factor (TPY LMS) x 1 ton/2,000 lb = Annual Emissions (TPY)

Table 4-10: PSD Applicability Analysis
No. 4 Lime Kiln, Georgia-Pacific, Palatka

Emissions Category	Pollutant Emission Rate (TPY)												
	SO_2	NO_x	CO	PM	PM_{10}	$PM_{2.5}$	VOC	TRS	SAM	Lead	Mercury	GHG [f]	CO_2e [f]
EMISSIONS THAT COULD HAVE BEEN ACCOMMODATED AND ARE UNRELATED TO THE PROJECT [a]													
- No. 4 Lime Kiln (EU 017)	4.12	115.06	14.17	53.49	45.31	41.08	5.80	5.21	0.183	0.0184	2.48E-04	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	89,315	89,379
- Total	**4.12**	**115.06**	**14.17**	**53.49**	**45.31**	**41.08**	**5.80**	**5.21**	**0.183**	**0.0184**	**2.48E-04**	**89,315**	**89,379**
BASELINE ACTUAL Emissions [b]													
- No. 4 Lime Kiln (EU 017)	3.77	105.51	12.99	49.06	41.55	37.67	5.32	4.78	0.168	0.0169	2.28E-04	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	77,722	77,778
- Total	**3.77**	**105.51**	**12.99**	**49.06**	**41.55**	**37.67**	**5.32**	**4.78**	**0.168**	**0.0169**	**2.28E-04**	**77,722**	**77,778**
DEMAND GROWTH EXCLUDED Emissions [c]	**0.34**	**9.55**	**1.18**	**4.44**	**3.76**	**3.41**	**0.48**	**0.43**	**0.015**	**0.0015**	**2.06E-05**	**11,593**	**11,601**
PROJECTED ACTUAL Emissions [d]													
- No. 4 Lime Kiln (EU 017)	4.55	154.27	51.84	59.13	50.09	45.42	6.42	6.49	0.202	0.0203	2.74E-04	--	--
- Natural Gas	--	--	--	--	--	--	--	--	--	--	--	89,315	89,379
- Total	**4.55**	**154.27**	**51.84**	**59.13**	**50.09**	**45.42**	**6.42**	**6.49**	**0.202**	**0.0203**	**2.74E-04**	**89,315**	**89,379**
BASELINE ACTUAL Emissions [b]													
- No. 4 Lime Kiln (EU 017)	3.77	105.51	12.99	49.06	41.55	37.67	5.32	4.78	0.168	0.0169	2.28E-04	--	--
- No. 6 Fuel Oil	--	--	--	--	--	--	--	--	--	--	--	77,722	77,778
- Total	**3.77**	**105.51**	**12.99**	**49.06**	**41.55**	**37.67**	**5.32**	**4.78**	**0.168**	**0.0169**	**2.28E-04**	**77,722**	**77,778**
DEMAND GROWTH EXCLUDED Emissions [c]	**0.34**	**9.55**	**1.18**	**4.44**	**3.76**	**3.41**	**0.48**	**0.43**	**0.015**	**0.0015**	**2.06E-05**	**11,593**	**11,601**
Increase Due to Project [e]	**0.43**	**39.21**	**37.67**	**5.64**	**4.78**	**4.33**	**0.61**	**1.28**	**0.019**	**0.0019**	**2.62E-05**	**0**	**0**
PSD SIGNIFICANT EMISSION RATE	40	40	100	25	15	10	40	40	40	0.6	0.1	0	75,000
PSD REVIEW TRIGGERED?	No	No	No	No	No	No	No	No	No	No	No	No	

[a] See Table 4-9 for the emissions that could have been accommodated during the baseline period, and that are unrelated to the proposed project.
[b] See Table 4-5 for derivation of Baseline Actual Emissions.
[c] Accommodated Emissions minus Projected Actual Emissions. Represents the emissions above the Baseline Actual Emissions that may be excluded from the Projected Actual Emissions due to demand growth.
[d] See Table 4-7 for derivation of Projected Actual Emissions.
[e] Projected Actual Emissions minus Baseline Actual Emissions minus Demand Growth Excluded Emissions.
[f] GHG = sum of emission rates of CO_2, CH_4, and N_2O on a mass basis. CO_2e = sum of emission rates of CO_2, CH_4, and N_2O using global warming potentials (GWP). GWP: CO_2 = 1, CH_4 = 21, and N_2O = 310. GHG = $CO_2 + CH_4 + N_2O$, $CO_2e = CO_2 + 21*CH_4 + 310*N_2O$

APPENDIX A
REFERENCES FOR EMISSION FACTORS

ncasi

NATIONAL COUNCIL FOR AIR AND STREAM IMPROVEMENT, INC.
P.O. Box 13318, Research Triangle Park, NC 27709-3318
Phone (919) 941-6400 Fax (919) 941-6401

Ronald A. Yeske, Ph.D.
President
(919) 941-6404

August 25, 2006

TO: Corporate Correspondents -- CC 06-021
Regional Managers

FROM: Ronald A. Yeske

SUBJECT: Information on Kraft Pulp Mill Particulate Emissions for Visibility Modeling

This memorandum will be of interest to kraft pulp mills conducting modeling of visibility impacts in response to regional haze regulatory programs.

Numerous kraft pulp mills have "BART-eligible" power boilers, recovery furnaces, smelt dissolving tanks, and lime kilns. Generally speaking, "BART-eligible" sources were built between 1962 and 1977, as discussed in NCASI Corporate Correspondent Memorandum No. 05-17, and emit SO_2, NO_x, and particulate matter. As required by EPA's regional haze program, states are now in the process of evaluating whether or not emission reductions should be imposed on these "BART-eligible" sources. The key factor in these evaluations is the impact that the source emissions have on visibility in Class I areas. If the impact is minimal, it is unlikely that emission reductions would be imposed as a result of a BART (Best Available Retrofit Technology) analysis.

As recommended by EPA, visibility impacts are being assessed with the CALPUFF model. CALPUFF is a long-range transport and dispersion model that also simulates the formation of fine particulate matter from gaseous emissions. In visibility assessments, CALPUFF is used to predict concentrations of ammonium sulfate, ammonium nitrate, organic aerosols, fine particulates, coarse particulates, and elemental carbon. These concentrations are then used to calculate a total light extinction coefficient based on the light scattering and absorption properties of each of the components. The amount of light extinction can then related to the deciview change in a Class I area attributable to emissions from a point source. EPA suggests BART-eligible sources with less than a 0.5 deciview impact in any Class I area could reasonably be exempted from further BART analysis.

To run the CALPUFF model for "BART-eligible" sources, emission rates of SO_2, NO_x, and particulate matter are required. However, CALPUFF inputs needed for particulate matter are rather detailed. A breakdown of PM_{10} emissions into the following components and aerodynamic diameters is necessary:

Filterable PM_{10}:
- <0.625 μm
- 0.625 – 1.0 μm
- 1.0 – 1.25 μm
- 1.25 – 2.5 μm
- 2.5 - 6 μm
- 6 – 10 μm
- Elemental carbon percentage

Condensible PM_{10}:
- organic portion
- inorganic sulfate, nitrate and soils portions

Most mills have total particulate emission test results from EPA Method 5, but very few have PM_{10} or $PM_{2.5}$ results and virtually none have detailed particle size distribution information. In response to company requests for this information, NCASI has compiled available data for kraft recovery furnaces, smelt dissolving tanks, and lime kilns that may used to estimate the required inputs for CALPUFF. The data are described and summarized in the attachment. For power boilers, similar information can be found in Chapter 1 of EPA's AP-42 publication for coal, oil, gas, and wood fuels.

The attached summary was prepared by Arun Someshwar (asomeshwar@ncasi.org; ext. 226) and Ashok Jain (ajain@ncasi.org; ext. 0) at the Southern Regional Center (352-331-1745). Please contact either one if you need further details or assistance.

Attachment

Table 3. Lime Kiln Data Summary

Lime Kilns with Wet Particulate Control Devices

Parameter	Measurement Method	No. of Sources	Range (lb/ton CaO)	Mean (lb/ton CaO)	Mean Percent of PM or CPM
PM	EPA Method 5	31	0.35 – 5.34	1.59	
PM_{10}	Dilution Tunnel	6			84.7[1]
$PM_{2.5}$	Dilution Tunnel	6			76.8[1]
CPM – Total	EPA Method 202	11	0.020 - 0.453	0.155	
CPM - Organic		3			8.3[2]
CPM Inorganic - Sulfate (as H_2SO_4)		2			58.2[2]
CPM Inorganic – non-sulfate[4]		3			33.5[2]

Lime Kilns with a Dry ESP for Particulate Control Followed by a Wet Scrubber

Parameter	Measurement Method	No. of Sources	Range (lb/ton CaO)	Mean (lb/ton CaO)	Mean Percent of PM or CPM
PM	EPA Method 5	2	0.043 - 0.053	0.048	
PM_{10}					No Data[3]
$PM_{2.5}$					No Data[3]
CPM – Total	EPA Method 202	2	0.070 - 0.161	0.116	
CPM - Organic		1			54.9[2]
CPM Inorganic - Sulfate (as H_2SO_4)		1			45.1[2]
CPM Inorganic – non-sulfate[4]		1			0.0[2]

Lime Kilns with a Dry ESP for Particulate Control

Parameter	Measurement Method	No. of Sources	Range (lb/ton CaO)	Mean (lb/ton CaO)	Mean Percent of PM
PM	EPA Method 5	7	0.024 - 0.525	0.175	
PM_{10}	EPA CTM-040	6			30.2[1]
$PM_{2.5}$	EPA CTM-040	6			11.0[1]
CPM – Total	EPA Method 202	4	0.057 - 0.198	0.152	
CPM - Organic		3			31.5[2]
CPM Inorganic - Sulfate (as H_2SO_4)		2			20.8[2]
CPM Inorganic – non-sulfate[4]		3			47.7[2]

[1]filterable PM_{10} and $PM_{2.5}$ values expressed as percent of filterable PM values – note that for lime kilns with ESPs, PM_{10} and $PM_{2.5}$ were calculated as percent of total PM by adding 0.004 gr/dscf to total PM values; average PM_{10} and $PM_{2.5}$ values without such adjustment would be higher (64.2% and 23.6%, respectively); [2]organic and inorganic (sulfate and non-sulfate) CPM values expressed as percent of total CPM values; [3]may be estimated using the fractions for lime kilns with dry ESPs in Table 3; [4]see footnote 3 in Table 1

Note – italicized entries denote non-detects shown at ½ detection limit

Table A4. Kraft Lime Kiln Particulate Matter Emissions

Mill Code	Total In-Stack PM gr/dscf	PM_{10}[1] As % of PM	$PM_{2.5}$[1] As % of PM	Total CPM (lb/t CaO)	Organic CPM lb/t CaO	Organic CPM % of total	Inorganic CPM Total lb/t CaO	Inorganic CPM Total % of total	Inorganic CPM SO_4 as H_2SO_4 lb/t CaO	Inorganic CPM SO_4 as H_2SO_4 % of total
Lime Kilns with ESPs										
A	0.0044	27.4%	9.5%	0.1748	0.0357	20.4%	0.1391	79.6%	0.0576	32.9%
E	0.0035	36.0%	16.0%	0.1979	0.0940	47.5%	0.1038	52.5%	0.0200	10.1%
G	0.0020	28.3%	23.3%	0.0565	0.0057	10.0%	0.0509	90.0%		
LKC1a	0.0014	8.4%	0.0%							
LKC1b	0.0015	18.7%	0.0%							
LKC6	0.0334	62.4%	17.0%							
LKC12				0.1789						
Mean	0.0077	30.2%	11.0%	0.1520	0.0451	31.5%[2]	0.0979	68.5%[2]	0.0388	20.8%[2]
Number	6	6	6	4	3		3		2	
Lime Kilns with Wet Scrubbers										
LKA1	0.0581	79.9%	78.0%	0.1494						
LKA2	0.0837	93.0%	91.0%	0.2507						
LKAB	0.0588	102.4%	95.9%	0.1897						
LKAC1	0.0476	92.1%	85.5%	0.1378						
LKAC2	0.1127	70.7%	50.1%	0.2217						
LKAE	0.0719			0.0663						
LKAH	0.0531	70.2%	60.5%	0.1130						
Mill C	0.0430			0.0700	0.0024	3.4%	0.0676	96.6%	0.0429	61.3%
Mill E	0.1640			0.0300	0.0044	14.6%	0.0256	85.4%	*0.0153*	*51.0%*
Mill F	0.0678			0.0200	0.0033	16.3%	0.0167	83.7%		
Mill H	0.0413			0.4532						
(Mean)	0.0729	(84.7%)	(76.8%)	(0.1547)	0.0033	8.3%[2]	0.0367	91.7%[2]	0.0291	58.2%[2]
Number	11	6	6	11		3		3		2
Lime Kilns with Wet Scrubber and ESP										
Mill D	0.0030			0.0700					0.0370	51.0%
Mill G	0.0033			0.1614	0.0887	54.9%	0.0728	45.1%		
Mean	0.0032			0.1157	0.0887	54.9%[2]	0.0728	45.1%[2]	0.0370	51.0%[2]
Number	2			2	1		1		1	

[1]For lime kilns with ESPs, PM_{10} and $PM_{2.5}$ is calculated as percent of total PM by adding 0.004 gr/dscf to total PM value; average PM_{10} and $PM_{2.5}$ values without such adjustment would be higher (64.2% for mean and 23.6% for median); [2]The mean % for organic CPM is obtained by dividing the mean organic CPM in lb/t CaO by the mean of the corresponding set of total CPM in lb/t CaO - same for inorganic CPM (total and SO_4 as H_2SO_4).

Note – italicized entries denote non-detects shown at ½ detection limit

Table 1.3-1. CRITERIA POLLUTANT EMISSION FACTORS FOR FUEL OIL COMBUSTION[a]

Firing Configuration (SCC)[a]	SO_2[b]		SO_3[c]		NO_x[d]		CO[e]		Filterable PM[f]	
	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING
Boilers > 100 Million Btu/hr										
No. 6 oil fired, normal firing (1-01-004-01), (1-02-004-01), (1-03-004-01)	157S	A	5.7S	C	47	A	5	A	9.19(S)+3.22	A
No. 6 oil fired, normal firing, low NO_x burner (1-01-004-01), (1-02-004-01)	157S	A	5.7S	C	40	B	5	A	9.19(S)+3.22	A
No. 6 oil fired, tangential firing, (1-01-004-04)	157S	A	5.7S	C	32	A	5	A	9.19(S)+3.22	A
No. 6 oil fired, tangential firing, low NO_x burner (1-01-004-04)	157S	A	5.7S	C	26	E	5	A	9.19(S)+3.22	A
No. 5 oil fired, normal firing (1-01-004-05), (1-02-004-04)	157S	A	5.7S	C	47	B	5	A	10	B
No. 5 oil fired, tangential firing (1-01-004-06)	157S	A	5.7S	C	32	B	5	A	10	B
No. 4 oil fired, normal firing (1-01-005-04), (1-02-005-04)	150S	A	5.7S	C	47	B	5	A	7	B
No. 4 oil fired, tangential firing (1-01-005-05)	150S	A	5.7S	C	32	B	5	A	7	B
No. 2 oil fired (1-01-005-01), (1-02-005-01), (1-03-005-01)	142S[h]	A	5.7S	C	24	D	5	A	2	A
No.2 oil fired, LNB/FGR, (1-01-005-01), (1-02-005-01), (1-03-005-01)	142S[h]	A	5.7S	A	10	D	5	A	2	A

Table 1.3-1. (cont.)

Firing Configuration (SCC)[a]	SO_2[b]		SO_3[c]		NO_x[d]		CO[e]		Filterable PM[f]	
	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING
Boilers < 100 Million Btu/hr										
No. 6 oil fired (1-02-004-02/03) (1-03-004-02/03)	157S	A	2S	A	55	A	5	A	9.19(S)+3.22[i]	B
No. 5 oil fired (1-03-004-04)	157S	A	2S	A	55	A	5	A	10[i]	A
No. 4 oil fired (1-03-005-04)	150S	A	2S	A	20	A	5	A	7	B
Distillate oil fired (1-02-005-02/03) (1-03-005-02/03)	142S	A	2S	A	20	A	5	A	2	A
Residential furnace (A2104004/A2104011)	142S	A	2S	A	18	A	5	A	0.4[g]	B

a To convert from lb/103 gal to kg/103 L, multiply by 0.120. SCC = Source Classification Code.
b References 1-2,6-9,14,56-60. S indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S = 1.
c References 1-2,6-8,16,57-60. S indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S = 1.
d References 6-7,15,19,22,56-62. Expressed as NO2. Test results indicate that at least 95% by weight of NOx is NO for all boiler types except residential furnaces, where about 75% is NO. For utility vertical fired boilers use 105 lb/103 gal at full load and normal (>15%) excess air. Nitrogen oxides emissions from residual oil combustion in industrial and commercial boilers are related to fuel nitrogen content, estimated by the following empirical relationship: lb NO2 /103 gal = 20.54 + 104.39(N), where N is the weight % of nitrogen in the oil. For example, if the fuel is 1% nitrogen, then N = 1.
e References 6-8,14,17-19,56-61. CO emissions may increase by factors of 10 to 100 if the unit is improperly operated or not well maintained.
f References 6-8,10,13-15,56-60,62-63. Filterable PM is that particulate collected on or prior to the filter of an EPA Method 5 (or equivalent) sampling train. Particulate emission factors for residual oil combustion are, on average, a function of fuel oil sulfur content where S is the weight % of sulfur in oil. For example, if fuel oil is 1% sulfur, then S = 1.
g Based on data from new burner designs. Pre-1970's burner designs may emit filterable PM as high as 3.0 1b/103 gal.
h The SO2 emission factor for both no. 2 oil fired and for no. 2 oil fired with LNB/FGR, is 142S, not 157S. Errata dated April 28, 2000. Section corrected May 2010.
i The PM factors for No.6 and No. 5 fuel were reversed. Errata dated April 28, 2000. Section corrected May 2010.

Table 4.27 Summary of Trace Metal Emissions from Kraft Lime Kilns with Wet Scrubbers (lb/T CaO)

Trace Metal	No. of Sources Tested*	Included	Detects	Min	Max	Median	Mean	Std. Dev.	UPL**
Antimony (Sb)	15	12	8	1.9E-07	1.0E-05	2.30E-06	3.22E-06	3.17E-06	8.45E-06
Arsenic (As)	15	13	7	1.1E-06	1.2E-04	2.80E-06	1.32E-05	3.12E-05	9.00E-05
Beryllium (Be)	15	13	6	2.30E-07	1.00E-05	5.80E-07	1.19E-06	2.55E-06	7.48E-06
Cadmium (Cd)	15	15	12	1.80E-06	2.30E-04	5.81E-06	2.60E-05	5.54E-05	1.17E-04
Chromium (Cr)	15	15	14	5.80E-06	9.60E-04	1.81E-04	2.68E-04	2.53E-04	8.90E-04
Hexavalent Cr[1]	3	2	1	<1.8E-05	7.60E-05	4.25E-05	4.25E-05	--	--
Cobalt (Co)	15	12	10	2.80E-07	3.60E-05	2.29E-06	8.57E-06	1.04E-05	3.42E-05
Lead (Pb)[b]	15	15	12	2.20E-06	4.30E-02	2.86E-04[a]	6.17E-03	1.15E-02	3.44E-02
Manganese (Mn)	15	15	15	1.00E-04	6.91E-03	3.91E-04	1.66E-03	2.36E-03	7.46E-03
Mercury (Hg)	15	8	3	<1.5E-08	5.20E-06	3.68E-06[a]	4.00E-06	4.58E-07	4.76E-06
Nickel (Ni)	15	15	15	1.46E-05	1.28E-03	8.62E-05	2.74E-04	3.69E-04	1.18E-03
Selenium (Se)	15	14	6	<4.7E-07	1.20E-04	3.00E-06	1.42E-05	2.99E-05	8.77E-05
Phosphorus (P)[2]	11	11	11	1.30E-03	1.91E-02	2.80E-03	5.80E-03	6.62E-03	2.23E-02
Copper (Cu)	12	12	12	9.00E-06	1.80E-04	6.70E-05	7.99E-05	6.69E-05	2.46E-04
Silver (Ag)	9	7	5	2.20E-07	1.70E-05	1.20E-06	4.69E-06	6.62E-06	1.56E-05
Thallium (Tl)	4	3	3	5.80E-07	7.80E-06	1.06E-06	3.15E-06	4.04E-06	9.81E-06
Barium (Ba)	8	6	6	5.60E-05	1.44E-03	4.35E-04	5.87E-04	5.62E-04	1.51E-03
Zinc (Zn)	8	8	8	5.80E-05	1.10E-02	1.05E-04	1.59E-03	3.81E-03	1.12E-02

Other Trace Metals and Non-Metals (in lb/T CaO)

	Sources	Min	Max	Mean		Sources	Min	Max	Mean
Aluminum (Al)	2	8.8E-04	3.0E-04	5.9E-04	Molybdenum(Mo)	2	5.0E-06	3.5E-06	4.3E-06
Boron (B)	2	1.3E-04	7.4E-05	1.0E-04	Sodium (Na)	2	9.3E-02	4.7E-01	2.8E-01
Bismuth (Bi)	1	--	--	1.6E-06	Sulfur (S)[3]	2	3.5E-02	2.9E-01	1.6E-01
Calcium (Ca)	2	1.0E-01	5.7E-02	8.0E-02	Silicon (Si)	2	2.9E-02	1.0E-02	2.0E-02
Chlorine (Cl)	2	7.9E-03	7.3E-03	7.6E-03	Tin (Sn)	2	5.5E-06	3.8E-06	4.7E-06
Iron (Fe)	2	4.0E-03	1.8E-03	2.9E-03	Strontium (Sr)	2	3.0E-04	2.1E-04	2.6E-04
Potassium (K)	2	2.9E-03	2.2E-02	1.3E-02	Thorium (Th)	2	8.0E-07	9.0E-08	4.5E-07
Lithium (Li)	2	4.8E-06	8.9E-06	6.8E-06	Titanium (Ti)	2	2.7E-04	6.3E-05	1.7E-04
Magnesium(Mg)	2	2.4E-02	7.1E-03	1.6E-02	Uranium (U)	2	3.9E-08	6.6E-08	5.3E-08
					Vanadium (V)	2	1.0E-06	3.0E-06	2.0E-06

*No. of sources tested represents the total number of sources that were tested. No. of sources included represents the sources for which data were included in the analysis for estimating averages. The difference represents sources whose data were rejected mainly because they yielded non-detects with detection limits exceeding the highest detected observation. Occasionally, an observation confirmed to be a statistical outlier was also rejected.

**UPL=upper prediction limit. Estimated using mean + 1.65 x std. dev. for normally distributed data and the Chebyshev Inequality with 85% confidence coefficient for non-normally distributed data.

[1]One unit had a Cr^{+6} to total Cr ratio of 3.2%; two other units had NDs for Cr^{+6} with detection limits that were higher than the corresponding detects for total Cr. [2]Phosphorus is a non-metal. [3]Most likely in the form of chlorides or sulfates.

[a] Modified Kaplan-Meier median - 50 percentile value obtained from best curve fit of the quantiles generated by the K-M subroutine. [b]See discussion in Section 4.3.3.2

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Africa	+ 27 11 254 4800
Asia	+ 852 2562 3658
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Inc.
6026 NW 1st Place
Gainesville, FL 32607 USA
Tel: (352) 336-5600
Fax: (352) 336-6603

Golder Associates

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