GEORGIA-PACIFIC CORPORATION

PALATKA MILL

COMBINED PSD PERMIT APPLICATION

FOR

NO. 4 RECOVERY BOILER TUBE

REPLACEMENT PROJECT

AND

NO. 4 LIME KILN SHELL

REPLACEMENT PROJECT

PALATKA (PUTNAM COUNTY), FLORIDA

JULY 2006

Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

July 17, 2006

Mr. Jeffrey Koerner, P.E., Permitting North Administrator
Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road, MS #5505
Tallahassee, Florida 32399-2400

RECEIVED
JUL 18 2006
BUREAU OF AIR REGULATION

Re: **Georgia-Pacific Palatka Mill - PSD Permit Applications – Consolidated Package**

Lime Kiln (LK) Shell	Project No.: 1070005-030-AC/PSD-FL-345
#4 Combination Boiler (CB)	Project No.: 1070005-033-AC/PSD-FL-357
#4 Recovery Boiler (RB)	Project No.: 1070005-035-AC/PSD-FL-367

Dear Mr. Koerner:

Enclosed are 7 complete copies of the consolidated package containing the #4 Recovery Boiler / #4 Lime Kiln Shell PSD application and the #4 Combination Boiler PSD Application. This package represents the consolidation of the above referenced PSD Applications sent to your department in 2004 and 2005 and subsequently withdrawn on July 11, 2006. Also included is a letter from Mr. Dave Buff, P.E. that summarizes how the projects were aggregated and the impacts on allowable emissions. Attached to Mr. Buff's letter is the updated netting table for these projects. To aid your review and understanding of this package, attached to this letter are the introduction sections of both applications.

We are submitting this package per discussions with you and your staff. Because this submittal is to consolidate and aggregate the three projects for which application fees were paid and that have already been reviewed by the Department, no additional application fee was to be required and none is enclosed. During the past year GP and DEP had settled on several limits for the #4 Recovery Boiler and the #4 Lime Kiln. GP intended to minimize any changes contained in this package compared to previous discussions with the Department. However, with the removal of the #4 Lime Kiln Petroleum Coke (Petcoke) fuel project, several changes to emissions limits are warranted. In order to facilitate the Department's review, and to avoid misunderstandings that might delay the issuance of a final PSD Permit, the updates contained in this package are listed below.

For the Recovery Boiler Project, GP had proposed a reduction in the mill wide Sulfur-in-fuel limitation from 2.35% Sulfur to 2.1% Sulfur. The elimination of the impact of the Petcoke project has allowed GP to maintain the current 2.35%S limit. The short term (24-hour) emission limit for SO2 has been changed from 37.5 ppm to 100 ppm based on the results of new ambient air modeling. During discussions between GP and DEP in early 2006, the possibility of increasing this short term limit was discussed and tentatively accepted as long as modeling supported the revised limit and the modeling results were submitted to the Department. The appropriate modeling has been completed and is included herein.

For the Lime Kiln Shell Project GP in July 2005 GP had agreed to a TRS limit of 17 ppm (12-hour average). However, with revised TRS information and modeling, the current limit of 20 ppm is proposed to remain the same.

Because some of the work included in this package could be started and finished this year, we are very interested in meeting with you and your staff to resolve any issues that could delay the processing of the permit.

If you have any questions please call me at (386) 329-0918.

Sincerely,

Myra J. Carpenter

Myra J. Carpenter
Environmental Superintendent

cc: T. Champion, S.D. Matchett, T. Wyles, E. Jamro
Mr. D. Buff – Golder Asso.

Golder Associates Inc.

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July 14, 2006

0537627

Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road, MS #5505
Tallahassee, Florida 32399-2400

Attention: Mr. Jeffrey Koerner, PE – Permitting North Administrator

**RE: GEORGIA-PACIFIC CORPORATION, PALATKA MILL
FACILITY I.D. NO. 1070005
PSD APPLICATION FOR NO. 4 RECOVERY BOILER, NO. 4 LIME KILN, AND NO. 4 COMBINATION BOILER PROJECTS**

Dear Mr. Koerner:

Georgia-Pacific Corporation (GP) operates an unbleached and bleached Kraft pulp and paper Mill in Palatka, Florida (Putnam County). In November 2005, the Mill submitted prevention of significant deterioration (PSD) applications for projects at the No. 4 Recovery Boiler and No. 4 Lime Kiln. The No. 4 Recovery Boiler application also reflected emission changes due to a planned project to allow the burning of petroleum coke in the Lime Kiln, as well as a project planned for the No. 4 Combination Boiler. The application was submitted using the past actual-to-future potential accounting methodology.

In light of the Mill's decision not to pursue the petroleum coke project at this time, Mr. Jeff Koerner of the Florida Department of Environmental Protection (FDEP) advised the Mill, in an email dated June 22, 2006, to withdraw these PSD applications and resubmit them, without the petroleum coke project, but along with an application for projects proposed for the No. 4 Combination Boiler. Accordingly, this PSD application is being submitted to cover the previously proposed projects for the No. 4 Recovery Boiler and the No. 4 Lime Kiln. In addition, the PSD application also covers projects being proposed for the No. 4 Combination Boiler. The PSD application information for the No. 4 Recovery Boiler and No. 4 Lime Kiln are contained in one volume, prepared by GP. The PSD application information for the No. 4 Combination Boiler is contained in a separate volume, prepared by Golder Associates Inc. (Golder).

As directed by the FDEP, emission increases for all three of these projects have been added to increases for other past and future projects, even though those projects are unrelated. In the interest of time and in order to avoid additional recordkeeping requirements that would be triggered if it were determined that there is a "reasonable possibility" that a PSD-significant increase will occur, GP has continued to conduct the PSD applicability analysis using the past actual-to-future potential accounting methodology.

GP continues to believe that this process of aggregating unrelated projects is inconsistent with past EPA guidance on this topic. For example, while actual emissions are expected to increase for the No. 4 Recovery Boiler, that is clearly not the case for the Lime Kiln. The Lime Kiln project, if reviewed on its own merit using a past actual-to-projected actual accounting methodology, would not trigger PSD review. Yet, GP has been forced to include it in this application, and the increases from the other projects cause this one to go through PSD review as well. GP does not consider the processing history of these applications to have established a precedent for future applications.

A summary table of the netting analysis is contained in Table 1 attached. The netting analysis includes the emission changes due to the Bark Handling System project (permit issued in November 2004). Also included are the contemporaneous emission increase and decreases occurring at the Mill in the last 5 years.

Following the more conservative accounting methodology, as discussed above, and taking into account net emission changes that have occurred during the last five years, PSD review is triggered for particulate matter (both total suspended particulate matter and particulate matter less than 10 micrometers in aerodynamic diameter), nitrogen oxides, carbon monoxide, sulfuric acid mist, and ozone (based on a significant increase in volatile organic compound emissions).

PSD review is not triggered for sulfur dioxide (SO_2), lead, total reduced sulfur (TRS) compounds, fluorides or mercury. The Mill is requesting voluntary, federally-enforceable restrictions for SO_2 and TRS in order to avoid PSD review for these pollutants.

The PSD permit application includes completed permit application forms, detailed emission calculations, and Best Available Control Technology (BACT) reviews. The air quality analysis is included in the application volume which addresses the No. 4 Recovery Boiler and the No. 4 Lime Kiln, as Attachment C.

GP understands that, based on correspondence with you, a single PSD permit will be issued by the Florida DEP to cover all three projects. GP also anticipates, given the fact that numerous requests for additional information (RAIs) have already been answered by GP on the Recovery Boiler and Lime Kiln applications and emission limits have been discussed extensively, that any additional questions concerning modifications to these sources should be minimal. If you have any questions regarding this matter, please contact Ms. Myra Carpenter at (386) 329-0918.

Sincerely,

GOLDER ASSOCIATES INC.

David A. Buff

David A. Buff, P.E., Q.E.P.
Principal Engineer

Enclosures

DB/nav

cc: Myra J. Carpenter, GP
Ed Jamro, GP
Tammy Wyles, GP
Wayne Galler, GP
Scott Matchett, GP
C. Booth, Golder Associates Inc.

0537627/CB4-RB4-LK4 submit ltr 7-14-06.doc

TABLE OF CONTENTS

3. INTRODUCTION

5. REGULATORY APPLICABILITY

1. EXECUTIVE SUMMARY

Georgia-Pacific Corporation (GP) operates an unbleached and bleached Kraft pulp and paper Mill in Palatka, Florida (Putnam County). Processes and systems at the Mill include a batch digester system, multiple effect evaporator (MEE) system, condensate stripper system, recovery boiler and smelt dissolving tanks, lime kiln, tall oil plant, utilities, bleach plant, chlorine dioxide plant, paper machines and converting operations used to produce finished paper products from virgin wood.

Putnam County has been designated by the U.S. Environmental Protection Agency (US EPA) as in attainment or unclassified for all criteria pollutants. The existing Mill is classified as a major stationary source under Prevention of Significant Deterioration (PSD) and Clean Air Act Title V definitions since it has the potential-to-emit more than 100 tons per year (tpy) of at least one regulated air pollutant.

The Mill previously submitted PSD applications for projects at the No. 4 Recovery Boiler and No. 4 Lime Kiln, including a planned project to allow the burning of petcoke in the Lime Kiln. In light of the Mill's decision not to pursue the petcoke project at this time, Mr. Jeff Koerner of the Florida Department of Environmental Protection (DEP) advised the Mill to withdraw these PSD applications and resubmit them, without the petcoke project but along with an application for projects proposed at the No. 4 Combination Boiler[1]. Accordingly, this PSD application is being submitted to cover the previously proposed projects for the No. 4 Recovery Boiler and the No. 4 Lime Kiln. A separate application is being submitted by Golder Associates, Inc. to cover projects for the No. 4 Combination Boiler. We understand, from our correspondence with Mr. Koerner, that a single PSD permit will be issued by the Florida DEP to cover all three projects.

No. 4 Recovery Boiler

Several projects are proposed for the No. 4 Recovery Boiler (Emission Unit ID No. 018) and associated evaporators. First, the Mill plans to replace a significant number of tubes in the No. 4 Recovery Boiler. This includes tubes in the superheater, economizer, and generating banks of the Boiler. This major tube work is estimated to commence in May 2007 and conclude in 2008. The total cost of this work is estimated to be in the range of $24 million. Many of the tubes to be replaced are originals that have been in place since the boiler was constructed in the mid-1970s. Because of the scope and cost of this project, and in light of continuing uncertainty in the law as to the meaning of "routine maintenance, repair and replacement", GP decided not to pursue that exemption for this work.

Although still in the preliminary engineering phase, the Mill is also considering replacement of, or changes to, the combustion air system for the recovery boiler. The objective of this part of the project is to lower peak furnace exit gas temperature and velocity into the superheater in an effort to reduce the potential for corrosion and pluggage of the superheater in the future. The new air system is also expected to reduce carry over and fouling in the Boiler convection banks. Through the staging of air, it is anticipated that emissions of some pollutants (*e.g.*, total reduced sulfur (TRS) compounds and carbon monoxide (CO)) will be more consistently controlled and/or reduced. At the same time, by reducing CO and increasing boiler efficiency, nitrogen oxides (NO_x) emissions are expected to increase slightly. To avoid the slight increase in NO_x emissions, the Mill plans to install a fourth level of combustion air to the boiler.

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[1] **Based on an e-mail sent by from Mr. Jeff Koerner of the FDEP to Mr. Ed Jamro of GP, dated June 22, 2006.**

The Mill is in the process of receiving vendor quotations for this work, including suggested scope. As such, the exact scope of this work is not available at this time.

A third project, which is planned to be completed in the spring of 2007, involves a change to the black liquor evaporation system (No. 4 Evaporator Set). This change will increase the solids concentration of the black liquor to the Recovery Boiler from 65 percent to approximately 75 percent solids. The purpose of the project is to increase efficiency by reducing the amount of water entering the recovery boiler with the liquor solids. The increase in solids will improve the efficiency of the boiler for steam production per pound of BLS, thus reducing the amount of steam produced from oil firing in the other boilers.

Finally, the Mill is considering the removal of some internal baffles and resizing some down comer piping in the existing concentrators. The unit currently has scaling problems, leading to the need for frequent "boil outs". The proposed changes will improve liquor circulation and increase velocity through the tubes, which should reduce scaling and fouling. This will increase the time between "boil outs". In addition, an external heat exchanger will be added to the existing concentrators to preheat the liquor with steam prior to entry into the concentrators. This will allow for increased evaporation, providing for a capability that more closely matches the capacity of the No. 4 Recovery Boiler.

No. 4 Lime Kiln

The Mill is proposing to replace a major section of the No. 4 Lime Kiln shell. In November 2003, the Mill experienced a near catastrophic failure of the Kiln shell. The Kiln had cracks all the way through the shell in several different areas of the "hot end". The failure occurred due to metal fatigue and crystallization, cooler design, and shell age. The November 2003 outage resulted in an unbudgeted expenditure of $639,200 for maintenance repairs and purchased chemicals.

In February 2006, a similar failure occurred in the same location on the lime kiln shell. The crack completely penetrated the shell and ran continuously around 70% of the circumference. The resulting 10-day emergency shutdown and repair cost $2.5 million. Based on testing and evaluation from the original equipment manufacturer, the failure is expected to recur sometime in the future.

An equipment vendor has recommended that the Mill replace 61 feet of the "hot end" kiln shell and refractory, and all ten (10) coolers. The total cost of this project is estimated at approximately $2 million. The Mill plans to complete this work during their spring outage in 2007.

The reformed New Source Review (NSR) regulations that were promulgated by the US Environmental Protection Agency (EPA) on December 31, 2002 and adopted by the Florida DEP in the spring of 2006, allow emission changes from projects of this nature to be evaluated on a "past actual-to-projected actual" basis. Using that calculation method, the triggering of NSR permitting would not be an issue since emissions for the No. 4 Lime Kiln are not expected to increase as a result of the project. However, in the case of the No. 4 Recovery Boiler project, actual black liquor solids throughput is expected to increase. Therefore, the comparison of "past actual-to-projected actual" emissions would trigger PSD review.

Furthermore, the exclusion for routine maintenance, repair, and replacement (RMRR) projects, such as the No. 4 Lime Kiln shell replacement project, is a case-by-case decision. Even though this is clearly a maintenance project, and a critical one at that, the federal NSR rules that provided clear criteria for evaluating these types of projects has been vacated. As such, these projects continue to be evaluated on a case-by-case basis. Given the estimated cost of the proposed work and uncertainty as to whether this type of repair would be deemed "routine", GP has addressed this maintenance work in this application as well.

As directed by the FDEP, emission increases for these two projects have been added to increases for other past and future projects, even though those projects are unrelated. In the interest of time and in order to avoid additional recordkeeping requirements that would be triggered if it were determined that there is a "reasonable possibility" that a PSD-significant increase will occur, GP has opted to conduct the PSD applicability analysis using the past actual-to-future potential accounting methodology. GP continues to believe this process of aggregating unrelated projects is inconsistent with past EPA guidance on this topic. For example, as discussed above, while actual emissions are expected to increase for the No. 4 Recovery Boiler, that is clearly not the case for the Lime Kiln. The Lime Kiln project, if reviewed on its own merit using a past actual-to-projected actual accounting methodology, would not trigger PSD review. Yet, GP has been forced to include it in this application, and the increases from the other projects cause this one to go through PSD review as well. Following this more conservative accounting methodology, PSD review is triggered for particulate matter (both total suspended particulate matter and particulate matter less than 10 micrometers in aerodynamic diameter), nitrogen oxides, carbon monoxide, sulfuric acid mist, and ozone (based on a significant increase in volatile organic compound emissions). PSD review is not triggered for emissions of sulfur dioxide (SO_2), lead or total reduced sulfur (TRS) compounds. The Mill is taking voluntary, federally-enforceable restrictions for SO_2 and TRS to avoid PSD review for these pollutants.

The PSD permit application includes completed permit application forms, detailed emission calculations, Best Available Control Technology (BACT) review, and an air quality analysis.

2. PERMIT APPLICATION FORMS

The completed, long version of the Florida Department of Environmental Protection's (DEP's) permit application forms is included in Attachment A.

0537627/0300/Forms

3. INTRODUCTION

3.1 Facility Location and Description

Georgia-Pacific Corporation (GP) operates an unbleached and bleached Kraft pulp and paper Mill in Palatka, Florida (Putnam County). Processes and systems at the Mill include a batch digester system, multiple effect evaporator (MEE) system, condensate stripper system, recovery boiler and smelt dissolving tanks, lime kiln, tall oil plant, utilities, bleach plant, chlorine dioxide plant, paper machines and converting operations used to produce finished paper products from virgin wood.

The Mill site is located north of County Road 216 and west of U.S. Highway 17. The approximate Universal Trans Mercator (UTM) coordinates are 434.0 kilometers (km) east and 3283.4 km north in Zone 17. The Mill location is shown on a United States Geological Survey (USGS) topographic map in Figure 3-1. A plot plan of the facility is included as Figure 3-2. Figure 3-3 is a simplified process flow diagram for the entire facility.

While equipment capacities may vary throughout the Mill, the current permitted allowable production level is 118 tons per hour of air dried unbleached pulp (ADUP) and 1,850 ADUP per day as a maximum monthly average.

Putnam County has been designated by the U.S. Environmental Protection Agency (US EPA) as in attainment or unclassified for all criteria pollutants. The existing Mill is classified as a major stationary source under Prevention of Significant Deterioration (PSD) and Clean Air Act Title V definitions since it has the potential-to-emit more than 100 tons per year (tpy) of at least one regulated air pollutant. The initial Title V permit was issued to the Palatka Mill on October 30, 2000. The Mill is currently operating under Title V Permit 1070005-034-AV, issued in December 2005.

3.2 Project Description

No. 4 Recovery Boiler

The No. 4 Recovery Boiler was originally constructed in 1974 and started up in 1975. The current permitted capacity of the boiler is 210,000 pounds (lbs) per hour of black liquor solids (BLS) and 5.04 million pounds (MM lbs) of BLS per day. The boiler is currently permitted to combust natural gas, No. 6 fuel oil with a sulfur content not to exceed 2.35% by weight, and on-spec used oil as start-up fuels. The recovery boiler, which is equipped with an electrostatic precipitator (ESP) for particulate matter control, has been subjected to PSD review twice in the past – once in 1991 and a second time in 1995.

In 1991, the entire bottom of the recovery boiler was replaced and modifications were made to the combustion air system. The changes to the combustion air system resulted in an increased throughput from 189,000 lbs BLS per hour to the current permitted capacity of 210,000 lbs BLS per hour.

The project in 1995 involved the addition of sixteen (16) screen tube banks in the boiler. One of the benefits from the project was a decrease in the flue gas temperature in certain sections of the boiler, which reduced tube abrasion, resulting in an improvement in performance and reduced maintenance downtime. The installation of the additional tubes also had the potential to increase BLS throughput and steam production by 4% and 30,000 pounds per hour, respectively. While an actual throughput increase was anticipated, the Mill did not expect, nor request, an increase in the permitted capacity of the unit (210,000 lbs/hour and 5.04 MM lbs BLS/day).

The Mill is now proposing to implement several projects for the No. 4 Recovery Boiler and associated evaporators. These projects, described in more detail below, include (1) extensive replacement of tubes, (2) replacement or changes to the air system, (3) addition of a crystallizer, to increase BLS concentration and (4) miscellaneous changes (*i.e.,* baffles, heat exchanger, piping, etc.) to the concentrators.

Tube Replacements

The Mill plans to replace a large percentage of the tubes in the No. 4 Recovery Boiler. This includes tubes in the superheater, economizer, and generating banks of the boiler. This major tube work is estimated to commence in May 2007 and conclude in 2008. The total cost of this work is estimated to be in the range of $24 million. Many of the tubes to be replaced are originals that have been in place since the boiler was constructed in the mid-1970s. Because of the scope and cost of the project, and in light of continuing uncertainty in the law as to what is "routine", GP decided not to pursue an exemption for this work as "routine maintenance, repair, and replacement." The preliminary scope for the tube replacements, although subject to change, is presented in Table 3-1.

Table 3-1. Preliminary Scope for Tube Maintenance on No. 4 Recovery Boiler

Boiler Section	Approximate Number of Tubes Involved	Affected Area/ Total Tube Area in Boiler (Percent)	Comments
Superheater	3,500	37.1	Most tubes are original. Three tubes have failed under pressure in the past 18 months.
Economizer	1,700	23.6	Tubes are original. Five tubes have failed under pressure in the past 26 months. Numerous tubes are plugged at both ends from previous failures.
Generating Bank	2,100	16.9	Tubes are original to boiler.
Floor	130	1.2	All but 14 tubes are original to boiler.

Combustion Air System

Although still in the preliminary engineering phase, the Mill is also considering replacement of, or changes to, the combustion air system for the boiler. The objective of this part of the project is to lower peak furnace exit gas temperature and velocity into the superheater in an effort to reduce the potential for erosion and pluggage of the superheater in the future. The new air system is also expected to reduce carry over and fouling in the boiler convection banks. Through the staging of air, it is anticipated that emissions of some pollutants (*e.g.,* total reduced sulfur (TRS) compounds and carbon monoxide (CO)) will be more consistently controlled and/or reduced). At the same time, by reducing CO and increasing boiler efficiency, nitrogen oxide (NO_x) emissions are expected to increase slightly. To avoid the slight increase in NO_x emissions, the Mill plans to install a fourth level of combustion air to the boiler. The Mill is in the process of receiving vendor quotations for this work, including suggested scope. As such, the exact scope of this work is not available at this time. The current cost estimate is less than $2 million.

Crystallizer

A third project involves a change to the black liquor evaporation system (No. 4 Evaporator Set). This change will increase the solids concentration of the black liquor to the recovery boiler from 65 percent solids to approximately 75 percent solids. When the new system is operational, the liquor from the concentrator will pass through a crystallizer vessel to raise the temperature of the liquor. The liquor will then enter a storage/flash tank at lower pressure where the moisture will "flash off". The "flash" vapors will then be routed to the existing evaporator system and collected as part of the existing non-condensable gas (NCG) collection system. The purpose of the project is to increase boiler efficiency by reducing the amount of water entering the boiler with the liquor solids. The increase in solids will improve the efficiency of the boiler for steam production per pound of BLS, thus reducing the amount of steam produced from oil firing in the other boilers. The estimated cost of this work is in the range of $5 to $6 million.

Concentrators

Finally, the Mill is considering the removal of some internal baffles and resizing some downcomer piping in the existing concentrators. The unit currently has scaling problems, leading to frequent "boil outs". The proposed changes will improve liquor circulation and increase velocity through the tubes, which should reduce scaling and fouling. This will increase the time between "boil outs". In addition, an external heat exchanger will be added to the existing concentrators to preheat the liquor with steam prior to entry into the concentrators. This will allow for increased evaporation, providing for a capability that more closely matches the capacity of the recovery boiler.

No. 4 Lime Kiln

The No. 4 Lime Kiln was constructed in 1975 and started up in 1976. The permitted input capacity of this unit is 82,986 pounds per hour of calcium carbonate and inert materials (24-hr block average). This equates to 19.44 tons per hour of calcium oxide produced by the kiln. The kiln uses a venturi scrubber to control particulate matter emissions. This unit fires No. 6 fuel oil with a maximum sulfur content of 2.35% (by weight).

The Mill needs to replace a major section of the No. 4 Lime Kiln shell. In November 2003, the Mill experienced a near catastrophic failure of the kiln shell. The kiln had cracks all the way through the shell in several different areas of the "hot end". The failure occurred due to metal fatigue and crystallization, cooler design, and shell age. The failure occurred underneath the cooler tubes, which is causing excessive stress on the kiln shell. The original metal thickness was 1 7/8". The repairs made were for temporary use only since the only material available at the time of failure was 1" thick steel plate. The kiln also has a history of limited brick life due to shell deformation in the same area. The November 2003 outage resulted in an unbudgeted expenditure of $639,200 for maintenance repairs and purchased chemicals.

In February 2006, a similar failure occurred in the same location on the lime kiln shell. The crack completely penetrated the shell and ran continuously around 70% of the circumference. The resulting 10-day emergency shutdown and repair cost $2.5 million. Based on testing and evaluation from the original equipment manufacturer, the failure is expected to recur sometime in the future. The shell must be capable of handling in excess of 95,000 pounds from Pier #1 to the end of the shell (55,000 pounds of weight from the dam and lining; 4,000 pounds for each of the ten (10) cooler tubes). The current hot end shell thickness is inadequate to reliably handle this weight load.

An equipment vendor has recommended that the Mill replace 61 feet of the "hot end" kiln shell and refractory and all ten (10) coolers. The new coolers will have an improved mounting bracket design that will eliminate future stress cracking underneath the coolers. The total cost of this project is estimated at approximately $2 million, with approximately 75 percent of this total going toward the labor costs needed to complete the project. The Mill plans to complete this work during their spring outage in 2007.

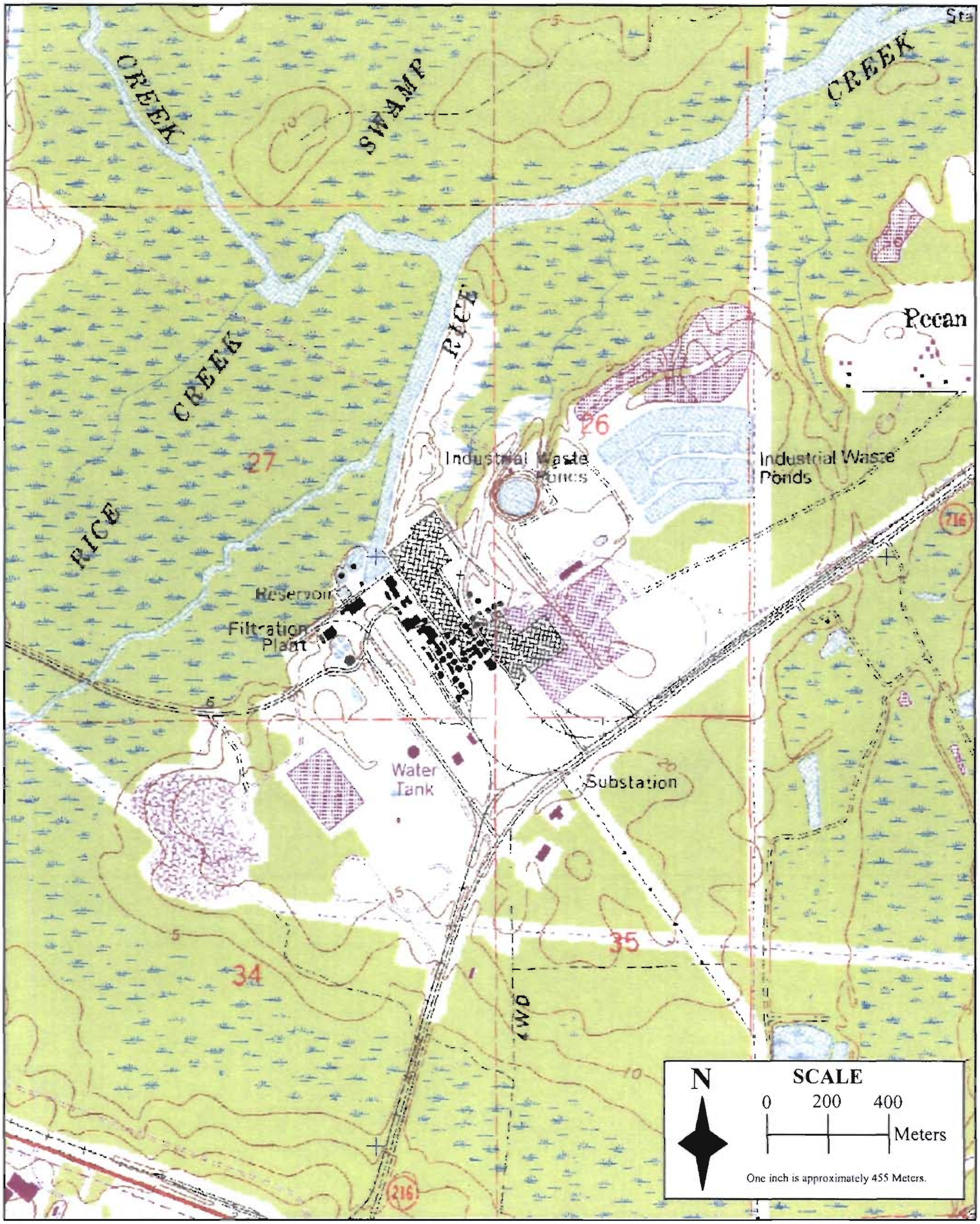
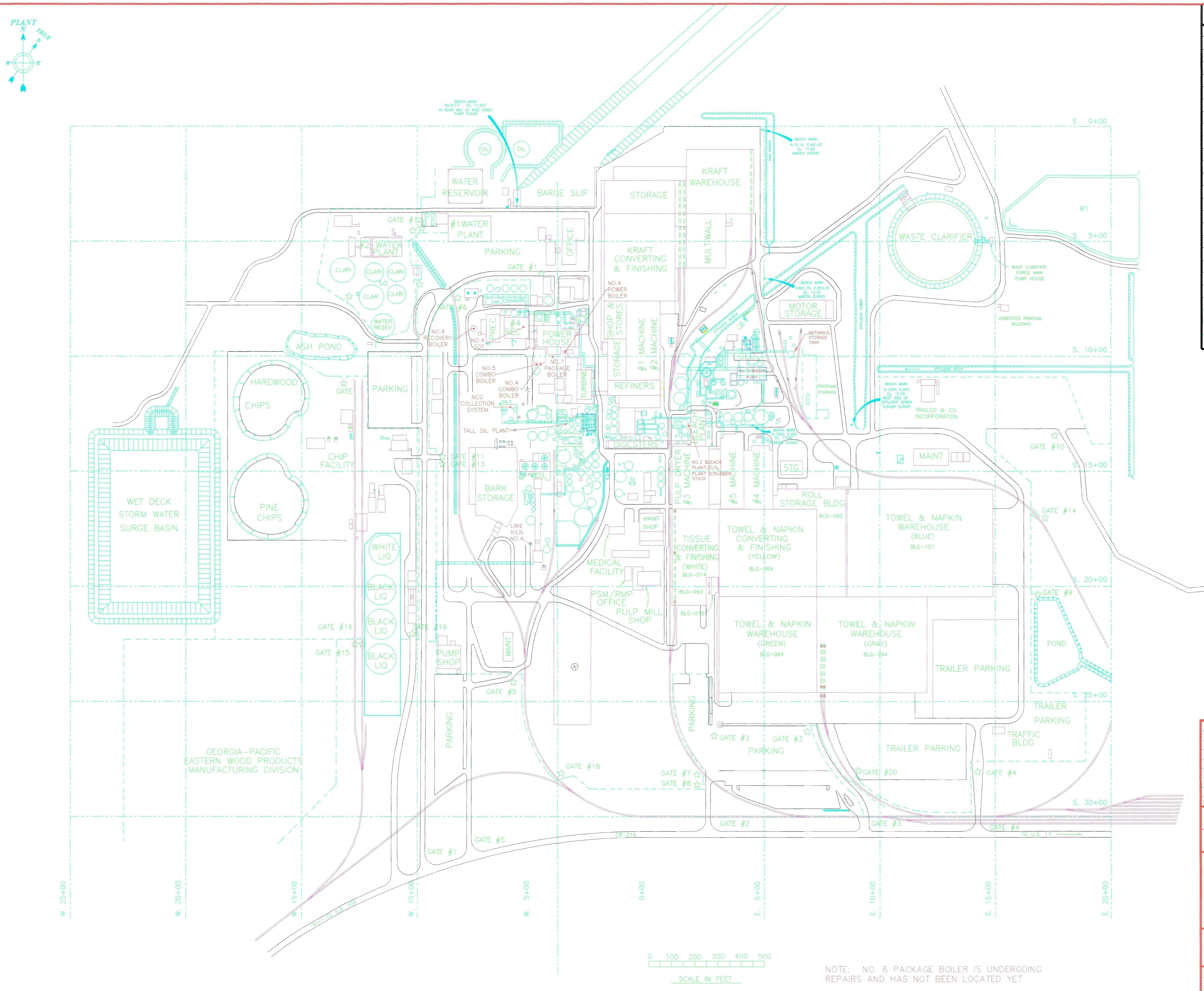


Figure 3-1
Area Map
Georgia-Pacific Corporation, Palatka Mill

Source: Golder, 2004.



NOTE: NO. 6 PACKAGE BOILER IS UNDERGOING REPAIRS AND HAS NOT BEEN LOCATED YET

NOTES

1070005-C38-AC ①

LEGEND & INFORMATION	
☆	GATE
═	RAILROAD TRACK
— — —	FENCE

GATE #	DESCRIPTION
1	MAIN GATE
2	EAST GATE
3	OLD CONSTRUCTION GATE
4	TRUCK TRAFFIC GATE
5	CONSTRUCTION GATE
6	R.R. GATE
7	R.R. GATE
8	PERIMETER GATE
9	PERIMETER GATE
10	CONSTRUCTION GATE
11	INNER MILL VEHICLE GATE
12	PERSONNEL GATE
13	PERSONNEL GATE
14	R.R. GATE
15	R.R. GATE
16	R.R. GATE
17	CONSTRUCTION GATE
18	R.R. GATE
19	CHIP TRUCK SCALE
20	R.R. GATE

REV.	DATE	DESCRIPTION	DRN. / CH'D.	AP'D
3	05/04/04	GOLDER TITLE V REVISION	NAV / DAB	DAB
2	12/02/02	GOLDER TITLE V REVISION	DTL / FWH	DAB
1	11/27/02	GOLDER TITLE V REVISION	DTL / FWH	DAB

CROSS-REFERENCE NO.
E-290-8469-1-0105-001

HUDSON NO.

Georgia-Pacific
THE GROWTH COMPANY
PALATKA OPERATIONS

FIGURE 3-2
FACILITY PLOT PLAN, PALATKA MILL
0437562\4\4.4\Plot Plan.dwg

DRAWN H. Trujillo	11/25/02	SCALE 1" = 150'
CHECKED		AFE NO.
APPROVED		PROJ NO.
APPROVED		AREA

G-P DRAWING NO.
290-8464MI -000-0009-006

CONSULTANT:
REV: 0

CONSULTANT NO.

4. EMISSION RATES

Detailed emission rate calculations are provided in Attachment B. The baseline annual throughput that is used in calculating past actual emissions for both the No. 4 Recovery Boiler and the No. 4 Lime Kiln, as well as all affected sources, is an average for the two-year period, January 2004 through December 2005. Actual source test results and operating hours were used in calculating the average, annual emissions for the baseline period when test data was available. If testing data was not available, published emission factors or engineering estimates were used.

No. 4 Recovery Boiler

The Mill is not proposing to increase the throughput that has been established in past permitting actions for the recovery boiler. In fact, in order to avoid PSD review for sulfur dioxide, the Mill is requesting an annual limit of 12 parts per million by volume (ppmv) (at 8% oxygen). This is a significant reduction over the current Title V limit of 75 ppmv (see detailed discussion in following paragraphs which discuss the current SO_2 permit limit and how it was derived). As discussed further in Section 5.2, there is a possibility that the addition of the crystallizer will lead to an increase in the maximum hourly emission rates for the recovery boiler, causing the unit to become subject to federal New Source Performance Standards. As such, an annual average of 5 ppmv (at 8% oxygen) is proposed for TRS compounds to avoid triggering PSD review. The Mill plans to retain the 12-hour block average of 11.2 ppmv for TRS compounds.

For sulfur dioxide, a request was submitted to the DEP in April 2004 to modify the short-term (3-hour and 24-hour average) emission rates for the recovery boiler. As explained in that submittal, the unit has been subjected to a number of permitting activities in the past and the history can be traced back to permits that were issued in the early- and mid-1980s. Varying sulfur dioxide emission limits have been imposed over time.

Air Operating Permit AO54-54072, dated June 1982, specified allowable sulfur dioxide emission rates for the recovery boiler of 277.5 lbs/hour and 1,189 tpy. Subsequently, Air Operating Permit AO54-131787, dated May 1987, specified allowable sulfur dioxide emission limits of 314.97 lbs/hour and 1,375.79 tpy. As part of the PSD permitting action in 1991, the Mill demonstrated that it could net out of PSD review for sulfur dioxide based on emission limits of 219.7 lbs/hour and 962.3 tpy for the Recovery Boiler. The rates that were proposed by the Mill were derived based on a stack gas concentration of 75 ppmvd, corrected to 8 percent oxygen and a gas flow rate of 210,000 dry standard cubic feet per minute (dscfm) at 2.8 percent oxygen (this also corresponds to a gas flow rate of 294,000 dscfm at 8 percent oxygen). In its technical review of the 1991 application, the Department proposed to establish limits that were approximately one-half of those proposed by the Mill, even though there were no issues with the application of Best Available Control Technology (BACT) since this pollutant had netted out of PSD review, even at the higher rates. The values proposed by the Department were 109.9 lbs/hour and 481.4 tpy, based on a concentration of 37.5 ppmvd, corrected to 8 percent oxygen. To GP's knowledge, these lower limits had nothing to do with PSD applicability or the 75 ppmvd concentration that was provided in the permit application. Rather, the 37.5 ppmvd concentration limit was an arbitrary multiple of 3.75 times the highest annual average concentration (10 ppmvd) shown by the Mill's uncertified continuous emission monitor (CEM) in prior years.

Subsequently, in a May 1991 letter, the Mill objected to these limits. However, the Mill mistakenly asked that the short-term limit of 109.9 lbs/hour be established "as requested in our application". As discussed previously, the value that was requested in the application was actually 219.7 lbs/hour, not 109.9 lbs/hour. In the May 1991 letter, the Mill intended to ask that the 219.7 lbs/hour value be established "as requested in our application". At any rate, the 109.9 lbs/hour value was included in the final permit (Permit No. PSD-FL-171, issued June 7, 1991), although the concentration limit of 37.5 ppmvd was removed.

The PSD permit issued for the recovery boiler (Permit No. PSD-FL-226) issued on September 21, 1995) contains a short-term limit of 109.9 lbs/hour, based on an "emission factor" of 75 ppmvd (at 8 percent oxygen). This same limit was carried forward into the Title V permit. As discussed above, the 109.9 value is based on 37.5 ppmvd, not 75 ppmvd. The Mill demonstrates compliance with the mass limit through annual stack testing, as required by the permit.

As discussed with the DEP in the past, the Mill operates an uncertified CEM for sulfur dioxide on the Recovery Boiler. The CEM has been used strictly as an operational tool in order to optimize Boiler performance. As disclosed in recent annual compliance certifications, the Mill is aware of hourly periods when the CEM has measured sulfur dioxide concentrations in excess of both 37.5 and 75 ppmvd, corrected to 8 percent oxygen. The Mill did not construe this information as evidence that the boiler was out of compliance, but disclosed it to the Department nonetheless.

To provide the Mill with the flexibility to operate the recovery boiler at higher sulfur dioxide emission rates for short time periods, mill-wide dispersion modeling was performed as part of this application submittal to determine what the highest sulfur dioxide concentrations could be without violating any of the national ambient air quality standards. The results have indicated that the recovery boiler can operate at the following short-term concentrations without violating the national ambient air quality standards for sulfur dioxide:

3-hour average	150 ppmv
24-hour average	100 ppmv

The results of the dispersion modeling are contained in Attachment C of this permit application. Based on this information, the Mill is proposing that the short-term concentration listed above be established for the recovery boiler (all values are expressed at 8 percent oxygen).

Beyond what is mentioned above for SO_2 and TRS compounds, emissions for some of the other pollutants need to be updated as well. There are currently no PM_{10} emission limits contained in the Title V Permit. The Mill is requesting that DEP establish new PM_{10} emission limits of 56.7 lbs/hour and 248.3 tons/year. These values are based on PM_{10} equaling 75% of PM (AP-42, Table 10.2-3 (9/90)). The Mill is also requesting that DEP change the sulfuric acid mist (SAM) emission limits from 3.2 lbs/hr and 14.2 tons/yr to 3.6 lbs/hr and 15.9 tons/yr. The new emission rates are based on the same concentration of 0.8 ppmv, but a slightly higher flow rate corrected to 8% oxygen. As part of the negotiations on the No. 4 Recovery Boiler PSD application that was submitted previously, the Mill agreed to use an emission factor of 0.2 lb/ton BLS for volatile organic compounds (VOCs), which results in mass emission rates of 21.0 lbs/hour and 92.0 tons/year, based on a BLS throughput of 210,000 lbs/hour.

The Mill proposes the following language for the PSD Permit Condition related to Visible Emissions for the Recovery Boiler: "As determined by EPA Reference Method 9 (40 CFR 60, Appendix A), visible emissions shall not exceed 20% opacity based on a 6-minute block average (excluding periods of startup, shutdown and malfunctions). The continuous opacity monitoring system (COMS) required for compliance demonstration purposes under the MACT II rules, 40 CFR Part 63, Subpart MM, may also provide evidence of compliance/noncompliance with this standard. Compliance with the VE standard for purposes of MACT II shall be based on the EU achieving opacity emissions of 35% or less, except for periods exceeding 35% for not more than 6% of the operating time in any calendar quarter, including periods of startup, shutdown and malfunctions"

No. 4 Lime Kiln

The Mill is not proposing to increase the throughput that has been established in past permitting actions for the Lime Kiln.

As the DEP is aware, there have been some questions raised with regard to the air flow rate for the kiln in the past as part of the earlier PSD application. The design flow rate for the lime kiln was presented as 24,200 dscfm at 4% oxygen (O_2) (equivalent to 37,400 dscfm at 10% O_2) in the 1991 PSD permit application. This corrected flow rate was the basis of the mass emission limits that were established in the 1991 PSD permit (Permit No. AC54-192551/PSD-FL-171). In preparing the 1995 PSD permit application, stack test data for prior years was reviewed to determine if the Lime Kiln design flow rate was still representative. This review concluded that the previous design flow was no longer appropriate. Therefore, the 1995 PSD application presented updated maximum flow rate of 32,000 dscfm. Although not specified on the application form, the 1993 stack test was the basis of the flow rate that was provided and that measurement was made at an oxygen level of 5.7%. This corresponds to a flow rate of 44,500 dscfm at 10% oxygen. Even though this issue was brought forward in the 1995 PSD application, GP elected to retain the same allowable mass emission limits for the lime kiln as contained in the previous 1991 PSD permit. Therefore, the basis of the allowable emissions was still shown as 37,400 dscfm @ 10% O_2, even though this flow rate was no longer appropriate (permit No. AC54-266676/ PSD-FL-226). In other words, the Mill accepted the same mass emission limits that were previously in place, although the stack flow rate had increased. The PSD application that was submitted for the lime kiln shell in 2004 utilized the 44,500-dscfm flow rate. During the earlier permit negotiations, in December 2004 and April 2005, GP provided another updated flow rate to the DEP as part of responses to the Agency's requests for additional information. In that correspondence, background information was provided supporting a flow rate of 54,200 dscfm at 10% oxygen. That higher flow rate is utilized in the calculations for this updated application.

With this application, the Mill is requesting changes to several of the prior limits for a variety of reasons, including the higher flow rate. An updated emission factor of 0.47 lb/ton calcium oxide (CaO) is used for sulfur dioxide, reducing the emission rates from 10.9 lbs/hour and 47.7 tons/year to 9.1 lbs/hour and 40.0 tons/year. The Mill is requesting an increase in the TRS emission rates from 4.0 lbs/hour and 17.5 tons/year to 5.7 lbs/hour and 25.1 tons/year, based on a concentration limit of 20 ppmv at 10% oxygen and the higher flow rate. The application also requests that the PM emission rates be increased from 26.0 lbs/hour and 113.9 tons/year to 29.7 lbs/hour and 130.2 tons/year. The proposed rates are based on using the MACT II PM standard of 0.064 grains/dscf and the revised flow rate. The Mill is also requesting that DEP establish new PM_{10} emission rates which are based on 98.3% of the PM emission rates (AP-42, Table 10.2-4). The proposed PM_{10} emission rates are 29.2 lbs/hour and 128 tons/year. For nitrogen oxides, it is requested that the limits be changed from 50.3 lbs/hour and 223.3 tons/year to 67.9 lbs/hour and 297.4 tons/year. The existing NO_x emission rates were based on a concentration of 290 ppmv, but used the lower flow rate. The proposed emission rates are based on a concentration of 175 ppmv at 8 % oxygen with the higher flow rate. This concentration limit was an agreement reached between DEP and the Mill as part of the prior negotiations. For CO, an increase in the limits is requested to correspond to the updated flow rate. During the prior negotiations, the Mill also agreed to a lowering of the VOC concentration limit from 185 to 69 ppmv (at 10% oxygen). As such, the emission rates for VOCs have also been revised to reflect this change, as well as the updated flow rate.

0537627/0300/Emissions

5. REGULATORY APPLICABILITY

5.1 PSD Applicability

The existing Mill, as constructed, and as operated today, is classified as a major stationary source under PSD definitions since it is within one of the 28 listed source categories in 40 CFR 52.21(b) and has the potential-to-emit more than 100 tons per year of at least one regulated air pollutant.

In the interest of time and in order to avoid additional recordkeeping requirements that would be triggered if it were determined that there is a "reasonable possibility" that a PSD-significant increase will occur, GP has opted to conduct the PSD applicability analysis using the past actual-to-future potential accounting methodology.

Upstream and/or downstream sources at the Mill that could potentially be impacted by the proposed recovery boiler project include the smelt dissolving tanks, green and black liquor tanks, and other caustic area sources. Upstream and/or downstream sources at the Mill that could potentially be impacted by the proposed lime kiln project include the lime slakers, lime mud washers, causticizers tanks, white liquor clarifiers, and other recausticizing area sources. Past actual and future potential emission rate calculations have been prepared for the No. 4 Recovery Boiler, the No. 4 Lime Kiln, and all other affected sources.

As directed by the FL DEP, actual-to-potential emission increases for this project have been added to increases for other past and future projects, even though those projects are unrelated. GP continues to believe this process of aggregating unrelated projects is inconsistent with past EPA guidance on this topic. At any rate, in the interest of time, the combined increases are presented in Table 5-1 (attached), along with the full netting analysis.

Based on the comparison of past actual-to-future potential emissions, and taking into account net emission changes that have occurred during the past five years, PSD review is triggered for particulate matter (PM and PM_{10}), NO_x, CO, SAM, and ozone (based on a significant increase in VOCs).

5.2 NSPS Applicability

In order to be subject to the federal NSPS contained in 40 CFR 60, an emission unit must be in a listed NSPS category and must have been constructed, modified, or reconstructed after the effective date of the respective NSPS.

In order to evaluate NSPS applicability for the proposed projects, it is important to understand the following definitions that can be found at 40 CFR 60:

Construction	*means fabrication, erection, or installation of an affected facility.*
Modification	*means any physical change in, or change in the method of operation of, an existing facility which increases the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or which results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted.*

With regard to modifications, 40 CFR 60.14 goes on to specify that the increase in emissions is evaluated on an hourly basis. Comparisons of hourly emission rates (before and after the modification) are made by comparing the capacity of the unit both before and after the modification (*e.g.*, potential-to-potential evaluation). This approach is supported by numerous, and consistent determinations from the US EPA on this issue in the past.

The NSPS, at 40 CFR 60.14, go on to state that certain changes are exempt and do not trigger new source standards. These include, but are not limited to the following:

40 CFR 60.14(e)(1)	*Maintenance, repair, and replacement which the Administrator determines to be routine for a source category...*
40 CFR 60.14(e)(2)	*An increase in production rate of an existing facility, if that increase can be accomplished without a capital expenditure on that facility.*
40 CFR 60.14(e)(3)	*An increase in the hours of operation.*
40 CFR 60.14(e)(6)	*The relocation or change in ownership of an existing facility.*

Reconstruction *means the replacement of components of an existing facility to such an extent that...The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility, and...It is technologically and economically feasible to meet the applicable standards set forth in this part...*

No. 4 Recovery Boiler

The No. 4 Recovery Boiler is potentially subject to the New Source Performance Standards (NSPS) contained at 40 CFR 60, Subparts BB (Kraft pulp mills) and D (fossil fuel-fired steam generators).

Initial construction of the recovery boiler occurred in July 1974, prior to the trigger date of September 24, 1976, as specified in NSPS Subpart BB. Furthermore, as presented in earlier applications, projects undertaken in 1991 and 1995 did not cause the recovery boiler to become subject to Subpart BB. However, the July 1974 construction start date is after the Subpart D trigger date of August 17, 1971. Since fossil fuel is not used for the purpose of producing steam, but rather to allow efficient startup/shutdown when the recovery boiler is fired with black liquor (not a fossil fuel), the recovery boiler is not subject to Subpart D. This is true as long as the fossil fuel "annual capacity factor" does not exceed 10%. The "annual capacity factor" is defined in 40 CFR 60.41b as "the ratio between the actual heat input to a steam generating unit....during a calendar year and the potential heat input to the steam generating unit had it been operated for 8,760 hours during a calendar year at the maximum steady state design heat input capacity". Based on historical records from the Mill's files, the recovery boiler has never fired fuel oil, or any other fossil fuel, at a rate that exceeds the 10% "annual capacity factor". However, in order to prevent questions on the applicability of Subpart D in the future, the Mill requests that DEP incorporate the 10% "annual capacity factor" (7.86 million gallons per year of No. 6 fuel oil) as a Title V permit limit for the No. 4 Recovery Boiler.

With regard to the applicability of Subpart BB, as discussed in Section 3, the tubes are not being replaced for the purpose of increasing the throughput (or maximum hourly emission rate) of the recovery boiler. This is strictly a maintenance project that is being subjected to permitting as a result of the uncertainty around PSD applicability for maintenance projects. The proposed air system project is not anticipated to change the current maximum hourly black liquor solids throughput rate for the recovery boiler, but instead will allow the boiler to operate at the higher rate for a longer, continuous period. The current black liquor recovery feed system normally operates at a black liquor solids content of approximately 68%. At this solids content, the evaporators cannot remove a sufficient amount of water to operate at the design rate of 210,000 pounds of black liquor solids per hour. In order to operate at the design black liquor solids rate, the Mill will install the crystallizer to increase the solids content of the black liquor from 68% to approximately 75%. This portion of the project could allow for an increase in the maximum hourly emission rates. However, at the same time, as discussed in Section 3, the air system changes will likely decrease the emissions for several of the pollutants.

In order to evaluate NSPS applicability for the recovery boiler, the Mill proposes to conduct emissions testing both before and after the air system and crystallizer projects are implemented in accordance with the procedures listed in 40 CFR 60 Appendix C, Determination of Emission Rate Change. This testing procedure is commonly used to determine whether a physical or operational change to an existing facility resulted in an increase in the emission rate to the atmosphere when there is some uncertainty regarding emission changes.

The estimated replacement cost of the Recovery Boiler in 2006 dollars is approximately $100 million. The preliminary cost estimate for the tube replacements is in the range of $24 million. The proposed changes to the combustion air system are estimated at less than $2 million and the cost for the crystallizer installation is estimated to be in the range of $5 to $6 million. Therefore, the total cost of this work, no more than $32 million, represents less than 32% of the replacement cost for the recovery boiler, which is much less than the 50 percent threshold, demonstrating that this work will not constitute reconstruction of the unit.

No. 4 Lime Kiln

The Lime Kiln is potentially subject to NSPS contained at 40 CFR 60 Subpart BB.

As discussed in Section 3, the shell and coolers are not being replaced for the purpose of increasing the throughput (or maximum hourly emissions) of the lime kiln. This is strictly a maintenance project that is being subjected to permitting as a result of having to apply the actual-to-potential accounting scheme. As such, this project is not being implemented for the purposes of increasing either the maximum hourly capacity or emissions of the lime kiln, and no such effect is anticipated. Therefore, NSPS applicability will not be triggered for this unit as a result of the "construction" or "modification" provisions.

The estimated replacement cost of the lime kiln is in the range of $30 to $40 million. The preliminary cost estimate for this project is $2 million. This is much less than 50 percent of the replacement cost of the unit that would be required in order to trigger coverage under the "reconstruction" provisions.

Based on these facts, the lime kiln will not become subject to the NSPS as a result of the proposed maintenance work.

5.3 NESHAP Applicability

The applicability of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) at 40 CFR Parts 61 and 63 is addressed in the following paragraphs for the No. 4 Recovery Boiler and No. 4 Lime Kiln.

The final Section 112(d) Maximum Achievable Control Technology (MACT) rule for recovery boilers and lime kilns was promulgated on January 12, 2001. This Rule, published as 40 CFR 63, Subpart MM, is known as the "National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills". The Rule, commonly referred to as MACT II, applies to both existing and new recovery boilers and lime kilns.

The MACT General Provisions, at 40 CFR 63.2, define a new source as, "...any affected source the construction or reconstruction of which is commenced after the Administrator first proposes a relevant emission standard under this part". As stated previously, the Recovery Boiler and the Lime Kiln were constructed in the mid-1970s. Under the MACT General Provisions (40 CFR 63, Subpart A), the Rule states that reconstruction, "...means the replacement of components of an affected or a previously unaffected stationary source to such an extent that...The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable new source..." Since the proposed recovery boiler maintenance project and combustion air project combined only constitute about 32% of the replacement cost, the No. 4 Recovery Boiler will not be "reconstructed" for the purposes of MACT applicability. Similarly, since the proposed lime kiln shell maintenance project constitutes less than 10% of the replacement cost, the No. 4 Lime Kiln will not be "reconstructed" for the purposes of MACT applicability

As the No. 4 Recovery Boiler and the No. 4 Lime Kiln currently exist, they are both considered "existing sources" for the purposes of MACT applicability. With that designation, these units had to be in compliance with the provisions of the MACT II rule no later than March 2004. The Mill currently complies with the MACT II rule by meeting each of the individual emission standards for each piece of recovery equipment, including the No. 4 Recovery Boiler, the No. 4 Smelt Dissolving Tanks, and the No. 4 Lime Kiln. None of the actions being proposed as part of this project will impact these units' designations as existing sources.

5.4 DEP Rule Applicability

Additional, potentially applicable requirements contained in DEP's rules are addressed in the following sections.

No. 4 Recovery Boiler

There are a number of regulations specifically addressing recovery boilers under Rule 62-296.404 of the DEP's regulations. These rules are summarized in Table 5-2. The No. 4 Recovery Boiler must comply with more stringent rules than those outlined in 62-296.404 since it was previously subjected to PSD and BACT review (PSD Permit No. PSD-FL-226 in 1995). Additionally, the Mill is taking further restrictions on emission limits for several pollutants as a result of this PSD application (more fully described in Section 4.0 and Attachment B of this application).

TABLE 5-1

CONTEMPORANEOUS AND DEBOTTLENECKING EMISSIONS ANALYSIS AND PSD APPLICABILITY NO. 4 RECOVERY BOILER, NO. 4 LIME KILN, AND NO. 4 COMBINATION BOILER

Source	Pollutant Emission Rate (TPY)										
Description	SO_2	NO_x	CO	PM	PM_{10}	VOC	TRS	SAM	Lead	Mercury	Fluoride
Future Potential Emissions[a]											
No. 4 Recovery Boiler	153.9	738.1	2,245.6	331.1	248.3	92.0	34.2	15.9	0.014	8.3E-05	--
No. 4 Smelt Dissolving Tank[b]	33.7	69.6	11.4	55.2	49.7	115.0	14.9	--	0.013	8.3E-05	--
Black Liquor/Green Liquor Tanks[b]	--	--	--	--	--	14.0	3.7	--	--	--	--
No. 4 Lime Kiln: annual: 20 ppmvd TRS	40.0	297.4	71.5	130.2	128.0	41.4	25.1	1.8	0.25	--	--
Caustic Area[b]	--	--	--	2.6	2.6	18.9	5.8	--	--	--	--
No. 4 Combination Boiler - 2.35% S	1,023.7	496.5	1,010.5	80.8	59.8	34.4	--	45.0	0.097	0.0071	0.095
Other Projects											
Bark Handling System[c]	--	--	0.0	22.8	13.9	475.8	--	--	--	--	--
Total- Future Potential	**1,251.3**	**1,601.6**	**3,339.0**	**622.7**	**502.3**	**791.5**	**83.8**	**62.7**	**0.4**	**7.24E-03**	**0.1**
Past Actual Emissions											
No. 4 Recovery Boiler	14.7	473.2	1,249.3	134.7	101.0	9.5	11.3	1.5	0.012	6.8E-05	--
No. 4 Smelt Dissolving Tank[b]	27.7	57.1	9.4	34.9	31.4	94.4	5.1	--	0.010	6.8E-05	--
Black Liquor/Green Liquor Tanks[b]	--	--	--	--	--	9.7	3.0	--	--	--	--
No. 4 Lime Kiln	0.04	101.4	6.8	51.3	50.4	2.5	2.6	1.8E-03	0.16	--	--
Caustic Area[b]	--	--	--	1.7	1.7	12.6	4.0	--	--	--	--
No. 4 Combination Boiler[d]	820.4	413.2	780.3	99.2	71.9	22.4	--	36.1	0.065	0.0047	0.084
Other Projects											
Bark Handling System[c]	--	--	--	14.6	10.6	175.4	--	--	--	--	--
Total- Past Actual	**862.8**	**1,044.9**	**2,045.7**	**336.3**	**267.0**	**326.4**	**25.9**	**37.6**	**0.25**	**0.0049**	**0.084**
Increase Due to Project	**388.5**	**556.7**	**1,293.3**	**286.5**	**235.3**	**465.1**	**57.8**	**25.1**	**0.13**	**0.0024**	**0.011**
PSD SIGNIFICANT EMISSION RATE	40	40	100	25	15	40	10	7	0.6	0.1	3.0
Netting Triggered?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No
CONTEMPORANEOUS EMISSION CHANGES											
MACT I Compliance Project (9/00) (Permit nos. 1070005-007-AC and -017-AC) - startup 2002											
--Increase Due to New Thermal Oxidizer	109.7	151.4	8.8	30.7	30.7	9.1	0.89	7.7	--	--	--
--Increase Due to Modified No. 4 Comb. Boiler	548.7	37.8	--	--	--	--	0.47	21.9	--	--	--
--Increase Due to BSW System w/Condensate Treatment	--	--	--	--	--	48.6	58.7	--	--	--	--
--Decrease Due to Existing Thermal Oxidizer	-749.8	-49.5	-0.3	-20.6	-20.6	-3.2	-0.3	-26.9	--	--	--
--Decrease Due to Existing BSW System w/o Condensate Treatment	--	--	--	--	--	-52.1	-62.9	--	--	--	--
--Net Change	-91.4	139.7[e]	8.5	10.1	10.1	2.4	-3.14	2.7	--	--	--
New Package Boiler (9/02) (Permit No. 1070005-018-AC) - startup Oct. 2002											
--Increase Due to New Package Boiler (EU 044)	0.1	39.4	16.5	1.5	1.5	1.1	--	--	[f]	[f]	[f]
--Decrease from old No. 6 Package Boiler	-0.07	-9.2	-2.1	-0.15	-0.15	--	--	--	[f]	[f]	[f]
--Net Change	0.03	30.20	14.40	1.35	1.35	1.1	--	--	[f]	[f]	[f]
Brown Stock Washer and Oxygen Delignification System (7/04) (Permit No. 1070005-024-AC) - startup Feb. 2006											
--Increase Due to No. 4 Comb. Boiler/No. 5 Power Boiler	236.3	--	0.3	--	--	4.0	17.1	9.5	--	--	--
--Increase Due to Pulp Storage Tanks	--	--	--	--	--	63.1	9.6	--	--	--	--
--Decrease from existing BSW System, BL Filter, etc.	--	--	--	--	--	-128.5	-77.1	--	--	--	--
--Net Change	236.3[e]	--	0.3	--	--	-61.4	-50.4	9.5	--	--	--
No. 4 Power Boiler Shutdown (Sep. 2003)	-270.6	-33.6	-3.6	-18.1	-15.7	-0.2	--	-11.9	-0.005	-0.000081	-0.027
Total Contemporaneous Emission Changes	**-362.0**	**-3.4**	**19.6**	**-6.7**	**-4.3**	**-58.10**	**-53.5**	**0.3**	**-0.005**	**-0.000081**	**-0.027**
TOTAL NET CHANGE	**26.5**	**553.3**	**1,312.9**	**279.8**	**231.0**	**407.0**	**4.3**	**25.4**	**0.12**	**0.0023**	**-0.015**
PSD SIGNIFICANT EMISSION RATE	40	40	100	25	15	40	10	7	0.6	0.1	3.0
PSD REVIEW TRIGGERED?	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**	**No**	**No**

Notes:

[a] Total future potential emissions from Golder Application for No. 4 Combination Boiler

[b] Sources will potentially be "affected" as part of the No. 4 Recovery Boiler tube replacement project.

[c] As estimated by FL DEP in Technical Evaluation and Preliminary Determination for Bark Hog Replacement PSD, November 2004

[d] For No. 4 Combination Boiler, based on actual emissions for 2004 and 2005 from Table 2-1 of Golder Application for this boiler.

[e] Pollution Control Projects (PCP) approved for G-P Palatka Mill; excluded from PSD review.

[f] Since project increase does not exceed PSD significant emission rate, netting is not performed for this pollutant

Table 5-2. Applicable FDEP Rules for No. 4 Recovery Boiler

Rule	Applicable Sub-Sections	Brief Description
62-296.404	(1)(a)1. Visible Emissions	45% opacity, six-minute average, except visible emissions up to 60% opacity are allowed for one six-minute period per hour
	(1)(a)2. Visible Emissions	Recovery Boilers equipped with a certified opacity monitor are allowed visible emissions in excess of 45% opacity for up to six percent per quarter. Excess emissions must be reported to the state quarterly.
	(2)(a) Particulate Matter Emissions	3 pounds per 3,000 pounds of black liquor solids fed
	(3)(c)1.a. TRS Emissions	17.5 ppm by volume dry basis corrected to 8% oxygen as a 12-hour average
	(4)(a) Test Methods and Procedures	Visible emissions-EPA Method 9 Particulate emissions-EPA Method 5 TRS emissions-EPA Method 16, 16A, 16B
	(5)(a) Continuous Emissions Monitoring Requirements	Recovery Boilers shall be equipped with a TRS continuous emissions monitoring system
	(5)(b)1 Continuous Determination of TRS Emissions	The TRS continuous emissions monitoring system shall be installed, calibrated, certified and operated pursuant to all of the provisions contained in 1a through 1h (see rules for specific requirements)
	(5)(b)2 Data Reduction and Record keeping Requirements	The TRS continuous emissions monitoring system must meet the data reduction and record keeping requirements contained in 2a through 2e
	(6) Quarterly Reporting Requirements	Reports of TRS emissions shall be submitted within 30 days after the end of each calendar quarter. See rules contained in a through d for specific information to be included with quarterly reports.

No. 4 Lime Kiln

In addition to the federal rules addressed above, there are a number of DEP rules that are applicable for the lime kiln as well. Table 5-3 on the following page contains a summary of the applicable rules. Additionally, the Mill is taking further restrictions on emission limits for several pollutants as a result of this PSD application (more fully described in Section 4.0 and Attachment B of this application)

Table 5-3. Applicable FDEP Rules for No. 4 Lime Kiln

Rule	Applicable Sub-Sections	Brief Description
62-296.320	(4)(a) and (b)	General Pollutant Emission Limiting Standards
62-296.404	(2)(b); (3)(e); (4)(f); (5)(a) and (b); (6)(a), (b), (c)2, (d)	Kraft (Sulfate) Pulp Mills and Tall Oil Plants
	(4)(b)	Lime Kilns and Calciners
62-297.310		General Test Requirements
62-297.401	(1)(a)	EPA Method 1 (Velocity Traverse)
	(2)	EPA Method 2 (Velocity and Flow)
	(3)	EPA Method 3 (CO_2, O_2, Excess Air)
	(4)	EPA Method 4 (Moisture Content)
	(5)	EPA Method 5 (PM)
	(7) and (7)(e)	EPA Method 7 and 7E (NO_x)
	(8)	EPA Method 8 (SAM and SO_2)
	(10)	EPA Method 10 (CO)
	(16) and (16)(a)	EPA Methods 16 and 16A (TRS)
	(25) and (25)(a)	EPA Method 25 (VOCs)

5.5 Compliance Assurance Monitoring (CAM)

The Compliance Assurance Monitoring (CAM) rule is essentially a companion rule to Title V, requiring that control device operating parameters be monitored in order to demonstrate compliance with a specified emission limitation or standard. In order for the CAM Rule to apply to a specific emission unit/pollutant, the following, four criteria must be met:

1) The emission unit must be located at a major source for which a Part 70 or Part 71 permit is required.
2) The emission unit must be subject to an emission limitation or standard.
3) The emission unit must use a control device to achieve compliance.
4) The emission unit must have potential, pre-controlled emissions of the pollutant of at least 100 percent of the major source threshold.

The CAM Rule defines two classes of emission units. These are "large pollutant-specific emissions units" and "other pollutant-specific emissions units". The "large" units are those, "...with the potential to emit...taking into account control devices...the applicable regulated pollutant in an amount greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source..." The "other" units are those that are not "large" units.

As such, the primary difference between the two categories is that "large" units are those that are still major (*i.e.,* greater than 100 percent of the major source threshold) after the application of controls, while the "other" units are those that are non-major (*i.e.,* less than or equal to 100 percent of the major source threshold) following the application of controls.

The federal regulations, at 40 CFR 64.5(a)(2), state the following with regard to submittal of a CAM Plan for "large pollutant-specific emissions units":

> *"On or after April 20, 1998, the owner or operator shall submit information as part of an application for a significant permit revision under part 70 or 71 of this chapter, but only*

> *with respect to those pollutant-specific emissions units for which the proposed permit revision is applicable."*

The regulations, at 40 CFR 64.5(b), state the following with regard to submittal of a CAM Plan for the "other pollutant-specific emissions units":

> *"...the owner or operator shall submit the information required...as part of an application for a renewal of a part 70 or part 71 permit."*

The No. 4 Recovery Boiler is currently equipped with an ESP for the purpose of controlling particulate matter emissions. No additional add-on controls are proposed as a result of the BACT analysis included with this PSD permit application. Similarly, the No. 4 Lime Kiln is equipped with a wet scrubber for the purpose of controlling particulate matter emissions. No additional add-on controls are proposed as a result of the BACT analysis included with this PSD permit application.

As shown in Attachment B, controlled, and hence uncontrolled, particulate matter emissions for both the No. 4 Recovery Boiler and the No. 4 Lime Kiln exceed 100 tons per year. As such, with regard to particulate matter, both of these units are considered to be large-emitting units and a CAM Plan would typically be due as part of a significant permit revision.

The federal regulations, at 40 CFR 64.2(b)(i), contain an exemption for, "emission limitations or standards proposed by the Administrator after November 15, 1990 pursuant to section 111 or 112 of the Act". Particulate matter emissions (as a surrogate for hazardous air pollutant (HAP) metals) from the No. 4 Recovery Boiler and the No. 4 Lime Kiln are regulated under Section 112 of the Act. Also, in cases where emission units utilize a continuous compliance demonstration method, such as a CEM or COM, 40 CFR 64.2(b)(1)(vi) provides an exemption as long as the method, "Provides data either in units of the standard or correlated directly with the compliance limit".

With regard to these criteria, the following facts are relevant at the Palatka Mill:

- The Palatka Mill is classified as a major source and a Part 70 permit is required
- The No. 4 Recovery Boiler and the No. 4 Lime Kiln are both subject to existing permit limits contained in the Mill's PSD and Title V permits
- The No. 4 Recovery Boiler and the No. 4 Lime Kiln are subject to a particulate matter emission limitations contained in 40 CFR 63, Subpart MM. This standard was proposed under section 112 of the Act on April 15, 1998.
- The only control device present on the No. 4 Recovery Boiler is an ESP for the control of particulate matter. The only control device present on the No. 4 Lime Kiln for the control of particulate matter is a wet scrubber. No additional add-on controls are proposed for either source as part of this permitting action.
- Both pre-control and post-control particulate matter emissions exceed 100 tons per year for both units, which is the major source threshold for that pollutant
- The Subpart MM monitoring rules require the No. 4 Recovery Boiler to be equipped with a COMS. The Mill installed COMS for the No. 4 Recovery Boiler in December 2003. The Subpart MM monitoring rules require the No. 4 Lime Kiln to be equipped with a continuous monitoring system (CMS) to determine and record the pressure drop across the scrubber and the scrubbing liquid flow rate at least every successive 15-minute

period. The Mill installed a CMS for the No. 4 Lime Kiln well ahead of the March 2004 MACT II compliance date.

As discussed previously (see Section 5.3), final MACT regulations for both sources were promulgated by the US EPA on January 12, 2001 (40 CFR 63, Subpart MM, National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills). The specific standards and monitoring requirements for this equipment are contained at 40 CFR 63.862 (standards) and 63.864 (monitoring requirements). Since this Rule was proposed and promulgated after November 15, 1990, the No. 4 Recovery Boiler and the No. 4 Lime Kiln are exempt from addressing CAM requirements as part of this permit application submittal.

6. BACT ANALYSIS

As part of the PSD permitting process, an applicant is required to conduct a BACT review. This requirement is set forth in the PSD regulations at 40 CFR 52.21(j) as follows:

> *"...an emission limitation based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any...source...which on a case-by-case basis is determined to be achievable taking into account energy, environmental and economic impacts and other costs."*

The BACT analyses for the No. 4 Recovery Boiler and the No. 4 Lime Kiln were conducted based on the "top-down" approach outlined in US EPA's, December 1, 1987 policy memorandum and their New Source Review Workshop Manual (Draft, October, 1990). A BACT analysis is required only for the pollutants found to be subject to PSD review. The results of the BACT analysis for the No. 4 Recovery Boiler is discussed in detail in Attachment D. The results of the BACT analysis for the No. 4 Lime Kiln is discussed in detail in Attachment E.

For the proposed maintenance work and project work for the No. 4 Recovery Boiler, plus the maintenance work for the No. 4 Lime Kiln, the pollutants subject to PSD review include NO_x, CO, PM, PM_{10}, VOCs and SAM.

As presented in Attachment D, based on other, recent BACT determinations, the No. 4 Recovery Boiler, as designed and operated with an ESP, employs BACT-level controls and operation for CO, PM, PM_{10}, VOCs and SAM. As such, the Mill is not proposing additional controls for these pollutants in conjunction with this portion of the project.

However, as a result of the BACT analysis for NO_x emissions from the Recovery Boiler, GP has determined that it is cost effective to install a fourth level of combustion air to maintain NO_x emissions at their current level. Therefore, BACT for NO_x will be the addition of a fourth level of combustion air and a NO_x limit of 80 parts per million by volume (ppmv), corrected to 8% oxygen.

As presented in Attachment E, based on other, recent BACT determinations, the No. 4 Lime Kiln, as designed and operated with a wet scrubber, employs BACT-level controls and operation for CO, PM, PM_{10}, NO_x, VOCs and SAM. As such, the Mill is not proposing additional controls for these pollutants in conjunction with this portion of the project.

7. AIR QUALITY ANALYSIS

An applicant for a prevention of significant deterioration (PSD) permit is required to conduct an air quality analysis to determine the ambient impacts associated with the modified source. The primary purpose is to demonstrate that new or increased emissions will not cause or contribute to a violation of the National Ambient Air Quality Standards (NAAQS) or a PSD increment. Applicants for a PSD permit are also required to make a demonstration that there will be no adverse impacts upon soils, vegetation, visibility, or growth.

The results of the dispersion modeling analysis, demonstrating compliance with the NAAQS and PSD increments and discussion of additional impacts, are provided in Attachment C.

All PSD permit applicants must prepare an "additional impacts" analysis for each pollutant that will be emitted by the proposed project in significant amounts. The "additional impacts" analysis depends on existing air quality, the quantity of emissions, and the sensitivity of local soils and vegetation, and visibility in the source's impact area. The analysis is presented in three parts: (1) a soils and vegetation impacts analysis, (2) a visibility impairment analysis, and (3) a growth analysis. Each of these is addressed in the following sections.

7.1 Impacts upon Soils and Vegetation

The secondary NAAQS are designed to protect soils and vegetation. As shown in Attachment C, the proposed projects will neither cause nor contribute to a violation of the NAAQS. As such, no adverse impact on soils or vegetation is predicted.

7.2 Impacts on Visibility

At the request of the U.S. Fish and Wildlife Service, the proposed and contemporaneous projects' impact on visibility impairment was evaluated at the Okefenokee, Wolf Island and Chassahowitzka National Wilderness Areas (NWA) using several of the latest air modeling techniques that also took into consideration the frequency of any predicted visibility impairment. The air modeling results indicated that the proposed projects' impact would exceed the Federal Land Manager's (FLM) visibility screening criteria of 5 percent impairment on several days per year. However, the predicted frequency of the impairment was below the current criteria being applied for modeling applications being performed for Best Available Retrofit Technology under the Regional Haze Rule. To this extent, the visibility impairment of the proposed projects is considered to not pose an adverse impact at the evaluated areas.

7.3 Impacts on Growth

The elements of the growth analysis include a projection of the associated industrial, commercial, and residential growth that will occur in the area due to the source, including the potential impact upon ambient air due to this growth.

During the time that the proposed modifications and maintenance work for the No. 4 Recovery Boiler are made, some additional contract personnel may work at the Mill site. However, there will be no additional, permanent positions added as a result of either of these projects. As such, there is no anticipated increase in industrial, commercial, or residential growth in the area as a result of the proposed work on the No. 4 Recovery Boiler.

There are also expected to be no air quality impacts due to associated commercial and industrial growth given the location of the existing GP Palatka Mill. The existing commercial and industrial infrastructure should be adequate to provide any support services that the project might require and would not increase with the operation of the project.

ATTACHMENT A

AIR APPLICATION FORMS

Department of Environmental Protection

Division of Air Resource Management

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

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

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

Air Operation Permit – Use this form to apply for:

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

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

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **Georgia-Pacific Corporation**
2. Site Name: **Palatka Mill**
3. Facility Identification Number: **1070005**
4. Facility Location...:
   Street Address or Other Locator: **North of CR 216; West of US 17**
   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: **Myra Carpenter, Superintendent of Environmental Affairs**
2. Application Contact Mailing Address...
   Organization/Firm: **Georgia-Pacific Corporation**
   Street Address: **P.O. Box 919**
   City: **Palatka** State: **FL** Zip Code: **32178-0919**
3. Application Contact Telephone Numbers...
   Telephone: **(386) 325-2001** ext. Fax: **(386) 328-0014**
4. Application Contact Email Address: **mjcarpen@gapac.com**

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	7-18-06
2. Project Number(s):	1070005-038-AC
3. PSD Number (if applicable):	PSD-FL-380
4. Siting Number (if applicable):	

Purpose of Application: Tube Replacement Project and Increase of Efficiency for No. 4 Recovery Boiler; Repair of No. 4 Lime Kiln Shell

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

Air Construction Permit

☒ Air construction permit.

Air Operation Permit

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

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

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

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

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

Application Comment

Tube Replacement Project and Increase of Efficiency for No. 4 Recovery Boiler:

First, the Palatka Mill plans to replace a large percentage of the tubes in the No. 4 Recovery Boiler (Emission Unit ID No. 018). This includes tubes in the superheater, economizer, and generating banks of the Boiler. This major tube work is estimated to commence in April 2007 and conclude in 2008. The total cost of this work is estimated to be in the range of $24 million. Many of the tubes to be replaced are originals that have been in place since the Boiler was constructed in the mid-1970s. For these reasons, it is GP's opinion that this work <u>does not</u> constitute routine maintenance, repair, and replacement.

Although still in the preliminary engineering phase, the Mill is also considering replacement of, or changes to, the combustion air system for the Boiler. The objective of this part of the project is to lower peak furnace exit gas temperature and velocity into the superheater in an effort to reduce the potential for corrosion and pluggage of the superheater in the future. The new air system is also expected to reduce carry over and fouling in the Boiler convection banks. Through the staging of air, it is anticipated that emissions of some pollutants (*e.g.,* total reduced sulfur compounds and carbon monoxide) will be more consistently controlled. The Mill plans to install a fourth level of combustion air to the Recovery Boiler to help maintain NO_x emission rates at their current levels. The Mill is in the process of receiving vendor quotations for this work, including suggested scope. As such, the exact scope of this work is not available at this time. The estimated cost for this project is less than $2 million.

A third project involves a modification to the black liquor evaporation system (No. 4 Evaporator Set). This change would increase the solids concentration of the black liquor to the Recovery Boiler from 65 percent solids to approximately 75 percent solids. When the new system is operational, the liquor from the concentrator will pass through a Crystallizer vessel to raise the temperature of the liquor. The liquor will then enter a storage/flash tank at lower pressure where the moisture will "flash off". The "flash" vapors will then be routed to the existing evaporator system and collected as part of the existing non-condensable gas (NCG) collection system. The purpose of the project is to increase Boiler efficiency by reducing the amount of water entering the Boiler with the liquor solids. By reducing the amount of water vaporization being performed by the Boiler, less supplemental fuel will be required to process the same amount of black liquor solids (BLS). Furthermore, the increase in solids will improve the efficiency of the Boiler for steam production per pound of BLS, thus reducing the amount of steam produced from oil in the other boilers. The estimated cost for this project is between $5-6 million.

Finally, the Mill is considering the removal of some internal baffles and resizing some downcomer piping in the existing concentrators. The unit currently has scaling problems, leading to frequent "boil outs". The proposed changes will improve liquor circulation and increase velocity through the tubes, which should reduce scaling and fouling. This will increase the time between "boil outs". In addition, an external heat exchanger will be added to the existing concentrators to preheat the liquor with steam prior to entry into the concentrators. This will allow for increased evaporation surface, providing for a capability that more closely matches the capacity of the Recovery Boiler.

No. 4 Lime Kiln Shell Replacement:

The Palatka Mill needs to replace a section of the Lime Kiln shell. In late 2003, the Mill experienced a failure of the Lime Kiln shell. The Kiln had cracks all the way through the shell in several different areas of the "hot end". This outage alone resulted in unbudgeted expenditures of $1.5 million for maintenance repairs and purchased chemicals.

The failure in late 2003 occurred underneath the cooler tubes, which are causing excessive stress on the Kiln shell. At the time, repairs were made for temporary use only. Based on testing and evaluation from the original equipment manufacturer, the failure will occur again if the underlying problems are not properly, and more permanently, corrected.

An equipment vendor has recommended that the Mill replace 62 feet of the hot end Kiln shell and all ten (10) coolers. The new coolers will have an improved mounting bracket design that will eliminate future stress cracking underneath the coolers. The total cost of this project is estimated at approximately $1.8 million, with approximately 75 percent of this total going toward the labor costs needed to complete the project. The Mill plans to complete this work during their spring outage in 2007.

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee
018	No. 4 Recovery Boiler	AC1A	*
017	No. 4 Lime Kiln	AC1A	*

Application Processing Fee

*Previously paid to state

Check one: ☐ Attached - Amount: ☒ Not Applicable

Owner/Authorized Representative Statement

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

1. Owner/Authorized Representative Name : **Theodore D. Kennedy, Vice President, Palatka Operations**

2. Owner/Authorized Representative Mailing Address...
Organization/Firm: **Georgia-Pacific Corporation**
Street Address: **P.O. Box 919**
City: **Palatka** State: **FL** Zip Code: **32178**

3. Owner/Authorized Representative Telephone Numbers...
Telephone: **(386) 325-2001** ext. Fax: **(386) 328-0014**

4. Owner/Authorized Representative Email Address: **tdkenned@gapac.com**

5. Owner/Authorized Representative Statement:

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

Signature

7/14/06
Date

Application Responsible Official Certification

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

1. Application Responsible Official Name:

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

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

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

5. Application Responsible Official Email Address:

6. Application Responsible Official Certification:

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

_______________________________ Signature

_______________________________ Date

Professional Engineer Certification

1. Professional Engineer Name: **David A. Buff**
Registration Number: **19011**

2. Professional Engineer Mailing Address:
Organization/Firm: **Golder Associates, Inc.****
Street Address: **6241 NW 23rd Street, Suite 500**
City: **Gainesville** State: **FL** Zip Code: **32653**

3. Professional Engineer Telephone Numbers...
Telephone: **(352) 336-5600** ext. **545** Fax: **(352) 336-6603**

4. Professional Engineer Email Address: **dbuff@golder.com**

5. Professional Engineer Statement:

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

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

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

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

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

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

David A. Buff
Signature

7/13/06
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) **3283.4**		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) **29/41/0** 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:
Myra Carpenter, Superintendent of Environmental Affairs

2. Facility Contact Mailing Address...
Organization/Firm: **Georgia-Pacific Corporation**
Street Address: **P.O. Box 919**
City: **Palatka** State: **FL** Zip Code: **32178-0919**

3. Facility Contact Telephone Numbers:
Telephone: **(386) 325-2001** ext. Fax: **(386) 328-0014**

4. Facility Contact Email Address: **mjcarpen@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 Email 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]?
PM (Particulate Matter - Total)	**A**	**N**
PM_{10} (Particulate Matter - PM)	**A**	**N**
SO_2 (Sulfur Dioxide)	**A**	**N**
NO_x (Nitrogen Oxides)	**A**	**N**
CO (Carbon Monoxide)	**A**	**N**
VOC (Volatile Organic Compounds)	**A**	**N**
Pb (Lead)	**A**	**N**
SAM (Sulfuric Acid Mist)	**A**	**N**
TRS (Total Reduced Sulfur)	**A**	**N**
H001 (Acetaldehyde)	**A**	**N**
H021 (Beryllium)	**B**	**N**
H043 (Chloroform)	**A**	**N**
H095 (Formaldehyde)	**A**	**N**
H106 (Hydrogen Chloride)	**A**	**N**
H115 (Methanol)	**A**	**N**
Total 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 No.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:**Figure 3-2** ☐ 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:**Figure 3-3** ☐ 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) ☒ **See comment at bottom of Page A-22** ☐ Previously Submitted, Date:_____

Additional Requirements for Air Construction Permit Applications

1. Area Map Showing Facility Location: ☒ Attached, Document ID: **See Figure 3-1** ☐ Not Applicable (existing permitted facility)
2. Description of Proposed Construction or Modification: ☒ Attached, Document ID: **See Introduction Section 3.0 of PSD Permit Application**
3. Rule Applicability Analysis: ☒ Attached, Document ID: **See Introduction Section 5.0 of PSD Permit Application**
4. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.): ☐ Attached, Document ID: ☒ **Not Applicable (no exempt units at facility)**
5. Fugitive Emissions Identification (Rule 62-212.400(2), F.A.C.): ☒ Attached, Document ID: **See Attachment B** ☐ Not Applicable
6. Preconstruction Air Quality Monitoring and Analysis (Rule 62-212.400(5)(f), F.A.C.): ☒ Attached, Document ID: **See Attachment C** ☐ Not Applicable
7. Ambient Impact Analysis (Rule 62-212.400(5)(d), F.A.C.): ☒ Attached, Document ID: **See Attachment C** ☐ Not Applicable
8. Air Quality Impact since 1977 (Rule 62-212.400(5)(h)5., F.A.C.): ☒ Attached, Document ID: **See Attachment C** ☐ Not Applicable
9. Additional Impact Analyses (Rules 62-212.400(5)(e)1. and 62-212.500(4)(e), F.A.C.): ☒ Attached, Document ID: **See Attachment C** ☐ Not Applicable
10. Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable

Additional Requirements for FESOP Applications

1. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.):
☐ 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 On site 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

Additional Requirements Comment

Under Additional Requirements for All Applications, Except as Otherwise Stated, No. 3 :

The emission limitations contained in Rule 62-296.320 F.A.C., pertain to visible emissions and reasonable precautions to prevent fugitive PM emissions.

III. EMISSIONS UNIT INFORMATION

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

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

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

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

EMISSIONS UNIT INFORMATION
Section [1] of [2]
No. 4 Recovery Boiler

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 Recovery Boiler**

3. Emissions Unit Identification Number: **018**

4. Emissions Unit Status Code: **A**	5. Commence Construction Date: **April 2006**	6. Initial Startup Date: **May 2006**	7. Emissions Unit Major Group SIC Code: **26**	8. Acid Rain Unit? ☐ Yes ☒ No

9. Package Unit:
Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment: **The No. 4 Recovery Boiler is an existing piece of equipment. The upgrades to the boiler to increase efficiency will begin in April 2007. The boiler tube replacement project will also begin in April 2007. The boiler upgrades and tube replacements will be conducted over several different shutdown phases with all work to be finished by the end of 2008.**

EMISSIONS UNIT INFORMATION
Section [1] of [2]
No. 4 Recovery Boiler

Emissions Unit Control Equipment

1. Control Equipment/Method(s) Description:
Electrostatic Precipitator for control of PM/PM_{10} emissions

2. Control Device or Method Code(s): **010**

EMISSIONS UNIT INFORMATION
Section [1] of [2]
No. 4 Recovery Boiler

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate: **5.04 MM lbs/day black liquor solids**		
2. Maximum Production Rate: **N/A**		
3. Maximum Heat Input Rate: **1,346.0 MM Btu/hr**		
4. Maximum Incineration Rate:	pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	**24** hours/day **52** weeks/year	**7** days/week **8,760** hours/year
6. Operating Capacity/Schedule Comment:		

EMISSIONS UNIT INFORMATION
Section [1] of [2]
No. 4 Recovery Boiler

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: **See Figure 3-2**	2. Emission Point Type Code: **1**	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking: **See Figure 3-3**		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: **N/A**		
5. Discharge Type Code: **V**	6. Stack Height: **230 feet**	7. Exit Diameter: **12.0 feet**
8. Exit Temperature: **425 °F**	9. Actual Volumetric Flow Rate: **447,000 acfm**	10. Water Vapor:
11. Maximum Dry Standard Flow Rate: **294,000 dscfm @ 8% oxygen**	12. Nonstack Emission Point Height: feet	
13. Emission Point UTM Coordinates... Zone: **17** East (km): **433902.5 m** North (km): **3283644.2 m**	14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)	
15. Emission Point Comment:		

EMISSIONS UNIT INFORMATION

Section [1] of [2]
No. 4 Recovery Boiler

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 2

1. Segment Description (Process/Fuel Type): **Pulp and Paper, Pulp & Paper Manufacturing, Paper/Board Forming** **No. 4 Recovery Boiler supplies steam for the pulp & paper mill**		
2. Source Classification Code (SCC): **3-07-001-04**	3. SCC Units: **Air-dried tons pulp (ADTP) per hour**	
4. Maximum Hourly Rate: **210,000 lbs black liquor solids (BLS)**	5. Maximum Annual Rate: **1,839.6 MM lbs BLS**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: **N/A**	8. Maximum % Ash: **N/A**	9. Million Btu per SCC Unit: **11.4**
10. Segment Comment: **Maximum annual firing rate is based on the maximum daily firing rate of 5.04 MM lbs BLS/day and assuming 365 days of operation per year.** **Capacity of Pulp Mill = 118 ADTP per hour and 1,850 ADTP per day** **Max. Heat input rating of boiler = 1,346 MM Btu/hr (based on 210,000 lb BLS/hr x 6,410 Btu/lb BLS)**		

Segment Description and Rate: Segment 2 of 2

1. Segment Description (Process/Fuel Type): **External Combustion Boiler - Industrial - Residual Oil**		
2. Source Classification Code (SCC): **1-02-004-01**	3. SCC Units: **1000 Gallons**	
4. Maximum Hourly Rate: **5.4**	5. Maximum Annual Rate: **7,860.640**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: **2.35**	8. Maximum % Ash:	9. Million Btu per SCC Unit: **150**
10. Segment Comment: **The mill is requesting an annual capacity limit for No. 6 fuel oil to avoid being subject to NSPS Subpart D. The annual capacity factor limit is 10 percent for fuel oil firing.**		

EMISSIONS UNIT INFORMATION
Section [1] of [2]
No. 4 Recovery Boiler

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control	3. Secondary Control Device Code	4. Pollutant
PM/PM_{10}	010		EL
SO_2			EL
NO_X			EL
CO			EL
VOC			EL
Pb	010		EL
SAM			EL
TRS			EL
(H001) Acetaldehyde			NS
(H015) Arsenic			NS
(H021) Beryllium			EL
(H017) Benzene			NS
(H027) Cadmium			NS
(H043) Chloroform			NS
(H047) Cobalt			NS
(H095) Formaldehyde			NS
(H104) n-Hexane			NS
(H106) Hydrogen Chloride			NS
(H113) Manganese			NS
(H114) Mercury			EL
(H115) Methanol			NS
(H120) Methyl Ethyl Ketone			NS
(H123) Methyl Isobutyl Ketone			NS
(H128) Methylene Chloride			NS
(H132) Naphthalene			NS
(H133) Nickel			NS
(H162) Selenium			NS
(H163) Styrene			NS

EMISSIONS UNIT INFORMATION
Section [1] of [2]
No. 4 Recovery Boiler

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control	3. Secondary Control Device Code	4. Pollutant
(H167) Tetrachloroethylene			**NS**
(H169) Toluene			**NS**
(H174) 1,2,4-Trichlorobenzene			**NS**
(H187) o-Xylene			**NS**
(H188) m-Xylene			**NS**
HAPS (Total Hazardous Air Pollutants)			**NS**

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **PM/PM_{10}**	2. Total Percent Efficiency of Control: **99+**
3. Potential Emissions: **75.6** lb/hour **331.1** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.03 grains/dscf @ 8 % oxygen** Reference: **BACT determination-see Attachment D**	7. Emissions Method Code: **5**

8. Calculation of Emissions:

PM (hourly) = 294,000 dscfm x 0.03 grains/dscf x 60 min/hr x 1 lb/7,000 grains = 75.6 lb/hr

PM (annual) = 75.6 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 331.1 ton/yr

PM_{10} (hourly) = 75.6 lb/hr x 0.75 (PM_{10} = 75% of PM) = 56.7 lb/hr
PM_{10} (annual) = 56.7 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 248.3 ton/yr

9. **Pollutant Potential/Estimated Fugitive Emissions Comment:**

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **75.6 lb/hr and 331.1 tons/year**	4. Equivalent Allowable Emissions: lb/hour
5. Method of Compliance: **Stack testing must be performed once per fiscal year**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on BACT analysis (see Attachment D) and Rule 62-212.400(5)(c)**	

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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: SO_2	2. Total Percent Efficiency of Control: 0.0
3. Potential Emissions: 439.4 lb/hour (3-hr avg.) 153.9 tons/year	4. Synthetically Limited? ☒ Yes ☐ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 12.0 ppmvd @ 8 % oxygen (annual avg.); 100.0 ppmvd @ 8 % oxygen (24-hr avg.); 150.0 ppmvd @ 8 % oxygen (3-hr avg.) Reference: PSD avoidance and compliance with regional visibility	7. Emissions Method Code: 5

8. Calculation of Emissions:

SO_2 (3-hour) = (150 $ft^3/10^6$ ft^3) x 294,000 dscf/min x 2,116.8 lb/ft^2 x 1 lb-n-°R/1,545.6 ft-lb x 1/528 °R x 64 lb-lb-n x 60 min/hr = 439.4 lb/hr

SO_2 (24-hour) = (100 $ft^3/10^6$ ft^3) x 294,000 dscf/min x 2,116.8 lb/ft^2 x 1 lb-n-°R/1,545.6 ft-lb x 1/528 °R x 64 lb-lb-n x 60 min/hr = 292.8 lb/hr

SO_2 (hourly-annual average) = (12 $ft^3/10^6$ ft^3) x 294,000 dscf/min x 2,116.8 lb/ft^2 x 1 lb-n-°R/1,545.6 ft-lb x 1/528 °R x 64 lb-lb-n x 60 min/hr = 35.1 lb/hr

SO_2 (annual) = 35.1 lb/hr x 8,760 hr/yr x 1 ton/2,000 lb = 153.9 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:
The Mill is requesting an annual capacity limit for No. 6 fuel oil burned in the Recovery Boiler to avoid being subject to NSPS standard Subpart D. The annual capacity limit is equivalent to 7,860,640 gallons per year.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 3

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **35.1 lb/hr (annual avg.)**	4. Equivalent Allowable Emissions: lb/hour **153.9** tons/year
5. Method of Compliance: **Stack testing must be performed once per fiscal year**	
6. Allowable Emissions Comment (Description of Operating Method): **Annual average based on taking voluntary restriction to avoid PSD.**	

Allowable Emissions Allowable Emissions 2 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **292.8 lb/hr (24-hour average)**	4. Equivalent Allowable Emissions: **292.8** lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **24-hour average based on taking voluntary restriction of SO_2 emissions to assure compliance with regional visibility.**	

Allowable Emissions Allowable Emissions 3 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **439.4 lb/hr (3-hour average)**	4. Equivalent Allowable Emissions: **439.4** lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **NO_x**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **168.5 lb/hour and 738.1 tons/year**	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **80 ppmvd @ 8 % oxygen** Reference: **BACT determination-see Attachment D**	7. Emissions Method Code: **5**

8. Calculation of Emissions: **See Attachment B of PSD Application**

NO_x = (80 $ft^3/10^6\ ft^3$) x 294,000 dscf/min x 2,116.8 lb/ft^2 x 1 lb-n-°R/1,545.6 ft-lb x 1/528 °R x 46 lb-lb-n x 60 min/hr = 168.5 lb/hr
NO_x (annual) = 168.5 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 738.1 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **168.5 lb/hr and 738.1 tons/year**	4. Equivalent Allowable Emissions: **168.5** lb/hour
5. Method of Compliance: **Stack testing must be performed once per fiscal year**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on BACT analysis (see Attachment D) and Rule 62-212.400(5)(c)**	

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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **CO**

2. Total Percent Efficiency of Control: **0.0**

3. Potential Emissions: **1,025.4 lb/hour (3-hr avg.) 2,245.6 tons/year**

4. Synthetically Limited? ☐ Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable): to tons/year

6. Emission Factor: **400 ppmvd @ 8 % oxygen (24-hr avg.); 800 ppmvd @ 8% oxygen (3-hr avg.)**
Reference: **BACT determination-see Attachment D**

7. Emissions Method Code: **5**

8. Calculation of Emissions: **See Attachment B of PSD Application**

CO (3-hr avg.) = (800 $ft^3/10^6\ ft^3$) x 294,000 dscf/min x 2,116.8 lb/ft^2 x 1 lb-n-°R/1,545.6 ft-lb x 1/528 °R x 28 lb-lb-n x 60 min/hr = 1,025.4 lb/hr

CO (24-hr avg. and annual average) = (400 $ft^3/10^6\ ft^3$) x 294,000 dscf/min x 2,116.8 lb/ft^2 x 1 lb-n-°R/1,545.6 ft-lb x 1/528 °R x 28 lb-lb-n x 60 min/hr = 512.7 lb/hr

CO (annual) = 512.7 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 2,245.6 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **1,025.4 lb/hr (3-hr avg.)**	4. Equivalent Allowable Emissions: lb/hour **2,245.6 tons/year**
5. Method of Compliance: **Stack testing must be performed once per fiscal year**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on BACT analysis (see Attachment D) and Rule 62-212.400(5)(c)**	

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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **VOC**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **21.0** lb/hour **92.0** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.2 lb/ton BLS** Reference: **BACT determination-see Attachment D**	7. Emissions Method Code: **5**

8. Calculation of Emissions: **See Attachment B of PSD Application**

VOC (hourly) = 0.2 lb/ton BLS x 210,000 lb BLS/hr / 2,000 lb/ton = 21.0 lb/hr
VOC (annual) = 21.0 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 92.0 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **21.0 lb/hr and 92.0 tons/year**	4. Equivalent Allowable Emissions: lb/hour
5. Method of Compliance: **Stack testing must be performed once per fiscal year**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on BACT analysis (see Attachment D) and Rule 62-212.400(5)(c)**	

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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **Pb**	2. Total Percent Efficiency of Control: 99+
3. Potential Emissions: **0.0033** lb/hour **0.014** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **31.3 lb / MM ton BLS** Reference: **NCASI TB No. 701, Table 12D (median).**	7. Emissions Method Code: **5**

8. Calculation of Emissions: **See Attachment B of PSD Application**

Pb (hourly) = 31.3 lb / MM ton BLS fired x 210,000 lb/hr BLS / 2,000 lb/ton x 1 MM ton/10^6 ton = 0.0033 lb/hr
Pb (annual) = 0.0033 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.014 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.0033 lb/hr and 0.014 tons/year**	4. Equivalent Allowable Emissions: lb/hour
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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **SAM**

2. Total Percent Efficiency of Control: **0.0**

3. Potential Emissions: **3.6 lb/hour 15.9 tons/year**

4. Synthetically Limited? ☐ Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable): to tons/year

6. Emission Factor: **0.8 ppmvd, corrected to 8% oxygen**

Reference: **BACT determination (see Attachment D)**

7. Emissions Method Code: **5**

9. Calculation of Emissions: **See Attachment B of PSD Application**

SAM (1-hour) = (0.8 $ft^3/10^6\ ft^3$) x 294,000 dscf/min x 2,116.8 lb/ft^2 x 1 lb-n-°R/1,545.6 ft-lb x 1/528 °R x 98 lb-lb-n x 60 min/hr = 3.6 lb/hr

SAM (annual) = 3.6 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 15.9 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **3.6 lb/hour 15.9 tons/year**	4. Equivalent Allowable Emissions: lb/hour
5. Method of Compliance: **Stack testing must be performed once per fiscal year**	
6. Allowable Emissions Comment (Description of Operating Method):): **Based on BACT analysis (see Attachment D) and Rule 62-212.400(5)(c).**	

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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **TRS**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **17.5 lb/hr (12-hr block avg.) and 34.2 tons/year**	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **11.2 ppmvd @ 8 % oxygen (12-hr block avg.)** **5.0 ppmvd @ 8 % oxygen (annual average)** Reference: **Voluntary limit to avoid PSD**	7. Emissions Method Code: **5**

10. Calculation of Emissions: **See Attachment B of PSD Application**

TRS (12-hr block average) = (11.2 $ft^3/10^6\ ft^3$) x 294,000 dscf/min x 2,116.8 lb/ft^2 x 1 lb-n-°R/1,545.6 ft-lb x 1/528 °R x 34 lb-lb-n x 60 min/hr = 17.5 lb/hr

TRS (annual average) = (5 $ft^3/10^6\ ft^3$) x 294,000 dscf/min x 2,116.8 lb/ft^2 x 1 lb-n-°R/1,545.6 ft-lb x 1/528 °R x 34 lb-lb-n x 60 min/hr = 7.8 lb/hr

TRS (annual average) = 7.8 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 34.2 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 2

1. Basis for Allowable Emissions Code: **ESCPSD**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **17.5 lb/hr (12-hr block avg.) and 34.2 tons/year**	4. Equivalent Allowable Emissions: lb/hour
5. Method of Compliance: **Stack testing must be performed once per fiscal year**	
6. Allowable Emissions Comment (Description of Operating Method): **Voluntary limit to avoid PSD review.**	

Allowable Emissions Allowable Emissions 2 of 2

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **7.8 lb/hr (annual avg.) and 34.2 tons/year**	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **Based on taking voluntary restriction of TRS emissions to avoid PSD.**	

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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H001**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **5.25** lb/hour **23.0** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.05 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**

11. Calculation of Emissions:

(hourly) = 0.05 lb/ton BLS x 105 ton BLS/hr = 5.25 lb/hr
(annual) = 5.25 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 23.0 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H015**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.057** lb/hour **0.25** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.00054 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14B (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
12. Calculation of Emissions: **(hourly) = 0.00054 lb/ton BLS x 105 ton BLS/hr = 0.057 lb/hr** **(annual) = 0.057 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.25 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H017**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **2.6** lb/hour **11.5** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.025 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
13. Calculation of Emissions: **(hourly) = 0.025 lb/ton BLS x 105 ton BLS/hr = 2.6 lb/hr** **(annual) = 2.6 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 11.5 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H021**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.000126** lb/hour **0.00055** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.0000012 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14B (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
14. Calculation of Emissions: **(hourly) = 0.0000012 lb/ton BLS x 105 ton BLS/hr = 0.000126 lb/hr** **(annual) = 0.000126 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.00055 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H027**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.00075** lb/hour **0.0033** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.0000071 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14B (median)**	7. Emissions Method Code: **5**

15. Calculation of Emissions:

(hourly) = 0.0000071 lb/ton BLS x 105 ton BLS/hr = 0.00075 lb/hr
(annual) = 0.00075 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.0033 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H043**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.19** lb/hour **0.83** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.0018 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**

16. Calculation of Emissions:

(hourly) = 0.0018 lb/ton BLS x 105 ton BLS/hr = 0.19 lb/hr
(annual) = 0.19 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.83 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: H047

2. Total Percent Efficiency of Control: 0.0

3. Potential Emissions: 0.00017 lb/hour 0.00074 tons/year

4. Synthetically Limited? ☐ Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable): to tons/year

6. Emission Factor: 0.0000016 lb/ton BLS

Reference: NCASI TB No. 858, Table 14B (median)

7. Emissions Method Code: 5

17. Calculation of Emissions:

(hourly) = 0.0000016 lb/ton BLS x 105 ton BLS/hr = 0.00017 lb/hr
(annual) = 0.00017 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.00074 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H095**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.50** lb/hour **2.2** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.0048 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (median)**	7. Emissions Method Code: **5**
18. Calculation of Emissions: **(hourly) = 0.0048 lb/ton BLS x 105 ton BLS/hr = 0.50 lb/hr** **(annual) = 0.50 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 2.2 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H104**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.38** lb/hour **1.7** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.0036 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**

19. Calculation of Emissions:

(hourly) = 0.0036 lb/ton BLS x 105 ton BLS/hr = 0.38 lb/hr
(annual) = 0.38 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 1.7 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H106**	2. Total Percent Efficiency of Control: 0.0
3. Potential Emissions: **5.8** lb/hour **25.4** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.055 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (median)**	7. Emissions Method Code: **5**
20. Calculation of Emissions: **(hourly) = 0.055 lb/ton BLS x 105 ton BLS/hr = 5.8 lb/hr** **(annual) = 5.8 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 25.4 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H113**
2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.0055** lb/hour **0.024** tons/year
4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year
6. Emission Factor: **0.000052 lb/ton BLS**
   Reference: **NCASI TB No. 858, Table 14B (median)**
7. Emissions Method Code: **5**

21. Calculation of Emissions:

(hourly) = 0.000052 lb/ton BLS x 105 ton BLS/hr = 0.0055 lb/hr
(annual) = 0.0055 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.024 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H114**

2. Total Percent Efficiency of Control: **0.0**

3. Potential Emissions: **0.000019** lb/hour **0.000083** tons/year

4. Synthetically Limited? ☐ Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable): to tons/year

6. Emission Factor: **0.00000018 lb/ton BLS**

Reference: **NCASI TB No. 858, Table 14B (median)**

7. Emissions Method Code: **5**

22. Calculation of Emissions:

(hourly) = 0.00000018 lb/ton BLS x 105 ton BLS/hr = 0.000019 lb/hr
(annual) = 0.000019 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.000083 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: H115	2. Total Percent Efficiency of Control: 0.0
3. Potential Emissions: 4.6 lb/hour 20.2 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 0.044 lb/ton BLS Reference: NCASI TB No. 858, Table 14A (median)	7. Emissions Method Code: 5

23. Calculation of Emissions:

Phenol (hourly) = 0.044 lb/ton BLS x 105 ton BLS/hr = 4.6 lb/hr
Phenol (annual) = 4.6 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 20.2 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H120**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.75** lb/hour **3.3** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.0071 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
24. Calculation of Emissions: **(hourly) = 0.0071 lb/ton BLS x 105 ton BLS/hr = 0.75 lb/hr** **(annual) = 0.75 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 3.3 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H123**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.54** lb/hour **2.4** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.0051 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
25. Calculation of Emissions: **(hourly) = 0.0051 lb/ton BLS x 105 ton BLS/hr = 0.54 lb/hr** **(annual) = 0.54 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 2.4 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: H128	2. Total Percent Efficiency of Control: 0.0
3. Potential Emissions: 1.2 lb/hour 5.3 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 0.011 lb/ton BLS Reference: NCASI TB No. 858, Table 14A (highest in range; no mean or median available)	7. Emissions Method Code: 5
26. Calculation of Emissions: (hourly) = 0.011 lb/ton BLS x 105 ton BLS/hr = 1.2 lb/hr (annual) = 1.2 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 5.3 ton/yr	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H132**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.027** lb/hour **0.12** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.00026 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (median)**	7. Emissions Method Code: **5**

27. Calculation of Emissions:

(hourly) = 0.00026 lb/ton BLS x 105 ton BLS/hr = 0.027 lb/hr
(annual) = 0.027 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.12 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H133**	2. Total Percent Efficiency of Control: 0.0
3. Potential Emissions: **0.0035** lb/hour **0.015** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.000033 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14B (median)**	7. Emissions Method Code: **5**
28. Calculation of Emissions: **(hourly) = 0.000033 lb/ton BLS x 105 ton BLS/hr = 0.0035 lb/hr** **(annual) = 0.0035 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.015 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H162**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.023** lb/hour **0.10** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.00022 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14B (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
29. Calculation of Emissions: **(hourly) = 0.00022 lb/ton BLS x 105 ton BLS/hr = 0.023 lb/hr** **(annual) = 0.023 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.10 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H163**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.059** lb/hour **0.26** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.00056 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (median)**	7. Emissions Method Code: **5**

30. Calculation of Emissions:

Cobalt (hourly) = 0.00056 lb/ton BLS x 105 ton BLS/hr = 0.059 lb/hr
Cobalt (annual) = 0.059 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.26 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H167**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.32** lb/hour **1.4** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.003 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**

31. Calculation of Emissions:

(hourly) = 0.003 lb/ton BLS x 105 ton BLS/hr = 0.32 lb/hr
(annual) = 0.32 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 1.4 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: H169	2. Total Percent Efficiency of Control: 0.0
3. Potential Emissions: 0.12 lb/hour 0.53 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 0.0011 lb/ton BLS Reference: NCASI TB No. 858, Table 14A (highest in range; no mean or median available)	7. Emissions Method Code: 5
32. Calculation of Emissions: (hourly) = 0.0011 lb/ton BLS x 105 ton BLS/hr = 0.12 lb/hr (annual) = 0.12 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.53 ton/yr	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H174**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.91** lb/hour **4.0** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.0087 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
33. Calculation of Emissions: **(hourly) = 0.0087 lb/ton BLS x 105 ton BLS/hr = 0.91 lb/hr** **(annual) = 0.91 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 4.0 ton/yr**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H187**	2. Total Percent Efficiency of Control: **0.0**
3. Potential Emissions: **0.13** lb/hour **0.57** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.0012 lb/ton BLS** Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**

34. Calculation of Emissions:

(hourly) = 0.0012 lb/ton BLS x 105 ton BLS/hr = 0.13 lb/hr
(annual) = 0.13 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.57 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H188**

2. Total Percent Efficiency of Control: **0.0**

3. Potential Emissions: **0.18** lb/hour **0.79** tons/year

4. Synthetically Limited? ☐ Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable): to tons/year

6. Emission Factor: **0.0017 lb/ton BLS**

Reference: **NCASI TB No. 858, Table 14A (highest in range; no mean or median available)**

7. Emissions Method Code: **5**

35. Calculation of Emissions:

(hourly) = 0.0017 lb/ton BLS x 105 ton BLS/hr = 0.18 lb/hr
(annual) = 0.18 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 0.79 ton/yr

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

G. VISIBLE EMISSIONS INFORMATION

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

Visible Emissions Limitation: Visible Emissions Limitation __ of ___

1. Visible Emissions Subtype: **VE20**	2. Basis for Allowable Opacity: x Rule Other
3. Allowable Opacity: **35%** Normal Conditions: **20 %** Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: **less than 6% of time during any calendar quarter** min/hour	
4. Method of Compliance: **EPA Method 9 performed once each fiscal year concurrently with PM performance test**	
5. Visible Emissions Comment: **Opacity requirements based on MACT II standards under 40 CFR 63.864 (Monitoring Requirements)**	

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

Continuous Monitoring System: **Continuous Monitor 1 of 5**

1. Parameter Code: **EM**	2. Pollutant(s): **TRS**
3. CMS Requirement:	**X** Rule Other
4. Monitor Information. Manufacturer: **TMI** Model Number: **Thermo 43-C**	Serial Number: **43C-67324-356**
5. Installation Date: **December 2000**	6. Performance Specification Test Date: **2/2001**
7. Continuous Monitor Comment: **Rule 62-296.404(5)**	

Continuous Monitoring System: **Continuous Monitor 2 of 5**

1. Parameter Code: **O_2**	2. Pollutant(s): **TRS**
3. CMS Requirement:	**x** Rule Other
4. Monitor Information... Manufacturer: **Citicell** Model Number: **F2O**	Serial Number: **None**
5. Installation Date: **12/2000**	6. Performance Specification Test Date: **2/2001**
7. Continuous Monitor Comment: **Oxygen is a diluent for TRS monitoring required by Rule 62-296.404(5)**	

H. CONTINUOUS MONITOR INFORMATION

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

Continuous Monitoring System: **Continuous Monitor 3 of 5**

1. Parameter Code: **VE**	2. Pollutant(s): **Opacity**
3. CMS Requirement:	**X Rule** Other
4. Monitor Information. Manufacturer: **TEI** Model Number: **440-TEI-Opacity**	Serial Number: **440-R-74895-377**
5. Installation Date: **Dec. 2003**	6. Performance Specification Test Date: **March 2004**
7. Continuous Monitor Comment: **Required under Rule 62.204.800 (11)(b)29 and 40 CFR 63.864**	

Continuous Monitoring System:

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	Rule Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

H. CONTINUOUS MONITOR INFORMATION

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

Continuous Monitoring System: **Continuous Monitor 4 of 5**

1. Parameter Code: **EM**	2. Pollutant(s): **NO_x**
3. CMS Requirement:	Rule **X** Other
4. Monitor Information. Manufacturer: **Not yet selected** Model Number: **Unknown**	Serial Number: **Unknown**
5. Installation Date: **To be determined**	6. Performance Specification Test Date: **N/A**
7. Continuous Monitor Comment: **The Mill has agreed to voluntarily install a NO_x CEMs**	

Continuous Monitoring System: **Continuous Monitor 5 of 5**

1. Parameter Code: **EM**	2. Pollutant(s): **CO**
3. CMS Requirement:	Rule **x** Other
4. Monitor Information... Manufacturer: **Not yet selected** Model Number: **Unknown**	Serial Number: **Unknown**
5. Installation Date:	6. Performance Specification Test Date: **N/A**
7. Continuous Monitor Comment: **The Mill has agreed to voluntarily install a CO CEMs**	

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: **Figure 3-3** ☐ 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: **Attachment B** ☐ 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: **Attachment D** ☐ 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: **Attachment C** ☐ Not Applicable

III. EMISSIONS UNIT INFORMATION

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

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

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

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

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

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

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

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

Emissions Unit Description and Status

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

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

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

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

2. Description of Emissions Unit Addressed in this Section: **No. 4 Lime Kiln**

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

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

9. Package Unit:
Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment:

Emissions Unit Control Equipment

1. Control Equipment/Method(s) Description: **Venturi scrubber**
2. Control Device or Method Code(s): **053**

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate:		
2. Maximum Production Rate:		
3. Maximum Heat Input Rate: **140** million Btu/hr		
4. Maximum Incineration Rate:	pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	**24** hours/day **52** weeks/year	**7** days/week **8,760** hours/year

6. Operating Capacity/Schedule Comment:

Maximum Heat Input Rate based on 933 gal/hr of No. 6 fuel oil and 150,000 Btu/gal.

Maximum Process/Throughput Rate: Total Kiln Production 19.44 tons reburned lime per hour

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: **164** °F	9. Actual Volumetric Flow Rate: **58,900** acfm	10. Water Vapor: **34** %
11. Maximum Dry Standard Flow Rate: **54,200 dscfm @ 10% oxygen**	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 @ 10 percent oxygen.
Actual volumetric flow rate and Exit temperature reflect observations at highest tested production rate.

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 2

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/day ADUP (monthly average). Throughput is equivalent to 19.44 tons/hr CaO lime production.**		

Segment Description and Rate: Segment 2 of 2

1. Segment Description (Process/Fuel Type): **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: **0.933**	5. Maximum Annual Rate: **8,173**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: **2.35**	8. Maximum % Ash:	9. Million Btu per SCC Unit: **150**
10. Segment Comment: **Residual oil may include No. 6 fuel oil and on spec used oil.**		

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	053		EL
PM_{10}	053		EL
SO_2		053	EL
NO_X			EL
CO			EL
VOC			EL
TRS			EL
PB			NS
H001 (Acetaldehyde)			NS
H004 (Acetophenone)			NS
H006 (Acrolein)			NS
H015 (Arsenic)			NS
H017 (Benzene)			NS
H021 (Beryllium)			NS
H027 (Cadmium)			NS
H033 (Carbon Tetrachloride)			NS
H034 (Carbonyl Sulfide)			NS
H041 (Chlorobenzene)			NS
H043 (Chloroform)			NS
H046 (Chromium)			NS
H047 (Cobalt)			NS
H050 (o-Cresol)			NS

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit (continued)

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
H051 (m-Cresol)			NS
H053 (Cumene)			NS
H085 (Ethyl Benzene)			NS
H089 (1,2-Dichloroethane)			NS
H095 (Formaldehyde)			NS
H100 (Hexachlorocyclopentadiene)			NS
H104 (n-Hexane)			NS
H106 (Hydrogen Chloride)			NS
H113 (Manganese)			NS
H114 (Mercury)			NS
H115 (Methanol)			NS
H118 (Chloromethane)			NS
H119 (1,1,1-Trichloroethane)			NS
H120 (Methyl Ethyl Ketone)			NS
H123 (Methyl Isobutyl Ketone)			NS
H128 (Methylene Chloride)			NS
H132 (Naphthalene)			NS
H133 (Nickel)			NS
H144 (Phenol)			NS
H162 (Selenium)			NS
H163 (Styrene)			NS
H167 (Tetrachloroethylene)			NS
H169 (Toluene)			NS
H174 (1,2,4-Trichlorobenzene)			NS
H175 (1,1,2-Trichloroethane)			NS
H176 (Trichloroethylene)			NS
H182 (Vinyl Acetate)			NS
H186 (m,p-Xylene)			NS
H187 (o-Xylene)			NS
HAPs			NS

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **29.7** lb/hour **130.2** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.064 gr/dscf** Reference: **Proposed limit**	7. Emissions Method Code: **0**

8. Calculation of Emissions:

0.064 gr/dscf x 54,200 dscf/min x 60 min/hr ÷ 7,000 gr/lb = 29.7 lb/hr (130.2 tpy)

Flow rate and emission factor conditions are set to 10% oxygen

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP Proposes to change the current Title V Permit Limit of 26.0 lbs/hr and 113.9 tons per year to 29.7 lbs/hr and 130.2 tons/yr.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.064 gr/dscf @ 10 percent O_2**	4. Equivalent Allowable Emissions: **29.7** lb/hour **130.2** tons/year
5. Method of Compliance: **Annual stack test using EPA Method 5.**	
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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **PM_{10}**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **29.2** lb/hour **128.0** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **PM_{10} = 98.3% of PM emissions** Reference: **AP-42, Table 10.2-4, lime kiln with venturi scrubber**	7. Emissions Method Code: **0**
8. Calculation of Emissions: **PM_{10} = 0.983 x 29.7 lbs/hr = 29.2 lbs/hr (128.0 tpy)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: **GP Proposes to change the current Title V Permit Limit of 26.0 lbs/hr and 113.9 tons per year to 29.2 lbs/hr and 128.0 tons/yr.**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **29.2 lbs/hr and 128.0 tons/yr**	4. Equivalent Allowable Emissions: **29.2** lb/hour **128.0** tons/year
5. Method of Compliance: **Annual stack test using EPA Method 5.**	
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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **TRS**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **5.7** lb/hour **25.1** 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 296-404 (3)(e)1.**	7. Emissions Method Code: **2**

8. Calculation of Emissions:

Based on 20 ppmvd at 10% oxygen (existing limit)
PV=nRT, where n=mass/molecular weight (MW)
Therefore, mass/volume (V) = P x MW/R x T
P = pressure = 1 atmosphere x 14.7 lb/in^2/atmosphere x 144 in^2/ft^2 x = 2116.8 lb/ft^2
T = temperature = 68 degrees Fahrenheit (°F) = 528 R; R = 1545.6 ft-lb$_f$/lb mole-R
Flow rate = 54,200 dscfm (@ 10% oxygen)
Corresponding mass emission limits are calculated as follows:
(20 ft^3 TRS/10^6 ft^3 air x 2116.8 lb/ft^2 x 34.1 lb/lb-mole)/(1545.6 ft-lb$_f$/lb mole-R x 528 R)
= 1.77 x 10^{-6} lb/ft^3
Mass emission rate = 1.77 x 10^{-6} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 5.7 lbs/hour (25.1 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP proposes to retain the emission limit 20 ppmvd @10% oxygen. GP proposes to replace the current permit allowable of 4.0 lbs/hr and 17.5 tpy with 5.7 lbs/hr and 25.1 tpy.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **20 ppmvd @ 10% O_2**	4. Equivalent Allowable Emissions: **5.7** lb/hour **25.1** tons/year
5. Method of Compliance: **EPA Method 16 or 16A**	
6. Allowable Emissions Comment (Description of Operating Method): **Rule 62-296.404 (3)(e)1.**	

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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: SO_2

2. Total Percent Efficiency of Control: 50%

3. Potential Emissions: 9.1 lb/hour 40.0 tons/year

4. Synthetically Limited? ☐ Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable): to tons/year

6. Emission Factor: 0.47 lb / ton CaO

Reference: NCASI Techincal Bulletin 646

7. Emissions Method Code: 5

8. Calculation of Emissions:

0.47 lb SO_2/ton CaO represents the average of source testing results by NCASI for oil-fired kilns equipped with a wet scrubber

SO_2 emissions = 0.47 lb SO_2/ton CaO x 19.44 ton CaO/hr = 9.1 lbs/hour (40 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP proposes to replace the current SO_2 emission limits of 10.9 lb/hr and 47.7 tpy to 9.1 lbs/hr and 40 tons/yr.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **ESCPSD**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **9.1 lb/hr**	4. Equivalent Allowable Emissions: **9.1** lb/hour **40.0** tons/year
5. Method of Compliance: **EPA Method 8**	
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):	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page [9] of [60]
Nitrogen Oxides

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **NO_x**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **67.9** lb/hour **297.4** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **175 ppmvd @ 10% O_2** Reference: BACT	7. Emissions Method Code: 2

8. Calculation of Emissions:

Based on 175 ppmvd at 10% oxygen (lowered from existing limit of 290 ppmvd)
PV=nRT, where n=mass/molecular weight (MW)
Therefore, mass/volume (V) = P x MW/R x T
P = pressure = 1 atmosphere x 14.7 lb/in^2/atmosphere x 144 in^2/ft^2 x = 2116.8 lb/ft^2
T = temperature = 68 degrees Fahrenheit (°F) = 528 R; R = 1545.6 ft-lb$_f$/lb mole-R
Flow rate = 44,500 dscfm (@ 10% oxygen)
Corresponding mass emission limits are calculated as follows:
(175 ft^3 NO_x/10^6 ft^3 air x 2116.8 lb/ft^2 x 46 lb/lb-mole)/(1545.6 ft-lb$_f$/lb mole-R x 528 R)
= 2.1 x 10^{-5} lb NOx /ft^3
Mass emission rate = 2.1 x 10^{-5} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 67.9 lbs/hour (297.4 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP proposes to replace the current emission limit of 290 ppmvd @ 10% O_2 to 175 ppmvd @ 10% O_2. GP also proposes to replace the current limits of 50.3 lb/hr and 223.3 tpy with 67.9 lb/hr and 297.4 tpy.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **175 ppmvd @ 10% O_2**	4. Equivalent Allowable Emissions: **67.9** lb/hour **297.4** tons/year
5. Method of Compliance: **EPA Method 7E**	
6. Allowable Emissions Comment (Description of Operating Method): **By restricting the NOx emissions below the current permit limit of 290 ppmvd @ 10% O_2 to 175 ppmvd @ 10% O_2, the net emissions increase associated with the project will cause a predicted ambient impact below the modeling significant impact level.**	

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):	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page [11] of [60]
Carbon Monoxide

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: CO	2. Total Percent Efficiency of Control:
3. Potential Emissions: 16.3 lb/hour 71.5 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:	7. Emissions Method Code: 2

8. Calculation of Emissions:

Based on 69 ppmvd at 10% oxygen (existing limit)
PV=nRT, where n=mass/molecular weight (MW)
Therefore, mass/volume (V) = P x MW/R x T
P = pressure = 1 atmosphere x 14.7 lb/in^2/atmosphere x 144 in^2/ft^2 x = 2116.8 lb/ft^2
T = temperature = 68 degrees Fahrenheit (°F) = 528 R; R = 1545.6 ft-lb$_f$/lb mole-R
Flow rate = 44,500 dscfm (@ 10% oxygen)
(69 ft^3 CO/10^6 ft^3 air x 2116.8 lb/ft^2 x 28 lb/lb-mole)/(1545.6 ft-lb$_f$/lb mole-R x 528 R)
= 5.01 x 10^{-6} lb/ft^3
Mass emission rate = 5.01 x 10^{-6} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 16.3 lbs/hour (71.5 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP proposes to retain the emission limit 69 ppmvd @10% oxygen. GP proposes to replace the current permit allowable of 7.3 lbs/hr and 32.0 tpy with 16.3 lbs/hr and 71.5 tpy.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 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: **16.3** lb/hour **71.5** tons/year
5. Method of Compliance: **EPA Method 10**	
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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **SAM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.4** lb/hour **1.8** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.6% of SO_2 is SO_3** Reference:	7. Emissions Method Code: **2**

8. Calculation of Emissions:

Assume 3.6% of sulfur dioxide is sulfates

9.1 lbs/hour x 0.036 = 0.33 lb/hour (as sulfates)

SAM rate = 0.33 lb/hour x 98 lbs SAM/lb-mole SAM x lb-mole SAM/lb-mole SO_3 x lb-mole SO_3/80 lbs SO_3 = 0.4 lb/hour (1.8 tpy) SAM

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **9.4** lb/hour **41.4** 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** Reference: **BACT**	7. Emissions Method Code: **2**

8. Calculation of Emissions:

Based on 70 ppmvd at 10% oxygen (existing limit)

PV=nRT, where n=mass/molecular weight (MW)
Therefore, mass/volume (V) = P x MW/R x T
P = pressure = 1 atmosphere x 14.7 lb/in^2/atmosphere x 144 in^2/ft^2 x = 2116.8 lb/ft^2
T = temperature = 68 degrees Fahrenheit (°F) = 528 R; R = 1545.6 ft-lb$_f$/lb mole-R
Flow rate = 54,200 dscfm (@ 10% oxygen)

(70 ft^3 VOC/10^6 ft^3 air x 2116.8 lb/ft^2 x 16 lb/lb-mole)/(1545.6 ft-lb$_f$/lb mole-R x 528 R)
= 2.91 x 10^{-6} lb/ft^3
Mass emission rate = 2.91 x 10^{-6} lb/ft^3 x 54,200 dscf /min x 60 mins/hour = 9.4 lbs/hour (41.4 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP proposes to reduce the emission limit from 185 ppmvd @10% oxygen to 70 ppmvd @10% oxygen. GP proposes to replace the current permit allowable of 17.2 lbs/hr and 75.3 tpy with 9.4 lbs/hr and 41.4 tpy.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

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

Allowable Emissions Allowable Emissions 1 of 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**	4. Equivalent Allowable Emissions: **9.4** lb/hour **41.4** tons/year
5. Method of Compliance: **EPA Method 25A and 3Aor 3B**	
6. Allowable Emissions Comment (Description of Operating Method): **Proposed BACT 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/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **PB**

2. Total Percent Efficiency of Control:

3. Potential Emissions: **0.056** lb/hour **0.25** tons/year

4. Synthetically Limited? ☐ Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable): to tons/year

6. Emission Factor: **0.0029 lb Pb/ton CaO**

Reference: **NCASI Technical Bulletin 858, Table 16C**

7. Emissions Method Code: **5**

8. Calculation of Emissions:

Based on median of all oil-fired kilns.

19.44 tons CaO/hour x 2.9E-03 lb Pb/ton CaO = 0.056 lb/hour (0.25 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

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

1. Pollutant Emitted: **H001**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.9E-02** lb/hour **0.082** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **9.6E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin # 858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00096 lb/ton CaO x 19.44 ton CaO/hr = 0.019 lb/hr (0.082 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page[18] of [60]
Acetophenone

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

(Optional for unregulated emissions units.)

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

1. Pollutant Emitted: **H004**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.11** lb/hour **0.47** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **5.5E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0055 lb/ton CaO x 19.44 ton CaO/hr = 0.11 lb/hr (0.47 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H006**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **4.08E-02** lb/hour **0.18** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **2.1E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0021 lb/ton CaO x 19.44 ton CaO/hr = 0.0408 lb/hr (0.18 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page [20] of [60]
Arsenic

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H015**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **2.33E-03** lb/hour **1.0E-02** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.2E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16C (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00012 lb/ton CaO x 19.44 ton CaO/hr = 0.00233 lb/hr (0.01 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H017**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.13** lb/hour **0.56** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **6.6E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0066 lb/ton CaO x 19.44 ton CaO/hr = 0.13 lb/hr (0.56 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H021**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.94E-04** lb/hour **8.5 E-04** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.0E-05 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16C (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00001 lb/ton CaO x 19.44 ton CaO/hr = 0.000194 lb/hr (0.00085 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H027**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.13E-04** lb/hour **4.94E-04** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **5.8E-06 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16C (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0000058 lb/ton CaO x 19.44 ton CaO/hr = 0.00011 lb/hr (0.00049 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H033**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **2.9E-02** lb/hour **0.13** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.5E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0015 lb/ton CaO x 19.44 ton CaO/hr = 0.029 lb/hr (0.13 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H034**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **7.6 E-02** lb/hour **0.33** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.9E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0039 lb/ton CaO x 19.44 ton CaO/hr = 0.076 lb/hr (0.33 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page [26] of [60]
Chlorobenzene

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H041**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **8.9E-03** lb/hour **0.039** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **4.6E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00046 lb/ton CaO x 19.44 ton CaO/hr = 0.0089 lb/hr (0.039 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H043**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **4.1 E-03** lb/hour **0.018** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **2.1E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00021 lb/ton CaO x 19.44 ton CaO/hr = 0.0041 lb/hr (0.018 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page [28] of [60]
Chromium

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H046**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **3.9E-03** lb/hour **1.70E-02** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **2.0E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16C (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0002 lb/ton CaO x 19.44 ton CaO/hr = 0.0039 lb/hr (0.017 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H047**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **4.5 E-05** lb/hour **2.0 E-04** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **2.3E-06 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16C (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0000023 lb/ton CaO x 19.44 ton CaO/hr = 0.000045 lb/hr (0.0002 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

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

1. Pollutant Emitted: **H050**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **9.1 E-02** lb/hour **0.40** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **4.7E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0047 lb/ton CaO x 19.44 ton CaO/hr = 0.091 lb/hr (0.4 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: H051	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.85E-01** lb/hour **0.81** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **9.5E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0095 lb/ton CaO x 19.44 ton CaO/hr = 0.185 lb/hr (0.81 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H053**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.11** lb/hour **0.47** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **5.5E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0055 lb/ton CaO x 19.44 ton CaO/hr = 0.11 lb/hr (0.47 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H085**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **5.8E-02** lb/hour **0.26** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.0E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.003 lb/ton CaO x 19.44 ton CaO/hr = 0.058 lb/hr (0.26 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H089**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **7.2E-03** lb/hr **0.032** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.7E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00037 lb/ton CaO x 19.44 ton CaO/hr = 0.0072 lb/hr (0.032 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H095**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **2.9E-02** lb/hour **0.13** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.5E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0015 lb/ton CaO x 19.44 ton CaO/hr = 0.029 lb/hr (0.13 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H100**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **2.3E-01** lb/hour **1.0** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.2E-02 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.012 lb/ton CaO x 19.44 ton CaO/hr = 0.23 lb/hr (1.0 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H104**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **9.33E-03** lb/hour **0.041** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **4.8E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00048 lb/ton CaO x 19.44 ton CaO/hr = 0.0093 lb/hr (0.041 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H106**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **3.7E-02** lb/hour **0.16** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.9E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: 0.0019 lb/ton CaO x 19.44 ton CaO/hr = 0.037 lb/hr (0.16 tons/yr)	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H113**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **5.83E-03** lb/hour **2.6 E-02** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.0E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16C (median)**	7. Emissions Method Code: 5
8. Calculation of Emissions: **0.0003 lb/ton CaO x 19.44 ton CaO/hr = 0.0058 lb/hr (0.026 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page [40] of [60]
Mercury

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H114**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.0E-04** lb/hour **4.4E-04** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **5.2E-06 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16C (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0000052 lb/ton CaO x 19.44 ton CaO/hr = 0.0001 lb/hr (0.00044 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H115**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.6E-01** lb/hour **0.68** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **8.0E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.008 lb/ton CaO x 19.44 ton CaO/hr = 0.16 lb/hr (0.68 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H118**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **3.30E-02** lb/hour **0.145** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.7E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0017 lb/ton CaO x 19.44 ton CaO/hr = 0.033 lb/hr (0.145 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

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

1. Pollutant Emitted: **H119**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.56E-03** lb/hour **0.007** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **8.0E-05 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00008 lb/ton CaO x 19.44 ton CaO/hr = 0.002 lb/hr (0.007 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page [44] of [60]
Methyl Ethyl Ketone

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H120**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **3.38** lb/hour **14.8** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.74E-01 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.174 lb/ton CaO x 19.44 ton CaO/hr = 3.38 lb/hr (14.8 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H123**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **2.5 E-02** lb/hour **0.11** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.3E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0013 lb/ton CaO x 19.44 ton CaO/hr = 0.025 lb/hr (0.111 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H128**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **4.5E-03** lb/hour **0.020** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **2.3E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00023 lb/ton CaO x 19.44 ton CaO/hr = 0.0045 lb/hr (0.02 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H132**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **2.5E-01** lb/hour **1.11** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.3E-02 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.013 lb/ton CaO x 19.44 ton CaO/hr = 0.25 lb/hr (1.11 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H133**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.9 E-03** lb/hour **8.0E-03** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **9.5E-05 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16C (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.000095 lb/ton CaO x 19.44 ton CaO/hr = 0.0019 lb/hr (0.008 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H144**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **3.11E-01** lb/hour **1.36** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.6E-02 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.016 lb/ton CaO x 19.44 ton CaO/hr = 0.311 lb/hr (1.36 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H162**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **2.3E-03** lb/hour **1.0E-02** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.2E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16C (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00012 lb/ton CaO x 19.44 ton CaO/hr = 0.0023 lb/hr (0.01 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H163**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **3.1 E-02** lb/hour **0.14** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.6E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0016 lb/ton CaO x 19.44 ton CaO/hr = 0.031 lb/hr (0.14 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H167**

2. Total Percent Efficiency of Control:

3. Potential Emissions: **1.03E-01** lb/hour **0.45** tons/year

4. Synthetically Limited? Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable): to tons/year

6. Emission Factor: **5.3E-03 lb/ton CaO**

Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**

7. Emissions Method Code: **5**

8. Calculation of Emissions:

0.0053 lb/ton CaO x 19.44 ton CaO/hr = 0.103 lb/hr (0.45 tons/yr)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H169**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **4.7E-01** lb/hour **2.04** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **2.4E-02 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.024 lb/ton CaO x 19.44 ton CaO/hr = 0.47 lb/hr (2.04 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H174**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **9.14E-01** lb/hour **4.00** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **4.7E-02 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.047 lb/ton CaO x 19.44 ton CaO/hr = 0.914 lb/hr (4.0 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page [55] of [60]
1,1,2-Trichloroethane

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H175**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **7.4 E-03** lb/hour **0.032** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.8E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00038 lb/ton CaO x 19.44 ton CaO/hr = 0.0074 lb/hr (0.032 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H176**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **7.2 E-03** lb/hour **0.032** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.7E-04 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00037 lb/ton CaO x 19.44 ton CaO/hr = 0.0072 lb/hr (0.032 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H182**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.6E-03** lb/hour **0.007** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **8.0E-05 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.00008 lb/ton CaO x 19.44 ton CaO/hr = 0.0016 lb/hr (0.007 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H186**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1.11E-01** lb/hour **0.49** tons/year	4. Synthetically Limited? Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **5.7E-03 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (median)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.0057 lb/ton CaO x 19.44 ton CaO/hr = 0.111 lb/hr (0.49 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **H187**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **2.6** lb/hour **11.2** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1.32E-01 lb/ton CaO** Reference: **NCASI Technical Bulletin #858, Table 16A (highest in range; no mean or median available)**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **0.132 lb/ton CaO x 19.44 ton CaO/hr = 2.6 lb/hr (11.2 tons/yr)**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

POLLUTANT DETAIL INFORMATION
Page [60] of [60]
Total HAPs

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

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

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

1. Pollutant Emitted: **HAPS**

2. Total Percent Efficiency of Control:

3. Potential Emissions: **9.6** lb/hour **42.1** tons/year

4. Synthetically Limited? Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable):
to tons/year

6. Emission Factor: **4.95E-01 lb/ton CaO**
Reference: **NCASI Technical Bulletin #858**

7. Emissions Method Code: **5**

8. Calculation of Emissions:

Note emission factor for total HAPs is the sum of individual HAP emission factors.

0.495 lb/ton CaO x 19.44 ton CaO/hr = 9.6 lb/hr (42.1 tons/yr)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

EMISSIONS UNIT INFORMATION
Section [2] of [2]
No. 4 Lime Kiln

G. VISIBLE EMISSIONS INFORMATION

Complete 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: **VE20**	2. Basis for Allowable Opacity: ☒ Rule ☐ Other

3. Allowable Opacity:
Normal Conditions: **20** % Exceptional Conditions: %
Maximum Period of Excess Opacity Allowed: min/hour

4. Method of Compliance: **DEP Method 9**

5. Visible Emissions Comment:

Due to moisture interference, the visible emission limiting standard pursuant to F.A.C. Rule 62-296.320(4) is not applicable and is deferred to F.A.C. Rule 62-296.404(2)(b).

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 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 Instrument, Inc** Model Number: **Not Applicable**	Serial Number: **Not Applicable**
5. Installation Date: **Dec 2000**	6. Performance Specification Test Date:
7. Continuous Monitor Comment: **Monitor information describes equipment in operation. GP reserves the right to replace this equipment as maintenance,**	

Continuous Monitoring System: Continuous Monitor 2 of 2

1. Parameter Code: **O_2**	2. Pollutant(s):
3. CMS Requirement:	☒ Rule ☐ Other
4. Monitor Information... Manufacturer: **Thermal Environmental Instrument, Inc** Model Number: **320B**	Serial Number: **Not available**
5. Installation Date: **Dec 2000**	6. Performance Specification Test Date:
7. Continuous Monitor Comment: **Rule 62-296.404(5)(a). Monitor information describes equipment in operation. GP reserves the right to replace this equipment as maintenance may require.**	

EMISSIONS UNIT INFORMATION

Section [2] of [2]
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: **Figure 3-3** ☐ 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: _____ ☒ 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: _____ ☒ Previously Submitted, Date **April 2003**

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: **Sections 3 and 5** ☐ Not Applicable

Section [1] of [1]
No. 4 Lime Kiln

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(6) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e))
   ☒ Attached, Document ID: **Attachment E** ☐ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rule 62-212.400(5)(h)6., F.A.C., and Rule 62-212.500(4)(f), F.A.C.)
   ☒ Attached, Document ID: **Attachment C** ☐ 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: **Section 5.0** ☐ Not Applicable
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
5. Acid Rain Part Application
   - ☐ Certificate of Representation (EPA Form No. 7610-1)
     - ☐ Copy Attached, Document ID: _____
   - ☐ Acid Rain Part (Form No. 62-210.900(1)(a))
     - ☐ Attached, Document ID: _____
     - ☐ Previously Submitted, Date: _____
   - ☐ Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
     - ☐ Attached, Document ID: _____
     - ☐ Previously Submitted, Date: _____
   - ☐ New Unit Exemption (Form No. 62-210.900(1)(a)2.)
     - ☐ Attached, Document ID: _____
     - ☐ Previously Submitted, Date: _____
   - ☐ Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)
     - ☐ Attached, Document ID: _____
     - ☐ Previously Submitted, Date: _____
   - ☐ Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)
     - ☐ Attached, Document ID: _____
     - ☐ Previously Submitted, Date: _____
   - ☐ Phase II NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)
     - ☐ Attached, Document ID: _____
     - ☐ Previously Submitted, Date: _____
   - ☒ Not Applicable

EMISSIONS UNIT INFORMATION

Section [1] of [1]

No. 4 Lime Kiln

Additional Requirements Comment

ATTACHMENT B

BASELINE AND POTENTIAL EMISSION CALCULATIONS

FOR PROJECT-AFFECTED SOURCES

Baseline Emission Rate Calculations For Project-Affected Sources

General Assumptions:

Baseline emission calculations have been calculated by taking the average values of either Mill production and/or combustion equipment fuel usage data for calendar years 2004 and 2005 and multiplying these average values by the appropriate emission factors. Emission factors used include those published in US Environmental Protection Agency (EPA) Manual AP-42, various technical bulletins and other reports published by the National Council for Air and Stream Improvement (NCASI). Additionally, some of the baseline emission data is taken directly from stack tests that have been performed. Some of the production and/or fuel usage data come from the Mill's 2004 and 2005 Annual Operating Reports submitted to the state while some of the data comes from other Mill records.

The pollutants considered for emission estimating purposes include: particulate matter (total particulate matter and PM_{10}), nitrogen oxides, sulfur dioxide, carbon monoxide, volatile organic compounds, lead, total reduced sulfur, sulfuric acid mist, mercury and beryllium.

Chemical Recovery

No. 4 Recovery Boiler- Emissions Unit ID # 018 - Rated capacity of 210,000 lb/hr of BLS or 5.04 MM lb BLS/day.

Unit uses an ESP with a particulate matter collection efficiency of 99%.

2004: 525,988 tons air-dried unbleached pulp or 744,438 tons BLS
Hours of operation: 8,082

2005: 534,339 tons air-dried unbleached pulp or 766,071 tons BLS
Hours of operation: 8,283

Particulate Matter Emissions:

2004:

$$\mathrm{PM(hourly)} = 52.7\ \frac{\mathrm{lb}}{\mathrm{hr}}$$ - Stack Test Data 3/2/2004

$$\mathrm{PM(annual)} = \left(52.7\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}082\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 213.0\,\mathrm{TPY}$$

2005:

$$\mathrm{PM(hourly)} = 13.6\ \frac{\mathrm{lb}}{\mathrm{hr}}$$ - Stack Test Data 9/6-7/2005

$$\mathrm{PM(annual)} = \left(13.6\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}283\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 56.3\ \mathrm{TPY}$$

Average:

PM (hourly) = 33.2 lb/hr

$$\mathrm{PM(annual)} = 134.7\ \mathrm{TPY}$$

Particulate Matter (PM_{10}) Emissions: AP-42, Table 10.2-3 (9/90), indicates that PM_{10} emissions from recovery boilers without a direct contact evaporator and with an ESP control device are equivalent to 75% of PM emissions.

2004:

$$\mathrm{PM_{10}(hourly)} = 0.75\left(52.7\frac{\mathrm{lb}}{\mathrm{hr}}\right) = 39.5\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{PM_{10}(annual)} = 0.75(213\,\mathrm{TPY}) = 159.8\ \mathrm{TPY}$$

2005:

$$\mathrm{PM_{10}(hourly)} = 0.75\left(13.6\frac{\mathrm{lb}}{\mathrm{hr}}\right) = 10.2\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{PM_{10}(annual)} = 0.75(56.3\,\mathrm{TPY}) = 42.2\ \mathrm{TPY}$$

Average:

$$\mathrm{PM}_{10}(\text{hourly}) = 24.9\ \frac{\text{lb}}{\text{hr}}$$

$$\mathrm{PM}_{10}(\text{annual}) = 101.0\,\text{TPY}$$

Sulfur Dioxide Emissions:

2004:

$\mathrm{SO}_2(\text{hourly}) = 4.3\ \frac{\text{lb}}{\text{hr}}$ - Stack Test Data 3/2/2004

$$\mathrm{SO}_2(\text{annual}) = \left(4.3\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 17.4\ \text{TPY}$$

2005:

$\mathrm{SO}_2(\text{hourly}) = 2.9\ \frac{\text{lb}}{\text{hr}}$ - Based on annual average of CEMS data for 2005, excluding SSM

$$\mathrm{SO}_2(\text{annual}) = \left(2.9\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}283\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 12.0\,\text{TPY}$$

Average:

$$\mathrm{SO}_2(\text{hourly}) = 3.6\ \frac{\text{lb}}{\text{hr}}$$

$$\mathrm{SO}_2(\text{annual}) = 14.7\ \text{TPY}$$

Sulfuric Acid Mist Emissions:

2004:

$\mathrm{SAM}(\text{hourly}) = 0.6\ \frac{\text{lb}}{\text{hr}}$ - Stack Test Data 3/2/2004

$$\mathrm{SAM}(\text{annual}) = \left(0.6\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.4\ \text{TPY}$$

2005:

Estimate based on similar derivation of sulfuric acid mist from AP-42, Table 1.3-1, for fuel oil: 3.6% of SO_2 becomes SO_3 then take into account the ratio of sulfuric acid mist and sulfur trioxide molecular weights (98/80).

$$\mathrm{SAM}(\text{hourly}) = 0.044\left(2.9\frac{\text{lb}}{\text{hr}}\right) = 0.13\frac{\text{lb}}{\text{hr}}$$

$$\mathrm{SAM}(\text{annual}) = 0.044(12.0\,\text{TPY}) = 0.53\ \text{TPY}$$

Average:

$$\mathrm{SAM(hourly)} = 0.37\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{SAM(annual)} = 1.5\ \mathrm{TPY}$$

Nitrogen Oxides Emissions:

2004:

$$\mathrm{NO_x\,(hourly)} = 115.0\frac{\mathrm{lb}}{\mathrm{hr}}$$ - Stack Test Data 3/2/2004

$$\mathrm{NO_x\,(annual)} = \left(115.0\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}082\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 464.7\ \mathrm{TPY}$$

2005:

$$\mathrm{NO_x\,(hourly)} = 116.3\frac{\mathrm{lb}}{\mathrm{hr}}$$ - Stack Test Data 9/6-7/2004

$$\mathrm{NO_x\,(annual)} = \left(116.3\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}283\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 481.7\ \mathrm{TPY}$$

Average:

$$\mathrm{NO_x\,(hourly)} = 115.7\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{NO_x\,(annual)} = 473.2\ \mathrm{TPY}$$

Carbon Monoxide Emissions:

2004:

$$\mathrm{CO(hourly)} = 318.0\frac{\mathrm{lb}}{\mathrm{hr}}$$ - Stack Test Data 3/2/2004

$$\mathrm{CO(annual)} = \left(318.0\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}082\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 1{,}285.0\,\mathrm{TPY}$$

2005:

$$\mathrm{CO(hourly)} = 293\frac{\mathrm{lb}}{\mathrm{hr}}$$ - Stack Test Data 9/6-7/2005

$$\mathrm{CO(annual)} = \left(293\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}283\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 1{,}213.5\,\mathrm{TPY}$$

Average:

$$\text{CO(hourly)} = 305.5\ \frac{\text{lb}}{\text{hr}}$$

$$\text{CO(annual)} = 1{,}249.3\ \text{TPY}$$

Volatile Organic Compound Emissions:

2004:

$$\text{VOC(hourly)} = 0.3\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 3/2/2004}$$

$$\text{VOC(annual)} = \left(0.3\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.2\,\text{TPY}$$

2005:

$$\text{VOC(hourly)} = 4.3\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 9/6-7/2005}$$

$$\text{VOC(annual)} = \left(4.3\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}283\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 17.8\,\text{TPY}$$

Average:

$$\text{VOC(hourly)} = 2.3\ \frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 9.5\,\text{TPY}$$

Total Reduced Sulfur Emissions:

2004:

$$\text{TRS(hourly)} = 2.2\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 3/2/2004}$$

$$\text{TRS(annual)} = \left(2.2\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 8.9\,\text{TPY}$$

2005:

$$\text{TRS(hourly)} = 3.3\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 9/6-7/2005}$$

$$\text{TRS(annual)} = \left(3.3\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}283\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 13.7\,\text{TPY}$$

Average:

$$\text{TRS(hourly)} = 2.8\ \frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = 11.3\ \text{TPY}$$

Lead Emissions: Emission factor - NCASI TB 701, Table 12D = 31.3 lbs Pb/MM ton BLS (median value).

2004:

$$\text{Pb(hourly)} = 31.3\frac{\text{lb}}{\text{MMton}}\left(\frac{744{,}438\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{MMton}}{10^6\,\text{ton}}\right)\left(\frac{\text{yr}}{8{,}082\,\text{hr}}\right) = 0.0029\frac{\text{lb}}{\text{hr}}$$

$$\text{Pb(annual)} = \left(0.0029\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.012\,\text{TPY}$$

2005:

$$\text{Pb(hourly)} = 31.3\frac{\text{lb}}{\text{MMton}}\left(\frac{766{,}071\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{MMton}}{10^6\,\text{ton}}\right)\left(\frac{\text{yr}}{8{,}282.5\,\text{hr}}\right) = 0.0029\frac{\text{lb}}{\text{hr}}$$

$$\text{Pb(annual)} = \left(0.0029\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}283\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.012\,\text{TPY}$$

Average:

$$\text{Pb(hourly)} = 0.0029\ \frac{\text{lb}}{\text{hr}}$$

$$\text{Pb(annual)} = 0.012\ \text{TPY}$$

Mercury Emissions: Emission factor - NCASI TB 858, Table 14B = $1.8\text{x}10^{-7}$ lb/ton BLS (median value).

2004:

$$\text{Hg(hourly)} = 1.8\text{x}10^{-7}\ \frac{\text{lb}}{\text{ton}}\left(\frac{744{,}438\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}082\,\text{hr}}\right) = 1.66\text{x}10^{-5}\ \frac{\text{lb}}{\text{hr}}$$

$$\text{Hg(annual)} = \left(1.66\text{x}10^{-5}\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 6.7\text{x}10^{-5}\ \text{TPY}$$

2005:

$$\text{Hg(hourly)} = 1.8\text{x}10^{-7}\ \frac{\text{lb}}{\text{ton}}\left(\frac{766{,}071\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}282.5\,\text{hr}}\right) = 1.66\text{x}10^{-5}\ \frac{\text{lb}}{\text{hr}}$$

$$\text{Hg(annual)} = \left(1.66\text{x}10^{-5}\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}283\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 6.9\text{x}10^{-5}\ \text{TPY}$$

Average:

$$\text{Hg(hourly)} = 1.66\text{x}10^{-5}\ \frac{\text{lb}}{\text{hr}}$$

$$\text{Hg(annual)} = 6.8\text{x}10^{-5}\ \text{TPY}$$

Highest Daily PM_{10}, SO_2, SAM, NO_x, CO, and TRS Emission Rates – Used for Modeling Purposes

Highest daily emission rates based on stack test data or as noted below:

lb/hr PM_{10} = 39.5 lb/hr (2004)
lb/hr SAM = 0.6 lb/hr (2004)
lb/hr NO_x = 116.3 lb/hr (2005)
lb/hr CO = 318.0 lb/hr (2004)
lb/hr TRS = 3.3 lb/hr (2005)

lb/hr SO_2:

3-hour average: Based on CEMS data from 9/23/04 – 69 ppmvd
Flow rate based on 2004 stack test: 234,700 dscfm

$$SO_2(3-\text{hour}) =$$

$$\left(\frac{69\ \text{ft}^3}{10^6\ \text{ft}^3}(\text{ppmvd})\right)\left(\frac{234{,}700\ \text{dscf}}{\text{min}}\right)\left(\frac{2{,}116.8\ \text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\ \text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\ \text{R}}\right)\left(\frac{64\ \text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{60\ \text{min}}{\text{hr}}\right) = 161.3\frac{\text{lb}}{\text{hr}}$$

24-hour average: Based on CEMS data from 7/04/04 – 10.6 ppmvd
Flow rate based on 2004 stack test: 234,700 dscfm

$$SO_2(24-\text{hour}) =$$

$$\left(\frac{10.6\ \text{ft}^3}{10^6\ \text{ft}^3}(\text{ppmvd})\right)\left(\frac{234{,}700\ \text{dscf}}{\text{min}}\right)\left(\frac{2{,}116.8\ \text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\ \text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\ \text{R}}\right)\left(\frac{64\ \text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{60\ \text{min}}{\text{hr}}\right) = 24.8\frac{\text{lb}}{\text{hr}}$$

No. 4 Smelt Dissolving Tanks- Emissions Unit ID # 019 –
Rated capacity of 210,000 lb BLS/hr (24-hr average).

2004: 525,988 tons air-dried unbleached pulp or 744,438 tons BLS
Hours of operation: 8,082

2005: 534,339 tons air-dried unbleached pulp or 766,071 tons BLS
Hours of operation: 8,283

Unit has a wet scrubber with rated efficiency of 95-99.9%

Particulate Matter Emissions:

2004:

$$\text{PM(hourly)} = 10.2\frac{\text{lb}}{\text{hr}} \text{ - Stack Test Data 8/27/2004}$$

$$\text{PM(annual)} = \left(10.2\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 41.2\,\text{TPY}$$

2005:

$$\text{PM(hourly)} = 6.9\frac{\text{lb}}{\text{hr}} \text{ - Stack Test Data 9/9/2005}$$

$$\text{PM(annual)} = \left(6.9\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}283\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 28.6\,\text{TPY}$$

Average:

$$\text{PM(hourly)} = 8.6\,\frac{\text{lb}}{\text{hr}}$$

$$\text{PM(annual)} = 34.9\text{ TPY}$$

Particulate Matter (PM_{10}) Emissions: AP-42, Table 10.2-7 (9/90), indicates that PM_{10} emissions from smelt dissolving tanks with venturi scrubbers are equivalent to 90% of PM emissions.

2004:

$$\text{PM}_{10}\text{(hourly)} = (0.90)\left(10.2\frac{\text{lb}}{\text{hr}}\right) = 9.2\frac{\text{lb}}{\text{hr}}$$

$$\text{PM}_{10}\text{(annual)} = (0.90)(41.2\,\text{TPY}) = 37.1\,\text{TPY}$$

2005:

$$PM_{10}(\text{hourly}) = (0.90)\left(6.9\frac{\text{lb}}{\text{hr}}\right) = 6.2\frac{\text{lb}}{\text{hr}}$$

$$PM_{10}(\text{annual}) = (0.90)(28.6\,\text{TPY}) = 25.7\,\text{TPY}$$

Average:

$$PM_{10}(\text{hourly}) = 7.7\ \frac{\text{lb}}{\text{hr}}$$

$$PM_{10}(\text{annual}) = 31.4\ \text{TPY}$$

Sulfur Dioxide Emissions: Emission factor - 0.073 lb/ton BLS (highest reported value for smelt dissolving tanks with scrubbers); NCASI TB #884, Table 4.15, August 2004.

2004:

$$SO_2(\text{hourly}) = 0.073\frac{\text{lb}}{\text{ton}}\left(\frac{744{,}438\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}082\,\text{hr}}\right) = 6.7\frac{\text{lb}}{\text{hr}}$$

$$SO_2(\text{annual}) = \left(6.7\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 27.2\,\text{TPY}$$

2005:

$$SO_2(\text{hourly}) = 0.073\frac{\text{lb}}{\text{ton}}\left(\frac{766{,}071\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}282.5\,\text{hr}}\right) = 6.8\frac{\text{lb}}{\text{hr}}$$

$$SO_2(\text{annual}) = \left(6.8\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}283\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 28.2\,\text{TPY}$$

Average:

$$SO_2(\text{hourly}) = 6.8\ \frac{\text{lb}}{\text{hr}}$$

$$SO_2(\text{annual}) = 27.7\ \text{TPY}$$

Nitrogen Oxides Emissions: Emission factor - 0.151 lb/ton BLS (highest reported value for smelt dissolving tanks with scrubbers); NCASI TB #884, Table 4.15, August 2004.

2004:

$$NO_x(\text{hourly}) = 0.151\frac{\text{lb}}{\text{ton}}\left(\frac{744{,}438\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}082\,\text{hr}}\right) = 13.9\frac{\text{lb}}{\text{hr}}$$

$$NO_x(\text{annual}) = \left(13.9\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 56.2\,\text{TPY}$$

2005:

$$\mathrm{NO_x\,(hourly)} = 0.151\frac{\mathrm{lb}}{\mathrm{ton}}\left(\frac{766{,}071\,\mathrm{ton}}{\mathrm{yr}}\right)\left(\frac{\mathrm{yr}}{8{,}282.5\,\mathrm{hr}}\right) = 14.0\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{NO_x\,(annual)} = \left(14.0\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}283\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 58.0\,\mathrm{TPY}$$

Average:

$$\mathrm{NO_x\,(hourly)} = 14.0\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{NO_x\,(annual)} = 57.1\ \mathrm{TPY}$$

Volatile Organic Compound Emissions: Emission factor - 0.25 lb/ton BLS (highest reported value for smelt dissolving tanks with scrubbers); NCASI TB #884, Table 4.15, August 2004.

2004:

$$\mathrm{VOC(hourly)} = 0.25\frac{\mathrm{lb}}{\mathrm{ton}}\left(\frac{744{,}438\,\mathrm{ton}}{\mathrm{yr}}\right)\left(\frac{\mathrm{yr}}{8{,}082\,\mathrm{hr}}\right) = 23.0\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{VOC(annual)} = \left(23.0\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}082\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 93.1\,\mathrm{TPY}$$

2005:

$$\mathrm{VOC(hourly)} = 0.25\frac{\mathrm{lb}}{\mathrm{ton}}\left(\frac{766{,}071\,\mathrm{ton}}{\mathrm{yr}}\right)\left(\frac{\mathrm{yr}}{8{,}282.5\,\mathrm{hr}}\right) = 23.1\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{VOC(annual)} = \left(23.1\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}283\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 95.7\,\mathrm{TPY}$$

Average:

$$\mathrm{VOC(hourly)} = 23.1\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{VOC(annual)} = 94.4\ \mathrm{TPY}$$

Carbon Monoxide Emissions: Emission factor - 0.025 lb/ton BLS (highest reported value for smelt dissolving tanks with scrubbers); NCASI TB #884, Table 4.15, August 2004.

2004:

$$\mathrm{CO(hourly)} = 0.025\frac{\mathrm{lb}}{\mathrm{ton}}\left(\frac{744{,}438\,\mathrm{ton}}{\mathrm{yr}}\right)\left(\frac{\mathrm{yr}}{8{,}082\,\mathrm{hr}}\right) = 2.3\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{CO(annual)} = \left(2.3\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}082\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 9.3\,\mathrm{TPY}$$

2005:

$$\mathrm{CO(hourly)} = 0.025\frac{\mathrm{lb}}{\mathrm{ton}}\left(\frac{766{,}071\,\mathrm{ton}}{\mathrm{yr}}\right)\left(\frac{\mathrm{yr}}{8{,}282.5\,\mathrm{hr}}\right) = 2.3\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{CO(annual)} = \left(2.3\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}283\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 9.5\,\mathrm{TPY}$$

Average:

$$\mathrm{CO(hourly)} = 2.3\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{CO(annual)} = 9.4\ \mathrm{TPY}$$

Total Reduced Sulfur Emissions:

2004:

$$\mathrm{TRS(hourly)} = 1.5\frac{\mathrm{lb}}{\mathrm{hr}}\ \text{- Stack Test Data 3/5/2004}$$

$$\mathrm{TRS(annual)} = \left(1.5\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}082\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 6.1\,\mathrm{TPY}$$

2005:

$$\mathrm{TRS(hourly)} = 1.0\frac{\mathrm{lb}}{\mathrm{hr}}\ \text{- Stack Test Data 9/9/2005}$$

$$\mathrm{TRS(annual)} = \left(1.0\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}283\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 4.1\,\mathrm{TPY}$$

Average:

$$\mathrm{TRS(hourly)} = 1.3\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{TRS(annual)} = 5.1\ \mathrm{TPY}$$

Lead Emissions: Emission factor - 28 lb/MM ton BLS (mean value for smelt dissolving tanks with scrubbers); NCASI TB #701, Table 15B, October 1995.

2004:

$$\mathrm{Pb(hourly)} = 28\frac{\mathrm{lb}}{\mathrm{MMton}}\left(\frac{744{,}438\,\mathrm{ton}}{\mathrm{yr}}\right)\left(\frac{\mathrm{MMton}}{10^{6}\,\mathrm{ton}}\right)\left(\frac{\mathrm{yr}}{8{,}082\,\mathrm{hr}}\right) = 2.6\mathrm{x}10^{-3}\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{Pb(annual)} = \left(2.6\mathrm{x}10^{-3}\ \frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}082\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 0.01\,\mathrm{TPY}$$

2005:

$$\text{Pb(hourly)} = 28\frac{\text{lb}}{\text{MMton}}\left(\frac{766{,}071\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{MMton}}{10^6\,\text{ton}}\right)\left(\frac{\text{yr}}{8{,}282.5\,\text{hr}}\right) = 2.6\text{x}10^{-3}\,\frac{\text{lb}}{\text{hr}}$$

$$\text{Pb(annual)} = \left(2.6\text{x}10^{-3}\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}283\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.01\,\text{TPY}$$

Average:

$$\text{Pb(hourly)} = 2.6\text{x}10^{-3}\,\frac{\text{lb}}{\text{hr}}$$

$$\text{Pb(annual)} = 0.01\ \text{TPY}$$

Mercury Emissions: Emission factor - NCASI TB 701, Table 15B, October 1995 = $1.8\text{x}10^{-7}$ lb/ton BLS (median value).

2004:

$$\text{Hg(hourly)} = 1.8\text{x}10^{-7}\,\frac{\text{lb}}{\text{ton}}\left(\frac{744{,}438\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}082\,\text{hr}}\right) = 1.7\text{x}10^{-5}\,\frac{\text{lb}}{\text{hr}}$$

$$\text{Hg(annual)} = \left(1.66\text{x}10^{-5}\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}082\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 6.7\text{x}10^{-5}\,\text{TPY}$$

2005:

$$\text{Hg(hourly)} = 1.8\text{x}10^{-7}\,\frac{\text{lb}}{\text{ton}}\left(\frac{766{,}071\,\text{ton}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}282.5\,\text{hr}}\right) = 1.7\text{x}10^{-5}\,\frac{\text{lb}}{\text{hr}}$$

$$\text{Hg(annual)} = \left(1.66\text{x}10^{-5}\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}283\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 6.9\text{x}10^{-5}\,\text{TPY}$$

Average:

$$\text{Hg(hourly)} = 1.7\text{x}10^{-5}\,\frac{\text{lb}}{\text{hr}}$$

$$\text{Hg(annual)} = 6.8\text{x}10^{-5}\ \text{TPY}$$

Highest Daily PM_{10}, SO_2, NO_x, CO, and TRS Emission Rates – Used for Modeling Purposes

Highest daily emission rates:

lb/hr PM_{10} = 9.2 lb/hr (2004)
lb/hr SO_2 = 6.8 lb/hr (2005)
lb/hr NO_x = 14.0 lb/hr (2005)
lb/hr CO = 2.3 lb/hr (2004, 2005)
lb/hr TRS = 1.5 lb/hr (2004)

Black Liquor, Green Liquor Cycle-Emissions Unit ID # 042 - This area includes a number of miscellaneous fugitive and point emission sources as listed below:

Digester Area Black Liquor Storage Tanks:

Insignificant emission sources include the two, 65% Black Liquor day tanks, the 300,000 gallon Black Liquor tank, the 50% Black Liquor tank, the unfiltered strong Black Liquor Tank, the filtered Black Liquor tank, the million gallon weak Black Liquor tank, the 157,000 gallon weak liquor tank, the Strong Black Liquor Charge Tank, and the Tissue Black Liquor Charge Tank. The only information available for these emission sources is from NCASI TB # 677 (9/1994), Table V.A.1. Emissions data are provided only in the units of pounds per hour and not an emission factor. Therefore, it is not possible to estimate the increase in VOC emissions attributable to this project for these emission sources.

North & South Precipitator Tanks:

Volatile Organic Compound Emissions: Emission factor – NCASI TB 884, Table 4.17 = 0.003 lb/ton BLS (mean value).

2004:

$$\text{VOC(hourly)} = \left(0.003\frac{\text{lb VOC}}{\text{ton BLS}}\right)\left(\frac{744{,}438\,\text{ton BLS}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.25\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.25\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.1\,\text{TPY}$$

2005:

$$\text{VOC(hourly)} = \left(0.003\frac{\text{lb VOC}}{\text{ton BLS}}\right)\left(\frac{766{,}071\,\text{ton BLS}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.26\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.26\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.1\,\text{TPY}$$

Average:

$$\text{VOC(hourly)} = 0.26\ \frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 1.1\ \text{TPY}$$

Total Reduced Sulfur Emissions: Emission factors – NCASI Technical Bulletin 858, Table A-24 (mean value).

Dimethyl disulfide – $1.2\text{x}10^{-3}$ lb/ton BLS
Dimethyl sulfide – $2.6\text{x}10^{-3}$ lb/ton BLS
Methyl mercaptan – $9.8\text{x}10^{-5}$ lb/ton BLS

Total TRS Compounds = 0.004 lb/ton BLS

2004:

$$\text{TRS(hourly)} = \left(0.004\frac{\text{lb TRS}}{\text{ton BLS}}\right)\left(\frac{744{,}438\text{ ton BLS}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.34\text{ lb/hr}$$

$$\text{TRS(annual)} = \left(0.34\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 1.5\text{ TPY}$$

2005:

$$\text{TRS(hourly)} = \left(0.004\frac{\text{lb TRS}}{\text{ton BLS}}\right)\left(\frac{766{,}071\text{ ton BLS}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.35\text{ lb/hr}$$

$$\text{TRS(annual)} = \left(0.35\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 1.5\text{ TPY}$$

Average:

$$\text{TRS(hourly)} = 0.35\ \frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = 1.5\text{ TPY}$$

Salt Cake Mix Tank:

Volatile Organic Compound Emissions: Emission factor – NCASI TB 884, Table 4.17 = 0.003 lb/ton BLS (mean value).

2004:

$$\text{VOC(hourly)} = \left(0.003\frac{\text{lb VOC}}{\text{ton BLS}}\right)\left(\frac{744{,}438\text{ ton BLS}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.25\text{ lb/hr}$$

$$\text{VOC(annual)} = \left(0.25\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 1.1\text{ TPY}$$

2005:

$$\text{VOC(hourly)} = \left(0.003\frac{\text{lb VOC}}{\text{ton BLS}}\right)\left(\frac{766{,}071\text{ ton BLS}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.26\text{ lb/hr}$$

$$\text{VOC(annual)} = \left(0.26\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 1.1\text{ TPY}$$

Average:

$$\text{VOC(hourly)} = 0.26\ \frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 1.1\text{ TPY}$$

Total Reduced Sulfur Emissions: Emission factors – NCASI Technical Bulletin 858, Table A-24 (mean value).

Dimethyl disulfide – $1.2\text{x}10^{-3}$ lb/ton BLS
Dimethyl sulfide – $2.6\text{x}10^{-3}$ lb/ton BLS
Methyl mercaptan – $9.8\text{x}10^{-5}$ lb/ton BLS

Total TRS Compounds = 0.004 lb/ton BLS

2004:

$$\text{TRS(hourly)} = \left(0.004\frac{\text{lb TRS}}{\text{ton BLS}}\right)\left(\frac{744{,}438\text{ ton BLS}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.34\text{ lb/hr}$$

$$\text{TRS(annual)} = \left(0.34\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 1.5\text{ TPY}$$

2005:

$$\text{TRS(hourly)} = \left(0.004\frac{\text{lb TRS}}{\text{ton BLS}}\right)\left(\frac{766{,}071\text{ ton BLS}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.35\text{ lb/hr}$$

$$\text{TRS(annual)} = \left(0.35\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 1.5\text{ TPY}$$

Average:

$$\text{TRS(hourly)} = 0.35\ \frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = 1.5\text{ TPY}$$

<u>Green Liquor Clarifier:</u>

Volatile Organic Compound Emissions: Emission factor – NCASI TB 884, Table 4.14 = 0.066 lb/ton CaO (mean value).

2004:

$$\text{VOC(hourly)} = \left(0.066\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{111{,}731\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.84\text{ lb/hr}$$

$$\text{VOC(annual)} = \left(0.84\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 3.7\text{ TPY}$$

2005:

$$\text{VOC(hourly)} = \left(0.066\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{113{,}043\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.85\text{ lb/hr}$$

$$\text{VOC(annual)} = \left(0.85\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 3.7\text{ TPY}$$

Average:

$$\text{VOC(hourly)} = 0.85\ \frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 3.7\ \text{TPY}$$

Total Reduced Sulfur Emissions: Emission factors – NCASI Technical Bulletin 858, Table A-17 (mean value).

Dimethyl disulfide – $2\text{x}10^{-4}$ lb/ton CaO
Dimethyl sulfide – Not Detected
Methyl mercaptan – $4.2\text{x}10^{-4}$ lb/ton CaO

Total TRS Compounds = $6.2\text{x}10^{-4}$ lb/ton CaO

2004:

$$\text{TRS(hourly)} = \left(6.2\text{x}10^{-4}\ \frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{111{,}731\ \text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\ \text{hr}}\right) = 7.9\text{x}10^{-3}\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(7.9\text{x}10^{-3}\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 3.5\text{x}10^{-2}\ \text{TPY}$$

2005:

$$\text{TRS(hourly)} = \left(6.2\text{x}10^{-4}\ \frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{113{,}043\ \text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\ \text{hr}}\right) = 8.0\text{x}10^{-3}\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(8.0\text{x}10^{-3}\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 3.5\text{x}10^{-2}\ \text{TPY}$$

Average:

$$\text{TRS(hourly)} = 8.0\text{x}10^{-3}\ \frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = 3.5\text{x}10^{-2}\ \text{TPY}$$

<u>Green Liquor Tanks (North, South, and 280,000 gallon units):</u>

Volatile Organic Compound Emissions: Emission factor – NCASI TB 884, Table 4.14 = 0.066 lb/ton CaO (mean value).

2004:

$$\text{VOC(hourly)} = \left(0.066\ \frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{111{,}731\ \text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\ \text{hr}}\right) = 0.84\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.84\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 3.7\ \text{TPY}$$

2005:

$$\text{VOC(hourly)} = \left(0.066\,\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{113{,}731\ \text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\ \text{hr}}\right) = 0.86\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.86\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 3.8\ \text{TPY}$$

Average:

$$\text{VOC(hourly)} = 0.85\ \frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 3.8\ \text{TPY}$$

Total Reduced Sulfur Emissions: Emission factors – NCASI Technical Bulletin 858, Table A-17 (mean value).

Dimethyl disulfide – $3.1\text{x}10^{-5}$ lb/ton CaO
Dimethyl sulfide – $4.8\text{x}10^{-5}$ lb/ton CaO
Methyl mercaptan – $2.1\text{x}10^{-6}$ lb/ton CaO

Total TRS Compounds = $8.1\text{x}10^{-5}$ lb/ton CaO

2004:

$$\text{TRS(hourly)} = \left(8.1\text{x}10^{-5}\ \frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{111{,}731\ \text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\ \text{hr}}\right) = 1.0\text{x}10^{-3}\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(1.0\text{x}10^{-3}\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 4.5\text{x}10^{-3}\ \text{TPY}$$

2005:

$$\text{TRS(hourly)} = \left(8.1\text{x}10^{-5}\ \frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{113{,}043\ \text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\ \text{hr}}\right) = 1.0\text{x}10^{-3}\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(1.0\text{x}10^{-3}\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 4.4\text{x}10^{-3}\ \text{TPY}$$

Average:

$$\text{TRS(hourly)} = 1.0\text{x}10^{-3}\ \frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = 4.5\text{x}10^{-3}\ \text{TPY}$$

Highest Daily TRS Emission Rates – Used for Modeling Purposes

Highest daily emission rate:

North and South Precipitator Tanks: TRS = 0.4 lb/hr (2005)
Salt Cake Mix Tank: TRS = 0.4 lb/hr (2005)
Green Liquor Clarifier: TRS = 0.008 lb/hr (2005)
Green Liquor Tanks: TRS = 0.001 lb/hr (2004, 2005)

Total TRS = 0.8 lb/hr

Recausticizing

 # 4 Lime Kiln- Emissions Unit ID # 017 - The permitted input capacity of this unit is 82,986 lb/hr (of $CaCO_3$ & inerts)(24-hr block average). This equates to 19.44 tons/hr CaO produced. This unit has a venturi scrubber to control particulate matter emissions. This unit fires No. 6 fuel oil with a maximum sulfur content of 2.35% (by weight) to support combustion in the kiln.

2004: 525,988 tons air-dried unbleached pulp	6,335 M gallons No. 6 fuel oil @ 2.14% sulfur
Hours of operation: 7,688	111,731 tons CaO processed
2005: 534,339 tons air-dried unbleached pulp	6,182.5 M gallons No. 6 fuel oil @ 2.18% sulfur
Hours of operation: 8,198	113,043 tons CaO processed

Particulate Matter Emissions:

2004:

$\text{PM(hourly)} = 7.9\frac{\text{lb}}{\text{hr}}$ - Stack Test Data 2004 – Average of two stack tests – 4.2 lb/hr (3/3-4/2004) and 11.5 lb/hr (8/26/2004).

$$\text{PM(annual)} = \left(7.9\frac{\text{lb}}{\text{hr}}\right)\left(\frac{7{,}688\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 30.4\,\text{TPY}$$

2005:

$\text{PM(hourly)} = 17.6\frac{\text{lb}}{\text{hr}}$ - Stack Test Data 9/8/2005

$$\text{PM(annual)} = \left(17.6\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}198\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 72.1\,\text{TPY}$$

Average:

$$\text{PM(hourly)} = 12.8\,\frac{\text{lb}}{\text{hr}}$$

$$\text{PM(annual)} = 51.3\ \text{TPY}$$

Particulate Matter (PM_{10}) Emissions: PM_{10} assumed to be 98.3% PM, based on AP-42 Table 10.2-4 (9/90-reformatted 1/95) for a lime kiln with a venturi scrubber for control.

2004:

$$PM_{10}\text{(hourly)} = \left(7.9\frac{\text{lb}}{\text{hr}}\right)\text{x}0.983 = 7.8\frac{\text{lb}}{\text{hr}}$$

$$PM_{10}\text{(annual)} = (30.4\,\text{TPY})\text{x}0.983 = 29.9\,\text{TPY}$$

2005:

$$PM_{10}\text{(hourly)} = \left(17.6\frac{\text{lb}}{\text{hr}}\right)\text{x}0.983 = 17.3\frac{\text{lb}}{\text{hr}}$$

$$PM_{10}\text{(annual)} = (72.1\,\text{TPY})\text{x}0.983 = 70.9\,\text{TPY}$$

Average:

$$PM_{10}\text{(hourly)} = 12.6\frac{\text{lb}}{\text{hr}}$$

$$PM_{10}\text{(annual)} = 50.4\ \text{TPY}$$

Sulfur Dioxide Emissions:

2004:

$SO_2\text{(hourly)} = 0.01\frac{\text{lb}}{\text{hr}}$ - Based on detection limit of stack test conducted on 2/26/2004. Emissions are expected to be less than the detection limit.

$$SO_2\text{(annual)} = \left(0.01\frac{\text{lb}}{\text{hr}}\right)\left(\frac{7{,}688\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.04\,\text{TPY}$$

2005:

$SO_2\text{(hourly)} = 0.01\frac{\text{lb}}{\text{hr}}$ - Based on detection limit of stack test conducted on 9/8/2005. Emissions are expected to be less than the detection limit.

$$SO_2\text{(annual)} = \left(0.01\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}198\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.04\,\text{TPY}$$

Average:

$$SO_2\text{(hourly)} = 0.01\ \frac{\text{lb}}{\text{hr}}$$

$$SO_2\text{(annual)} = 0.04\ \text{TPY}$$

Sulfuric Acid Mist Emissions: Assume 3.6% of sulfur dioxide is sulfates. AP-42 emission factors of 5.7S lb/10^3 gal for SO_3 and 157S lb/10^3 gal for SO_2 (Table 1.3-1 (9/98)). The ratio of SO_3 to SO_2 is 3.6%, and then SO_3 was converted to sulfuric acid mist (SAM) by multiplying by ratio of molecular weights (x 98/80).

2004:

$$\text{SAM(hourly)} = \left(\frac{3.6\%}{100\%}\right)\left(0.01\frac{\text{lb}}{\text{hr}}\right) = 0.00036\frac{\text{lbSO}_3}{\text{hr}}\left(\frac{98\,\text{lbSAM}}{\text{lb}-\text{moleSAM}}\right)\left(\frac{\text{lb}-\text{moleSAM}}{\text{lb}-\text{moleSO}_3}\right)\left(\frac{\text{lb}-\text{moleSO}_3}{80\,\text{lbSO}_3}\right)$$

$$= 0.00044\frac{\text{lb}}{\text{hr}}$$

$$\text{SAM(annual)} = \left(0.00044\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{7{,}688\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.0017\,\text{TPY}$$

2005:

$$\text{SAM(hourly)} = \left(\frac{3.6\%}{100\%}\right)\left(0.01\frac{\text{lb}}{\text{hr}}\right) = 0.00036\frac{\text{lbSO}_3}{\text{hr}}\left(\frac{98\,\text{lbSAM}}{\text{lb}-\text{moleSAM}}\right)\left(\frac{\text{lb}-\text{moleSAM}}{\text{lb}-\text{moleSO}_3}\right)\left(\frac{\text{lb}-\text{moleSO}_3}{80\,\text{lbSO}_3}\right)$$

$$= 0.00044\frac{\text{lb}}{\text{hr}}$$

$$\text{SAM(annual)} = \left(0.00044\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}198\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.0018\,\text{TPY}$$

Average:

$$\text{SAM(hourly)} = 0.00044\ \frac{\text{lb}}{\text{hr}}$$

$$\text{SAM(annual)} = 0.0018\ \text{TPY}$$

Total Reduced Sulfur Emissions:

2004:

$$\text{TRS(hourly)} = 0.60\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 3/3/2004}$$

$$\text{TRS(annual)} = \left(0.60\frac{\text{lb}}{\text{hr}}\right)\left(\frac{7{,}688\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.3\,\text{TPY}$$

2005:

$$\text{TRS(hourly)} = 0.69\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 9/8/2005}$$

$$\text{TRS(annual)} = \left(0.69\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}198\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.8\,\text{TPY}$$

Average:

$$\text{TRS(hourly)} = 0.65\ \frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = 2.6\ \text{TPY}$$

Nitrogen Oxides Emissions:

2004:

$$NO_x\,(\text{hourly}) = 33.7\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 2/26/2004}$$

$$NO_x\,(\text{annual}) = \left(33.7\frac{\text{lb}}{\text{hr}}\right)\left(\frac{7{,}688\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 129.5\,\text{TPY}$$

2005:

$$NO_x\,(\text{hourly}) = 17.9\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 9/8/2005}$$

$$NO_x\,(\text{annual}) = \left(17.9\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}198\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 73.3\,\text{TPY}$$

Average:

$$NO_x\,(\text{hourly}) = 25.8\ \frac{\text{lb}}{\text{hr}}$$

$$NO_x\,(\text{annual}) = 101.4\ \text{TPY}$$

Carbon Monoxide Emissions:

2004:

$$\text{CO(hourly)} = 1.4\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 2/26/2004}$$

$$\text{CO(annual)} = \left(1.4\frac{\text{lb}}{\text{hr}}\right)\left(\frac{7{,}688\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 5.4\,\text{TPY}$$

2005:

$$\text{CO(hourly)} = 2.0\frac{\text{lb}}{\text{hr}}\ \text{- Stack Test Data 9/8/2005}$$

$$\text{CO(annual)} = \left(2.0\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}198\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 8.2\,\text{TPY}$$

Average:

$$\text{CO(hourly)} = 1.7\ \frac{\text{lb}}{\text{hr}}$$

$$\text{CO(annual)} = 6.8\ \text{TPY}$$

Volatile Organic Compound Emissions:

2004:

$$\text{VOC(hourly)} = 0.60\frac{\text{lb}}{\text{hr}} \text{ - Stack Test Data 2/26/2004}$$

$$\text{VOC(annual)} = \left(0.60\frac{\text{lb}}{\text{hr}}\right)\left(\frac{7{,}688\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.3\,\text{TPY}$$

2005:

$$\text{VOC(hourly)} = 0.63\frac{\text{lb}}{\text{hr}} \text{ - Stack Test Data 9/8/2005}$$

$$\text{VOC(annual)} = \left(0.63\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}198\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.6\,\text{TPY}$$

Average:

$$\text{VOC(hourly)} = 0.62\frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 2.5\,\text{TPY}$$

Lead Emissions: Emission factor = 2.9E-03 lb/ton CaO NCASI, TB # 858, Table 16C, February 2003, using the median of all oil-fired kilns.

2004:

$$\text{Pb(hourly)} = \left(2.9\text{x}10^{-3}\frac{\text{lb CaO}}{\text{ton}}\right)\left(\frac{111{,}731\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{7{,}688\,\text{hr}}\right) = 0.04\frac{\text{lb}}{\text{hr}}$$

$$\text{Pb(annual)} = \left(0.04\frac{\text{lb}}{\text{hr}}\right)\left(\frac{7{,}688\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.16\,\text{TPY}$$

2005:

$$\text{Pb(hourly)} = \left(2.9\text{x}10^{-3}\frac{\text{lb CaO}}{\text{ton}}\right)\left(\frac{113{,}043\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}198\,\text{hr}}\right) = 0.04\frac{\text{lb}}{\text{hr}}$$

$$\text{Pb(annual)} = \left(0.04\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}198\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.16\,\text{TPY}$$

Average:

$$Pb(hourly) = 0.04\ \frac{lb}{hr}$$

$$Pb(annual) = 0.16\ TPY$$

Highest Daily PM_{10}, SO_2, SAM, NO_x, CO, and TRS Emission Rates – Used for Modeling Purposes

Highest daily emission rates based on stack test data:

lb/hr PM_{10} = 17.3 lb/hr (2005)
lb/hr SO_2 = 0.01 lb/hr (2004, 2005)
lb/hr SAM = 0.0004 lb/hr (2004, 2005)
lb/hr NO_x = 33.7 lb/hr (2004)
lb/hr CO = 2.0 lb/hr (2005)
lb/hr TRS = 0.7 lb/hr (2005)

Caustic Area- Emissions Unit ID # 042 - This area includes a number of miscellaneous fugitive and point emission sources as listed below:

Lime (White Liquor) Slakers (Nos. 1 & 2)

Particulate Matter Emissions: Emission factor – NCASI TB 884, Table 4.14; mean = 0.031 lb/ton CaO.

2004:

$$\text{PM(hourly)} = \left(0.031\frac{\text{lb PM}}{\text{ton CaO}}\right)\left(\frac{111{,}731\ \text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\ \text{hr}}\right) = 0.40\ \text{lb/hr}$$

$$\text{PM(annual)} = \left(0.40\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 1.7\ \text{TPY}$$

2005:

$$\text{PM(hourly)} = \left(0.031\frac{\text{lb PM}}{\text{ton CaO}}\right)\left(\frac{113{,}043\ \text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\ \text{hr}}\right) = 0.40\ \text{lb/hr}$$

$$\text{PM(annual)} = \left(0.40\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 1.7\ \text{TPY}$$

Average:

$$\text{PM(hourly)} = 0.40\ \frac{\text{lb}}{\text{hr}}$$

$$\text{PM(annual)} = 1.7\ \text{TPY}$$

Particulate Matter (PM_{10}) Emissions: Assume PM_{10} is 100% PM.

2004:

$$\text{PM}_{10}\text{(hourly)} = (1)\left(0.40\frac{\text{lb}}{\text{hr}}\right) = 0.40\ \text{lb/hr}$$

$$\text{PM}_{10}\text{(annual)} = (1)(1.7\ \text{TPY}) = 1.7\ \text{TPY}$$

2005:

$$\text{PM}_{10}\text{(hourly)} = (1)\left(0.40\frac{\text{lb}}{\text{hr}}\right) = 0.40\ \text{lb/hr}$$

$$\text{PM}_{10}\text{(annual)} = (1)(1.7\ \text{TPY}) = 1.7\ \text{TPY}$$

Average:

$$PM_{10}(\text{hourly}) = 0.40\ \frac{\text{lb}}{\text{hr}}$$

$$PM_{10}(\text{annual}) = 1.7\ \text{TPY}$$

Volatile Organic Compound Emissions: Emission factor – NCASI TB 676, Table VII.A.5, Mill M (only mill with separate slaker and causticizer exhausts); mean = 0.041 lb/ton CaO.

2004:

$$\text{VOC(hourly)} = \left(0.041\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{111{,}731\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.52\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.52\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.3\,\text{TPY}$$

2005:

$$\text{VOC(hourly)} = \left(0.041\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{113{,}043\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.53\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.53\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.3\,\text{TPY}$$

Average:

$$\text{VOC(hourly)} = 0.53\ \frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 2.3\ \text{TPY}$$

Total Reduced Sulfur Emissions: Emission factor – NCASI TB 849, Table 24; mean = 0.045 lb/ton CaO.

2004:

$$\text{TRS(hourly)} = \left(0.045\frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{111{,}731\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.60\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.60\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.6\,\text{TPY}$$

2005:

$$\text{TRS(hourly)} = \left(0.045\frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{113{,}043\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.60\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.60\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.6\,\text{TPY}$$

Average:

$$\text{TRS(hourly)} = 0.60\ \frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = 2.6\ \text{TPY}$$

White Liquor Storage Tanks (5 units)

Volatile Organic Compound Emissions: Emission factor – NCASI TB 858, Table A-17 = 0.0056 lb/ton CaO (mean value).

2004:

$$\text{VOC(hourly)} = \left(0.0056\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{111{,}731\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.07\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.07\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.31\,\text{TPY}$$

2005:

$$\text{VOC(hourly)} = \left(0.0056\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{113{,}043\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.07\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.07\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.31\,\text{TPY}$$

Average:

$$\text{VOC(hourly)} = 0.07\ \frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 0.31\ \text{TPY}$$

White Liquor Clarifiers (East and West Units)

Volatile Organic Compound Emissions: Emission factor – NCASI TB 858, Table A-17 = 0.0056 lb/ton CaO (mean value).

2004:

$$\text{VOC(hourly)} = \left(0.0056\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{111{,}731\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.07\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.07\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.31\,\text{TPY}$$

2005:

$$\text{VOC(hourly)} = \left(0.0056\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{113{,}043\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.07\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.07\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.31\,\text{TPY}$$

Average:

$$\text{VOC(hourly)} = 0.07\ \frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 0.31\ \text{TPY}$$

Lime Mud Washer Tanks (4 units)

Volatile Organic Compound Emissions: Emission factor = 0.085 lb VOC/ton CaO processed NCASI TB # 676, Table VIII.A.1-DCA3 (mean value).

2004:

$$\text{VOC(hourly)} = \left(0.085\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{111{,}731\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 1.1\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(1.1\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 4.8\,\text{TPY}$$

2005:

$$\text{VOC(hourly)} = \left(0.085\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{113{,}043\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 1.1\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(1.1\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 4.8\,\text{TPY}$$

Average:

$$\text{VOC(hourly)} = 1.1\ \frac{\text{lb}}{\text{hr}}$$

$$\text{VOC(annual)} = 4.8\ \text{TPY}$$

Total Reduced Sulfur Emissions: Emission factor from NCASI TB# 676, Table VIII.A.1-DCA3 with values less than the detection limit represented as zero (mean values).

Dimethyl sulfide – 1.2E-03 lb/ton CaO
Methyl mercaptan – 7.4E-04 lb/ton CaO

Total TRS Compounds = 1.9E-03 lb/ton CaO

2004:

$$\text{TRS(hourly)} = \left(1.9\text{x}10^{-3}\ \frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{111{,}731\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.025\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.025\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.11\,\text{TPY}$$

2005:

$$\text{TRS(hourly)} = \left(1.9\text{x}10^{-3}\ \frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{113{,}043\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.025\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.025\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.11\,\text{TPY}$$

Average:

$$\text{TRS(hourly)} = 0.025\ \frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = 0.11\ \text{TPY}$$

Lime Mud Splitter Box Tank

Volatile Organic Compound Emissions: Emission factor = 0.085 lb VOC/ton CaO processed NCASI TB # 676, Table VIII.A.1-DCA3 (mean value).

2004:

$$\mathrm{VOC(hourly)} = \left(0.085 \frac{\mathrm{lb\,VOC}}{\mathrm{ton\,CaO}}\right)\left(\frac{111{,}731\,\mathrm{ton\,CaO}}{\mathrm{yr}}\right)\left(\frac{\mathrm{yr}}{8{,}760\,\mathrm{hr}}\right) = 1.1\ \mathrm{lb/hr}$$

$$\mathrm{VOC(annual)} = \left(1.1 \frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 4.8\,\mathrm{TPY}$$

2005:

$$\mathrm{VOC(hourly)} = \left(0.085 \frac{\mathrm{lb\,VOC}}{\mathrm{ton\,CaO}}\right)\left(\frac{113{,}043\,\mathrm{ton\,CaO}}{\mathrm{yr}}\right)\left(\frac{\mathrm{yr}}{8{,}760\,\mathrm{hr}}\right) = 1.1\ \mathrm{lb/hr}$$

$$\mathrm{VOC(annual)} = \left(1.1 \frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 4.8\,\mathrm{TPY}$$

Average:

$$\mathrm{VOC(hourly)} = 1.1\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{VOC(annual)} = 4.8\ \mathrm{TPY}$$

Total Reduced Sulfur Emissions: Emission factor from NCASI TB# 676, Table VIII.A.1-DCA3 with values less than the detection limit represented as zero (mean values).

Dimethyl sulfide – $1.2\mathrm{x}10^{-3}$ lb/ton CaO
Methyl mercaptan – $7.4\mathrm{x}10^{-4}$ lb/ton CaO

Total TRS Compounds = $1.9\mathrm{x}10^{-3}$ lb/ton CaO

2004:

$$TRS(hourly) = \left(0.0019 \frac{lb\,VOC}{ton\,CaO}\right)\left(\frac{111{,}731\,ton\,CaO}{yr}\right)\left(\frac{yr}{8{,}760\,hr}\right) = 0.024\ lb/hr$$

$$TRS(annual) = \left(0.024 \frac{lb}{hr}\right)\left(\frac{8{,}760\,hr}{yr}\right)\left(\frac{ton}{2{,}000\,lb}\right) = 0.11\,TPY$$

2005:

$$TRS(hourly) = \left(0.0019 \frac{lb\,VOC}{ton\,CaO}\right)\left(\frac{113{,}043\,ton\,CaO}{yr}\right)\left(\frac{yr}{8{,}760\,hr}\right) = 0.025\ lb/hr$$

$$TRS(annual) = \left(0.025 \frac{lb}{hr}\right)\left(\frac{8{,}760\,hr}{yr}\right)\left(\frac{ton}{2{,}000\,lb}\right) = 0.11\,TPY$$

Average:

$$TRS(hourly) = 0.025\ \frac{lb}{hr}$$

$$TRS(annual) = 0.11\ TPY$$

__Causticizer Tanks (Nos. 1A, 1B, 2,3)__

Volatile Organic Compound Emissions: Emission factor – NCASI TB 676, Table VII.A.5, Mill M (only mill with separate slaker and causticizer exhausts); mean = 8.3E-04 lb/ton CaO.

2004:

$$\mathrm{VOC(hourly)} = \left(0.00083 \frac{\mathrm{lb\,VOC}}{\mathrm{ton\,CaO}}\right)\left(\frac{111{,}731\,\mathrm{ton\,CaO}}{\mathrm{yr}}\right)\left(\frac{\mathrm{yr}}{8{,}760\,\mathrm{hr}}\right) = 0.011\ \mathrm{lb/hr}$$

$$\mathrm{VOC(annual)} = \left(0.011 \frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 0.05\,\mathrm{TPY}$$

2005:

$$\mathrm{VOC(hourly)} = \left(0.00083 \frac{\mathrm{lb\,VOC}}{\mathrm{ton\,CaO}}\right)\left(\frac{113{,}043\,\mathrm{ton\,CaO}}{\mathrm{yr}}\right)\left(\frac{\mathrm{yr}}{8{,}760\,\mathrm{hr}}\right) = 0.011\ \mathrm{lb/hr}$$

$$\mathrm{VOC(annual)} = \left(0.011 \frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 0.05\,\mathrm{TPY}$$

Average:

$$\mathrm{VOC(hourly)} = 0.011\ \frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{VOC(annual)} = 0.05\ \mathrm{TPY}$$

Total Reduced Sulfur Emissions: Emission factor – NCASI TB 849, Table 24; mean = 0.019 lb/ton CaO (as sulfur); factor as hydrogen sulfide = 0.019 x 34/32 = 0.020 lb/ton CaO.

2004:

$$\text{TRS(hourly)} = \left(0.020 \frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{111{,}731\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.26\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.26 \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.13\,\text{TPY}$$

2005:

$$\text{TRS(hourly)} = \left(0.020 \frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{113{,}043\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.26\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.26 \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.13\,\text{TPY}$$

Average:

$$\text{TRS(hourly)} = 0.26\ \frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = 1.13\ \text{TPY}$$

Highest Daily PM_{10} and TRS Emission Rates – Used for Modeling Purposes

Highest daily TRS emission rates:

Lime Slakers: TRS = 0.60 lb/hr (2004/2005)
Lime Mud Washer Tanks: TRS = 0.025 lb/hr (2004/2005)
Lime Mud Splitter Box Tank: TRS = 0.025 lb/hr
Causticizer Tanks: TRS = 0.26 lb/hr (2004/2005)

Total TRS = 0.91 lb/hr

Highest daily PM_{10} emission rates:

Lime Slakers: PM_{10} = 0.4 lb/hr (2004/2005)

Total PM_{10} = 0.4 lb/hr

Potential Emission Rate Calculations

For Project-Affected Sources

Palatka, Florida Mill Emission Rate Calculations - Comments and Assumptions

Bases for pollutant potential emission estimates are taken from a number of sources. These include Title V Permit limits, general engineering knowledge and assumptions concerning process operations, emission factors published in US EPA Manual AP-42, various technical bulletins and other reports published by NCASI and EPA's FIRE data system. All potential emission calculations are based on the Mill operating 8,760 hours per year, unless specifically noted otherwise.

The pollutants considered for emission estimating purposes include: particulate matter (total particulate matter and PM_{10}), nitrogen oxides, sulfur dioxide, carbon monoxide, volatile organic compounds, lead, total reduced sulfur, sulfuric acid mist, beryllium and mercury.

There are a number of changes in Title V Permit limits that are addressed in the potential emission rate calculations below. A summary of the current Title V Permit limits (as of Title V Permit Revision No. 1070005-029-AV, dated February 7, 2005) and requested changes are listed below. The reasons for the changes are discussed in the detailed emission calculations following this table.

Chemical Recovery

No. 4 Recovery Boiler- Emissions Unit ID # 018 - Rated capacity of 210,000 lb/hr of BLS or 5.04 MM lb BLS/day. Maximum dry standard cubic feet per minute (dscfm) at 2.8% oxygen = 210,000 dscfm = 294,000 dscfm @ 8% oxygen. Maximum CaO = 38,889 lb/hr or 170,334 ton CaO/yr.

	Current Title V Limits 1070005-029-AV		**Proposed Title V Limits**	
Pollutant	**lb/hr**	**TPY**	**lb/hr**	**TPY**
PM	75.6	331.1	75.6	331.1
PM_{10}	-	-	56.7	248.3
VOC	31.5	138.0	21.0	92.0
SO_2	109.9	481.4	439.4 (3-hr) 292.8 (24-hr) 35.1 (annual)	153.9
NO_x	168.5	738.1	168.5	738.1
SAM	3.2	14.2	3.6	15.9
CO	1,025.4 (3-hr) 512.7 (24-hr)	2,245.6 (24-hr)	1,025.4 (3-hr) 512.7 (24-hr)	2,245.6 (24-hr)
TRS	10.9 (12-mo) 17.5 (12-hr)	47.7 (12-mo)	17.5 (12-hour) 7.8 (12-month)	34.2
Lead	-	-	0.0033	0.014
Be	6.4E-04	2.8E-03	6.4E-04	2.8E-03

Oxygen correction from 210,000 dscfm at 2.8% oxygen to 8% oxygen is shown in the calculations below.

$$\text{Correction Factor} = \text{Actual}\left[\frac{(21-2.8)}{(21-8.0)}\right] = \text{Actual}(1.4)$$

$$\text{Corrected Oxygen} = 210{,}000\,\text{dscfm}\,(1.4) = 294{,}000\,\text{dscfm at 8\% oxygen}$$

Particulate Matter Emissions - 75.6 lb/hr and 331.1 TPY - Current Title V Permit Limits (Section III Subsection E.4).

$$\text{PM (hourly)} = \left(\frac{0.03\text{ grains}}{\text{dscf}}\right)\left(\frac{294{,}000\text{ dscf}}{\text{min}}\right)\left(\frac{1\text{ lb}}{7{,}000\text{ grains}}\right)\left(\frac{60\text{ min}}{\text{hr}}\right) = 75.6\frac{\text{lb}}{\text{hr}}$$

$$\text{PM(annual)} = \left(75.6\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 331.1\,\text{TPY}$$

Proposed PM_{10} limits of 56.7 lb/hr and 248.3 TPY based on PM_{10} as 75% of PM from AP-42, Table 10.2-3 (9/90).

$$\text{PM}_{10}\text{(hourly)} = 0.75\left(75.6\frac{\text{lb}}{\text{hr}}\right) = 56.7\frac{\text{lb}}{\text{hr}}$$

$$\text{PM}_{10}\text{(annual)} = \left(56.7\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 248.3\,\text{TPY}$$

Sulfur Dioxide Emissions - 109.9 lb/hr and 481.4 TPY - Current Title V Permit Limits (Section III Subsection E.7). Proposed SO_2 limits based on annual average = 12 ppmvd @ 8% oxygen; 24-hr average = 100 ppmvd @ 8% oxygen; 3-hr average = 150 ppmvd @ 8% oxygen.

3-hour average:

$$SO_2\,(\text{hourly}) =$$

$$\left(\frac{150\ \text{ft}^3}{10^6\ \text{ft}^3}(\text{ppmvd})\right)\left(\frac{294{,}000\ \text{dscf}}{\text{min}}\right)\left(\frac{2{,}116.8\ \text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\ \text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\ \text{R}}\right)\left(\frac{64\ \text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{60\ \text{min}}{\text{hr}}\right) = 439.4\frac{\text{lb}}{\text{hr}}$$

24-hour average:

$$SO_2\,(\text{hourly}) =$$

$$\left(\frac{100\ \text{ft}^3}{10^6\ \text{ft}^3}(\text{ppmvd})\right)\left(\frac{294{,}000\ \text{dscf}}{\text{min}}\right)\left(\frac{2{,}116.8\ \text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\ \text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\ \text{R}}\right)\left(\frac{64\ \text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{60\ \text{min}}{\text{hr}}\right) = 292.8\frac{\text{lb}}{\text{hr}}$$

Annual average:

$$SO_2\,(\text{hourly}) =$$

$$\left(\frac{12\ \text{ft}^3}{10^6\ \text{ft}^3}(\text{ppmvd})\right)\left(\frac{294{,}000\ \text{dscf}}{\text{min}}\right)\left(\frac{2{,}116.8\ \text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\ \text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\ \text{R}}\right)\left(\frac{64\ \text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{60\ \text{min}}{\text{hr}}\right) = 35.14\frac{\text{lb}}{\text{hr}}$$

$$SO_2\,(\text{annual}) = \left(35.14\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{lb}}\right) = 153.9\text{TPY}$$

Sulfuric Acid Mist Emissions - 3.2 lb/hr and 14.2 TPY - Current Title V Permit Limits (Section III Subsection E.11) based on a limit of 0.81 ppmvd. Proposed Title V Permit Limits of 3.6 lb/hr and 15.8 TPY based on concentration of 0.8 ppmvd, corrected to 8% oxygen.

1-hour average:

$$\text{SAM}(\text{hourly}) =$$

$$\left(\frac{0.8\,\text{ft}^3}{10^6\,\text{ft}^3}(\text{ppmvd})\right)\left(\frac{294{,}000\text{dscf}}{\text{min}}\right)\left(\frac{2{,}116.8\text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\text{R}}\right)\left(\frac{98\text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{60\text{min}}{\text{hr}}\right) = 3.6\frac{\text{lb}}{\text{hr}}$$

Annual average:

$$\text{SAM}(\text{annual}) = \left(3.6\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 15.9\text{TPY}$$

Nitrogen Oxide Emissions - 168.5 lb/hr and 738.1 TPY - Current Title V Permit Limits (Section III Subsection E.8).

$$\mathrm{NOx_x\,(hourly)} =$$

$$\left(\frac{80\ \mathrm{ft}^3}{10^6\ \mathrm{ft}^3}(\mathrm{ppmvd})\right)\left(\frac{294{,}000\ \mathrm{dscf}}{\mathrm{min}}\right)\left(\frac{2{,}116.8\ \mathrm{lb}}{\mathrm{ft}^2}\right)\left(\frac{\mathrm{lb-mole-R}}{1{,}545.6\ \mathrm{ft-lb_f}}\right)\left(\frac{1}{528\ \mathrm{R}}\right)\left(\frac{46\ \mathrm{lb}}{\mathrm{lb-mole}}\right)\left(\frac{60\ \mathrm{min}}{\mathrm{hr}}\right) = 168.5\,\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{NO_x\,(annual)} = \left(168.5\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 738.1\,\mathrm{TPY}$$

Carbon Monoxide Emissions - 1,025.4 lb/hr (3-hr block average), 512.7 lb/hr (24-hr block average), and 2,245.6 TPY - Current Title V Permit Limits (Section III Subsection E.9).

3-hour average:

$$\mathrm{CO\,(hourly)} =$$

$$\left(\frac{800\ \mathrm{ft}^3}{10^6\ \mathrm{ft}^3}(\mathrm{ppmvd})\right)\left(\frac{294{,}000\ \mathrm{dscf}}{\mathrm{min}}\right)\left(\frac{2{,}116.8\ \mathrm{lb}}{\mathrm{ft}^2}\right)\left(\frac{\mathrm{lb-mole-R}}{1{,}545.6\ \mathrm{ft-lb_f}}\right)\left(\frac{1}{528\ \mathrm{R}}\right)\left(\frac{28\ \mathrm{lb}}{\mathrm{lb-mole}}\right)\left(\frac{60\ \mathrm{min}}{\mathrm{hr}}\right) = 1{,}025.4\,\frac{\mathrm{lb}}{\mathrm{hr}}$$

24-hour and annual average:

$$\mathrm{CO\,(hourly)} =$$

$$\left(\frac{400\ \mathrm{ft}^3}{10^6\ \mathrm{ft}^3}(\mathrm{ppmvd})\right)\left(\frac{294{,}000\ \mathrm{dscf}}{\mathrm{min}}\right)\left(\frac{2{,}116.8\ \mathrm{lb}}{\mathrm{ft}^2}\right)\left(\frac{\mathrm{lb-mole-R}}{1{,}545.6\ \mathrm{ft-lb_f}}\right)\left(\frac{1}{528\ \mathrm{R}}\right)\left(\frac{28\ \mathrm{lb}}{\mathrm{lb-mole}}\right)\left(\frac{60\ \mathrm{min}}{\mathrm{hr}}\right) = 512.7\,\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{CO(annual)} = \left(512.7\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 2{,}245.6\,\mathrm{TPY}$$

Volatile Organic Compound Emissions - 31.5 lb/hr and 138.0 TPY - Current Title V Permit Limits (Section III Subsection E.10). Proposed Title V Permit limits of 21.0 lb/hr and 92.0 TPY are based on limits agreed to between Mill and FL DEP.

$$\mathrm{VOC(hourly)} = \left(0.20\frac{\mathrm{lb}}{\mathrm{ton}}\right)\left(\frac{210{,}000\,\mathrm{lb\,BLS}}{\mathrm{hr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 21.0\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{VOC(annual)} = \left(21.0\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 92.0\,\mathrm{TPY}$$

Total Reduced Sulfur Emissions – Current Title V Permit Limits:

7.0 ppmvd @ 8% O_2, 10.9 lb/hr and 47.7 TPY as H_2S (12-month rolling average)
11.2 ppmvd @ 8% O_2, 17.5 lb/hr as H_2S (12-hour block average)

Proposed limit is 5 ppmvd @ 8% O_2, 7.8 lb/hr and 34.2 TPY as H_2S (12-month rolling)

12-hour block average:

$$\text{TRS(hourly)} = \left(\frac{11.2\,\text{ft}^3}{10^6\,\text{ft}^3}(\text{ppmvd})\right)\left(\frac{294{,}000\,\text{dscf}}{\text{min}}\right)\left(\frac{2{,}116.8\,\text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\,\text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\,\text{R}}\right)\left(\frac{34\,\text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{60\,\text{min}}{\text{hr}}\right) = 17.5\frac{\text{lb}}{\text{hr}}$$

Annual average:

$$\text{TRS (hourly)} = \left(\frac{5\,\text{ft}^3}{10^6\,\text{ft}^3}(\text{ppmvd })\right)\left(\frac{294{,}000\,\text{dscf}}{\text{min}}\right)\left(\frac{2{,}116.8\,\text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\,\text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\,\text{R}}\right)\left(\frac{34\,\text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{60\,\text{min}}{\text{hr}}\right) = 7.8\frac{\text{lb}}{\text{hr}}$$

$$\text{TRS(annual)} = \left(7.8\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 34.2\,\text{TPY}$$

Lead Emissions – Proposed Title V permit limits of 0.0033 lb/hr and 0.014 TPY based on emission factor for BLS firing of 31.3 lb/MM ton BLS from NCASI TB # 701, Table 12 D (median value).

$$\text{Pb(hourly)} = \left(31.3\frac{\text{lb}}{\text{MMton}}\right)\left(\frac{\text{MMton}}{10^6\,\text{ton}}\right)\left(\frac{210{,}000\,\text{lb BLS}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.0033\frac{\text{lb}}{\text{hr}}$$

$$\text{Pb(annual)} = \left(0.0033\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.014\,\text{TPY}$$

Beryllium Emissions - 0.5 lb/10^{12} Btu or $6.4\text{x}10^{-4}$ lb/hr and $2.8\text{x}10^{-3}$ TPY - Current Title V Permit Limits (Section III Subsection E.12).

$$\text{Be(hourly)} = \left(\frac{0.5\,\text{lb}}{10^{12}\,\text{Btu}}\right)\left(\frac{210{,}000\,\text{lb BLS}}{\text{hr}}\right)\left(\frac{6{,}084\,\text{Btu}}{\text{lb}}\right) = 6.4\text{x}10^{-4}\frac{\text{lb}}{\text{hr}}$$

$$\text{Be(annual)} = \left(6.4\text{x}10^{-4}\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 2.8\text{x}10^{-3}\,\text{TPY}$$

Mercury Emissions: Emission factor of $1.8\text{x}10^{-7}$ lb/ton BLS from NCASI TB 858, Table 14B (median value).

$$\text{Hg(hourly)} = 1.8\text{x}10^{-7}\,\frac{\text{lb}}{\text{ton}}\left(\frac{210{,}000\,\text{lb}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.9\text{x}10^{-5}\,\frac{\text{lb}}{\text{hr}}$$

$$\text{Hg(annual)} = \left(1.9\text{x}10^{-5}\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 8.3\text{x}10^{-5}\ \text{TPY}$$

Other HAP emission estimates are contained in Attachment A of this application.

No. 4 Smelt Dissolving Tank - Emissions Unit ID # 019 - Rated capacity of 210,000 lb BLS/hr (24-hr average).

Particulate Matter Emissions: 0.12 lb/ton BLS (based on BACT limit established in 1991 PSD permit application) or 12.6 lb/hr and 55.2 TPY – Current Title V Permit Limits.

$$\text{PM(hourly)} = \left(0.12\frac{\text{lb}}{\text{ton BLS}}\right)\left(\frac{210{,}000\,\text{lb BLS}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 12.6\frac{\text{lb}}{\text{hr}}$$

$$\text{PM(annual)} = \left(12.6\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 55.2\,\text{TPY}$$

Particulate Matter (PM_{10}) Emissions: AP-42, Table 10.2-7 (9/90), indicates that PM_{10} emissions from smelt dissolving tanks are equivalent to 90% of PM emissions.

$$\text{PM}_{10}\text{(hourly)} = (0.90)\left(12.6\frac{\text{lb}}{\text{hr}}\right) = 11.3\frac{\text{lb}}{\text{hr}}$$

$$\text{PM}_{10}\text{(annual)} = (0.90)(55.2\,\text{TPY}) = 49.7\,\text{TPY}$$

Sulfur Dioxide Emissions: Emission factor - 0.073 lb/ton BLS (highest reported value for smelt dissolving tanks with scrubbers); NCASI TB # 884, Table 4.15, August 2004.

$$\text{SO}_2\text{(hourly)} = \left(0.073\frac{\text{lb}}{\text{ton BLS}}\right)\left(\frac{210{,}000\,\text{lb BLS}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 7.7\frac{\text{lb}}{\text{hr}}$$

$$\text{SO}_2\text{(annual)} = \left(7.7\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 33.7\,\text{TPY}$$

Nitrogen Oxides Emissions: Emission factor - 0.151 lb/ton BLS (highest reported value for smelt dissolving tanks with scrubbers); NCASI TB # 884, Table 4.15, August 2004.

$$\text{NO}_x\text{(hourly)} = \left(0.151\frac{\text{lb}}{\text{ton BLS}}\right)\left(\frac{210{,}000\,\text{lb BLS}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 15.9\frac{\text{lb}}{\text{hr}}$$

$$\text{NO}_x\text{(annual)} = \left(15.9\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 69.6\,\text{TPY}$$

Volatile Organic Compound Emissions: Emission factor - 0.25 lb/ton BLS (highest reported value for smelt dissolving tanks with scrubbers); NCASI TB # 884, Table 4.15, August 2004.

$$\mathrm{VOC(hourly)} = \left(0.25\frac{\mathrm{lb}}{\mathrm{ton\,BLS}}\right)\left(\frac{210{,}000\,\mathrm{lb\,BLS}}{\mathrm{hr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 26.25\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{VOC(annual)} = \left(26.25\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 115.0\,\mathrm{TPY}$$

Carbon Monoxide Emissions: Emission factor - 0.025 lb/ton BLS (highest reported value for smelt dissolving tanks with scrubbers); NCASI TB # 884, Table 4.15, August 2004.

$$\mathrm{CO(hourly)} = \left(0.025\frac{\mathrm{lb}}{\mathrm{ton\,BLS}}\right)\left(\frac{210{,}000\,\mathrm{lb\,BLS}}{\mathrm{hr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 2.6\frac{\mathrm{lb}}{\mathrm{hr}}$$

$$\mathrm{CO(annual)} = \left(2.6\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 11.4\,\mathrm{TPY}$$

Total Reduced Sulfur Emissions: Current Title V permit limit: 0.048 lb TRS/3,000 lb BLS as H_2S (FL DEP state rule 296.404(3)(d)(1)) or 3.4 lb/hr and 14.9 ton/yr.

$$\mathrm{TRS(hourly)} = \left(\frac{0.048\ \mathrm{lb\,TRS}}{3{,}000\ \mathrm{lb\,BLS}}\right)\left(\frac{210{,}000\ \mathrm{lb\,BLS}}{\mathrm{hr}}\right) = 3.4\ \mathrm{lb/hr}$$

$$\mathrm{TRS(annual)} = \left(3.4\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 14.9\,\mathrm{TPY}$$

Lead Emissions: Emission factor - 28 lb/MM ton BLS (mean value for smelt dissolving tanks with scrubbers); NCASI TB # 701, Table 15B, October 1995.

$$\mathrm{Pb(hourly)} = \left(\frac{28\,\mathrm{lb}}{\mathrm{MMton\,BLS}}\right)\left(\frac{1.05\mathrm{x}10^{-4}\,\mathrm{MMton\,BLS}}{\mathrm{hr}}\right) = 2.9\mathrm{x}10^{-3}\ \mathrm{lb/hr}$$

$$\mathrm{Pb(annual)} = \left(2.9\mathrm{x}10^{-3}\frac{\mathrm{lb}}{\mathrm{hr}}\right)\left(\frac{8{,}760\,\mathrm{hr}}{\mathrm{yr}}\right)\left(\frac{\mathrm{ton}}{2{,}000\,\mathrm{lb}}\right) = 0.013\,\mathrm{TPY}$$

Mercury Emissions: Emission factor – $1.8\text{x}10^{-7}$ lb/ton BLS (median value for smelt dissolving tanks with ND = 0); NCASI TB #701, Table 15B, October 1995.

$$\text{Hg(hourly)} = 1.8\text{x}10^{-7}\,\frac{\text{lb}}{\text{ton}}\left(\frac{210{,}000\,\text{lb}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.9\text{x}10^{-5}\,\frac{\text{lb}}{\text{hr}}$$

$$\text{Hg(annual)} = \left(1.9\text{x}10^{-5}\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 8.3\text{x}10^{-5}\ \text{TPY}$$

Hazardous Air Pollutant Emissions: Emission factors taken from NCASI Technical Bulletin No. 701, Table Nos. 15A and 15B, Oct. 1995, median values and using 105 tons BLS/hr (210,000 lbs BLS/hr).

HAP	Emission Factor (lb/ton BLS)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Acetaldehyde	5.5E-04	5.78E-02	2.53E-01
Acrolein	6.6E-06	6.93E-04	3.04E-03
Benzene	5.6E-07	5.88E-05	2.58E-04
Carbon Disulfide	2.6E-06	2.73E-04	1.20E-03
Chlorobenzene	2.0E-06	2.10E-04	9.20E-04
Chloroform	2.3E-06	2.42E-04	1.06E-03
Cumene	2.9E-07	3.05E-05	1.33E-04
Di-n-butylphthalate	2.5E-04	2.63E-02	1.15E-01
Ethyl Benzene	1.5E-08	1.58E-06	6.90E-06
Formaldehyde	5.2E-03	5.46E-01	2.39E+00
Hexachloropentadiene	8.0E-05	8.40E-03	3.68E-02
n-Hexane	6.1E-07	6.41E-05	2.81E-04
Methanol	0.01	1.05E+00	4.60E+00
Methyl Ethyl Ketone	8.4E-07	8.82E-05	3.86E-04
Methylene Chloride	1.5E-06	1.58E-04	6.90E-04
Methyl Isobutyl Ketone	3.0E-07	3.15E-05	1.38E-04
Styrene	1.2E-04	1.26E-02	5.52E-02
Tetrachloroethylene	3.7E-06	3.89E-04	1.70E-03
Toluene	1.9E-06	2.00E-04	8.74E-04
1,2,4-Trichlorobenzene	1.0E-04	1.05E-02	4.60E-02
1,1,1-Trichloroethane	6.0E-07	6.30E-05	2.76E-04
1,1,2-Trichloroethane	6.8E-06	7.14E-04	3.13E-03
Trichloroethylene	1.5E-05	1.58E-03	6.90E-03
o-Xylene	2.5E-07	2.63E-05	1.15E-04
m,p-Xylene	4.7E-08	4.94E-06	2.16E-05
Antimony	8.7E-06	9.14E-04	4.00E-03
Arsenic	3.0E-06	3.15E-04	1.38E-03
Beryllium	9.6E-07	1.01E-04	4.42E-04
Cadmium	3.0E-06	3.15E-04	1.38E-03
Chromium	1.5E-05	1.58E-03	6.90E-03
Manganese	3.8E-05	3.99E-03	1.75E-02
Mercury	1.8E-07	1.89E-05	8.28E-05
Nickel	6.0E-06	6.30E-04	2.76E-03
Phosphorous	1.2E-04	1.26E-02	5.52E-02
Selenium	3.0E-06	3.15E-04	1.38E-03
Silver	3.5E-06	3.68E-04	1.61E-03

Black Liquor, Green Liquor Cycle-Emissions Unit ID # 042-This area includes a number of miscellaneous fugitive and point emission sources as listed below:

Digester Area Black Liquor Storage Tanks:

Insignificant emission sources include the two, 65% Black Liquor day tanks, the 300,000-gallon Black Liquor tank, the 50% Black Liquor tank, the unfiltered strong Black Liquor Tank, the filtered Black Liquor tank, the million gallon weak Black Liquor tank, the 157,000 gallon weak liquor tank, the Strong Black Liquor Charge Tank, and the Tissue Black Liquor Charge Tank. The only information available for these emission sources is from NCASI TB # 677 (9/1994), Table V.A.1. Emissions data are provided only in the units of pounds per hour and not an emission factor. Therefore, it is not possible to estimate the increase in VOC emissions attributable to this project for these emission sources.

North & South Precipitator Tanks:

Volatile Organic Compound Emissions: Emission factor – NCASI TB 884, Table 4.17 = 0.003 lb/ton BLS (mean value).

$$\text{Potential ton BLS processed/yr} = \left(\frac{210{,}000\,\text{lb BLS}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 105\,\frac{\text{ton BLS}}{\text{hr}}$$

$$\text{VOC(hourly)} = \left(0.003\,\frac{\text{lb TRS}}{\text{ton BLS}}\right)\left(\frac{105\,\text{ton BLS}}{\text{hr}}\right) = 0.315\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.315\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.4\,\text{TPY}$$

Total Reduced Sulfur Emissions: Emission factors – NCASI Technical Bulletin 858, Table A-24 (mean value).

Dimethyl disulfide – $1.2\text{x}10^{-3}$ lb/ton BLS
Dimethyl sulfide – $2.6\text{x}10^{-3}$ lb/ton BLS
Methyl mercaptan – $9.8\text{x}10^{-5}$ lb/ton BLS

Total TRS Compounds = 0.004 lb/ton BLS

$$\text{Potential ton BLS processed/yr} = \left(\frac{210{,}000\,\text{lb BLS}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 105\,\frac{\text{ton BLS}}{\text{hr}}$$

$$\text{TRS(hourly)} = \left(0.004\,\frac{\text{lb TRS}}{\text{ton BLS}}\right)\left(\frac{105\,\text{ton BLS}}{\text{hr}}\right) = 0.42\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.42\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.84\,\text{TPY}$$

Hazardous Air Pollutant Emissions: Emission factors – NCASI TB 858, Table A-24, mean values; emission factors listed as below the detection limit are not used. Emission rates based on using 105 tons BLS/hr (210,000 lbs BLS/hr).

HAP	Emission Factor (lb/ton BLS)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Acetaldehyde	1.7E-04	1.79E-02	7.82E-02
Acrolein	3.5E-06	3.68E-04	1.61E-03
Benzene	2.1E-08	2.21E-06	9.66E-06
Chlorobenzene	3.7E-07	3.89E-05	1.70E-04
Formaldehyde	1.1E-05	1.16E-03	5.06E-03
n-Hexane	1.3E-07	1.37E-05	5.98E-05
Methanol	3.1E-03	3.26E-01	1.43E+00
Methyl Ethyl Ketone	3.8E-05	3.99E-03	1.75E-02
Methyl Isobutyl Ketone	1.2E-06	1.26E-04	5.52E-04
Styrene	1.6E-06	1.68E-04	7.36E-04
Tetrachloroethylene	2.9E-07	3.05E-05	1.33E-04
Toluene	1.2E-05	1.26E-03	5.52E-03
1,1,2-Trichloroethane	1.3E-06	1.37E-04	5.98E-04
1,2,4-Trichlorobenzene	5.0E-06	5.25E-04	2.30E-03
o-Xylene	7.5E-07	7.88E-05	3.45E-04
m,p-Xylene	5.4E-07	5.67E-05	2.48E-04

Salt Cake Mix Tank:

Volatile Organic Compound Emissions: Emission factor – NCASI TB 884, Table 4.17 = 0.003 lb/ton BLS (mean value).

$$\text{Potential ton BLS processed/yr} = \left(\frac{210{,}000\,\text{lb BLS}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 105\frac{\text{ton BLS}}{\text{hr}}$$

$$\text{VOC(hourly)} = \left(0.003\frac{\text{lb TRS}}{\text{ton BLS}}\right)\left(\frac{105\,\text{ton BLS}}{\text{hr}}\right) = 0.315\ \text{lb}/\text{hr}$$

$$\text{VOC(annual)} = \left(0.315\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.4\,\text{TPY}$$

Total Reduced Sulfur Emissions: Emission factors – NCASI Technical Bulletin 858, Table A-24 (mean values).

Dimethyl disulfide – $1.2\text{x}10^{-3}$ lb/ton BLS
Dimethyl sulfide – $2.6\text{x}10^{-3}$ lb/ton BLS
Methyl mercaptan – $9.8\text{x}10^{-5}$ lb/ton BLS

Total TRS Compounds = 0.004 lb/ton BLS

$$\text{Potential ton BLS processed/yr} = \left(\frac{210{,}000\,\text{lb BLS}}{\text{hr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 105\,\frac{\text{ton BLS}}{\text{hr}}$$

$$\text{TRS(hourly)} = \left(0.004\,\frac{\text{lb TRS}}{\text{ton BLS}}\right)\left(\frac{105\,\text{ton BLS}}{\text{hr}}\right) = 0.42\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.42\,\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 1.84\,\text{TPY}$$

Hazardous Air Pollutant Emissions: Emission factors – NCASI TB 858, Table A-24, mean values; emission factors listed as below the detection limit are not used. Emission rates are based on using 105 tons BLS/hr (210,000 lbs BLS/hr).

HAP	Emission Factor (lb/ton BLS)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Acetaldehyde	1.7E-04	1.79E-02	7.82E-02
Acrolein	3.5E-06	3.68E-04	1.61E-03
Benzene	2.1E-08	2.21E-06	9.66E-06
Chlorobenzene	3.7E-07	3.89E-05	1.70E-04
Formaldehyde	1.1E-05	1.16E-03	5.06E-03
n-Hexane	1.3E-07	1.37E-05	5.98E-05
Methanol	3.1E-03	3.26E-01	1.43E+00
Methyl Ethyl Ketone	3.8E-05	3.99E-03	1.75E-02
Methyl Isobutyl Ketone	1.2E-06	1.26E-04	5.52E-04
Styrene	1.6E-06	1.68E-04	7.36E-04
Tetrachloroethylene	2.9E-07	3.05E-05	1.33E-04
Toluene	1.2E-05	1.26E-03	5.52E-03
1,1,2-Trichloroethane	1.3E-06	1.37E-04	5.98E-04
1,2,4-Trichlorobenzene	5.0E-06	5.25E-04	2.30E-03
o-Xylene	7.5E-07	7.88E-05	3.45E-04
m,p-Xylene	5.4E-07	5.67E-05	2.48E-04

Green Liquor Clarifier:

Volatile Organic Compound Emissions: Emission factor – NCASI TB 884, Table 4.14 = 0.066 lb/ton CaO (mean value).

Potential quantity of CaO processed = 170,334 TPY or 19.44 ton/hr

$$\text{VOC(hourly)} = \left(0.066\frac{\text{lb}}{\text{ton CaO}}\right)\left(\frac{170{,}334\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 1.3\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(1.3\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 5.6\,\text{TPY}$$

Total Reduced Sulfur Emissions: Emission factors – NCASI Technical Bulletin 858, Table A-17 (mean value).

Dimethyl disulfide – $2\text{x}10^{-4}$ lb/ton CaO
Dimethyl sulfide – Not Detected
Methyl mercaptan – $4.2\text{x}10^{-4}$ lb/ton CaO

Total TRS Compounds = $6.2\text{x}10^{-4}$ lb/ton CaO

$$\text{TRS(hourly)} = \left(6.2\text{x}10^{-4}\frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{170{,}334\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.012\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.012\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.053\,\text{TPY}$$

Hazardous Air Pollutant Emissions: Emission factors – NCASI TB 858, Table A-17, mean values; emission factors listed as below the detection limit are not used. Emission rates based on using 105 tons BLS/hr (210,000 lbs BLS/hr).

HAP	Emission Factor (lb/ton CaO)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Acetaldehyde	5.8E-05	1.13E-03	4.94E-03
Benzene	4.7E-06	9.14E-05	4.00E-04
Chlorobenzene	1.9E-07	3.69E-06	1.62E-05
Chloroform	2.0E-06	3.89E-05	1.70E-04
1,2-Dichloroethane	1.2E-06	2.33E-05	1.02E-04
n-Hexane	1.1E-06	2.14E-05	9.37E-05
Methanol	1.1E-03	2.14E-02	9.37E-02
Methyl Ethyl Ketone	2.0E-05	3.89E-04	1.70E-03
Methyl Isobutyl Ketone	2.9E-06	5.64E-05	2.47E-04
Tetrachlorethylene	1.4E-06	2.72E-05	1.19E-04
1,1,2-Trichloroethane	6.5E-06	1.26E-04	5.53E-04
o-Xylene	3.4E-07	6.61E-06	2.90E-05

__Green Liquor Tanks (North, South, and 280,000 gallon Units):__

Volatile Organic Compound Emissions: Emission factor – NCASI TB 884, Table 4.14 = 0.066 lb/ton CaO (mean value).

Potential quantity of CaO processed = 170,334 TPY or 19.44 ton/hr

$$\text{VOC(hourly)} = \left(0.066\frac{\text{lb}}{\text{ton CaO}}\right)\left(\frac{170{,}334\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 1.3\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(1.3\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 5.6\,\text{TPY}$$

Total Reduced Sulfur Emissions: Emission factors – NCASI Technical Bulletin 858, Table A-17 (mean value).

Dimethyl disulfide – $3.1\text{x}10^{-5}$ lb/ton CaO
Dimethyl sulfide – $4.8\text{x}10^{-5}$ lb/ton CaO
Methyl mercaptan – $2.1\text{x}10^{-6}$ lb/ton CaO

Total TRS Compounds = $8.1\text{x}10^{-5}$ lb/ton CaO

$$\text{TRS(hourly)} = \left(8.1\text{x}10^{-5}\frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{170{,}334\,\text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.0016\ \text{lb/hr}$$

$$\text{TRS(annual)} = \left(0.0016\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.0069\,\text{TPY}$$

Hazardous Air Pollutant Emissions: Emission factors – NCASI TB 858, Table A-17, mean values; emission factors listed as below the detection limit are not used. Emission rates based on using 105 tons BLS/hr (210,000 lbs BLS/hr).

HAP	Emission Factor (lb/ton CaO)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Acetaldehyde	5.8E-05	1.13E-03	4.94E-03
Benzene	4.7E-06	9.14E-05	4.00E-04
Chlorobenzene	1.9E-07	3.69E-06	1.62E-05
Chloroform	2.0E-06	3.89E-05	1.70E-04
1,2-Dichloroethane	1.2E-06	2.33E-05	1.02E-04
n-Hexane	1.1E-06	2.14E-05	9.37E-05
Methanol	1.1E-03	2.14E-02	9.37E-02
Methyl Ethyl Ketone	2.0E-05	3.89E-04	1.70E-03
Methyl Isobutyl Ketone	2.9E-06	5.64E-05	2.47E-04
Tetrachlorethylene	1.4E-06	2.72E-05	1.19E-04
1,1,2-Trichloroethane	6.5E-06	1.26E-04	5.53E-04
o-Xylene	3.4E-07	6.61E-06	2.90E-05

Recausticizing

No. 4 Lime Kiln- Emissions Unit ID # 017 - The permitted input capacity of this unit is 82,986 pounds per hour (lb/hr) (of $CaCO_3$ & inerts)(24-hr block average). This equates to 19.44 tons/hr CaO produced. This unit has a venturi scrubber to control particulate matter (PM/PM_{10}) emissions and sulfur dioxide (SO_2) emissions (90% assumed). This unit will fire No. 6 fuel oil with a maximum sulfur content of 2.35% (by weight) to support combustion in the kiln.

Pollutant	Current Title V Limits 1070005-029-AV		Proposed Title V Limits	
	lb/hr	**TPY**	**lb/hr**	**TPY**
PM	26.0	113.9	29.7	130.2
PM_{10}	26.0	113.9	29.2	128.0
TRS	4.0	17.5	5.7	25.1
SO_2	10.9	47.7	9.1	40.0
SAM	---	---	0.4	1.8
NO_x	50.3	223.3	67.9	297.4
CO	7.3	32.0	16.3	71.5
VOC	17.2	75.3	9.4	41.4
Lead	---	---	0.056	0.25

Particulate Matter Emissions: Current Title V Permit Limits: 26.0 lb/hr and 113.9 tons per year (TPY) -
previous BACT determination – permit issued 5/31/1992. Based on 0.081 grains/dscf at 10% O_2.

Proposed Title V Permit Limits of 29.7 lb/hr and 130.2 TPY shown by the calculations below.

Flow rate at 10% O_2 = 54,200 dscfm as explained in letter dated April 14, 2005 submitted to Trina Vielhauer.

PM limit = 0.064 grains/dscf is based on MACT II limit.
dscfm = dry standard cubic feet per minute

$$\text{PM(hourly)} = \left(\frac{54{,}200\ \text{dscf}}{\text{min}}\right)\left(\frac{0.064\ \text{grains}}{\text{dscf}}\right)\left(\frac{\text{lb}}{7{,}000\ \text{grains}}\right)\left(\frac{60\text{min}}{\text{hr}}\right) = 29.7\ \text{lb/hr}$$

$$\text{PM(annual)} = \left(29.7\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 130.2\ \text{TPY}$$

PM_{10} assumed to be 98.3% PM, based on AP-42 Table 10.2-4 (9/90-reformatted 1/95) for a lime kiln with a venturi scrubber for control.

$$\text{PM}_{10}\text{(hourly)} = \left(29.7\frac{\text{lb}}{\text{hr}}\right)\text{x}0.983 = 29.2\ \text{lb/hr}$$

$$\text{PM}_{10}\text{(annual)} = (130.2\ \text{TPY})\text{x}0.983 = 128.0\ \text{TPY}$$

TRS Emissions: Current Title V Permit Limits: 4.0 lb/hr (12-hr average) and 17.5 TPY as H_2S - based on 20 ppmv at 10% O_2.

Proposed Title V Permit Limits of 5.7 lb/hr and 25.1 TPY shown by the calculations listed below, based on 20 ppmvd at 10% O_2 and flow rate of 54,200 dscf.

TRS(hourly) =

$$\left(\frac{20\ \text{ft}^3}{10^6\ \text{ft}^3}(\text{ppmvd})\right)\left(\frac{2{,}116.8\ \text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\ \text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\ \text{R}}\right)\left(\frac{34\ \text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{54{,}200\ \text{dscf}}{\text{min}}\right)\left(\frac{60\ \text{min}}{\text{hr}}\right)=5.7\ \text{lb}/\text{hr}$$

$$\text{TRS(annual)}=\left(5.7\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right)=25.1\ \text{TPY}$$

Sulfur Dioxide Emissions: Current Title V Permit Limits: 10.9 lb/hr and 47.7 TPY previous BACT determination – permit issued 5/31/1992. Based on 0.3 lb/adtubp and 72.9 adtubp/hr or 638,604 adtubp/yr and 50% efficiency for SO_2 reduction.

Proposed Title V Permit Limits of 9.1 lb/hr and 40.0 TPY shown by the calculations listed below.

Based on emission factor of 0.47 lbs/ton CaO (NCASI TB 646, February 1993 – from Table 13, average of all the oil-fired kiln values (0.18, 0.02, 0.45, 0.07, 1.63).

$$\text{SO}_2\text{(hourly)}=\left(\frac{19.44\ \text{ton CaO}}{\text{hr}}\right)\left(\frac{0.47\ \text{lb}}{\text{ton CaO}}\right)=9.1\ \text{lb}/\text{hr}$$

$$\text{SO}_2\text{(annual)}=\left(9.1\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right)=40.0\ \text{TPY}$$

Sulfuric Acid Mist Emissions: Current Title V limits-None. Proposed Title V Permit Limits of 0.4 lb/hr and 1.8 TPY, as shown by the calculations listed below, are based on AP-42 emission factors of 5.7S lb/10^3 gal for SO_3 and 157S lb/10^3 gal for SO_2 (Table 1.3-1 (9/98)). The ratio of SO_3 to SO_2 is 3.6%, and then SO_3 was converted to sulfuric acid mist (SAM) by multiplying by ratio of molecular weights (x 98/80).

SAM(hourly) =

$$\left(9.1\frac{\text{lb}}{\text{hr}}\right)\left(\frac{3.6\%}{100\%}\right)=\left(0.33\frac{\text{lb}}{\text{hr}}\ \text{SO}_3\right)\left(\frac{98\ \text{lb SAM}}{\text{lb}-\text{mole SAM}}\right)\left(\frac{\text{lb}-\text{mole SAM}}{\text{lb}-\text{mole SO}_3}\right)\left(\frac{\text{lb}-\text{mole SO}_3}{80\ \text{lb SO}_3}\right)=0.4\ \text{lb}/\text{hr}$$

$$\text{SAM(annual)}=\left(0.4\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right)=1.8\ \text{TPY}$$

Nitrogen Oxides Emissions: Current Title V Permit Limits: 50.3 lb/hr and 223.3 TPY - previous BACT determination – permit issued 5/31/1992. Based on 290 ppmv at 10% O_2

Proposed Title V Permit Limits of 67.9 lb/hr and 297.4 TPY based on 175 ppmvd at 10% oxygen and flow rate of 54,200 dscf. Corresponding mass emission rate calculated as follows:

NOx(hourly) =

$$\left(\frac{175\,\text{ft}^3}{10^6\,\text{ft}^3}(\text{ppmvd})\right)\left(\frac{2{,}116.8\ \text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\ \text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\ \text{R}}\right)\left(\frac{46\ \text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{54{,}200\ \text{dscf}}{\text{min}}\right)\left(\frac{60\ \text{min}}{\text{hr}}\right)=67.9\ \text{lb/hr}$$

$$\text{NOx(annual)}=\left(67.9\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right)=297.4\ \text{TPY}$$

Carbon Monoxide Emissions: Current Title V Permit Limits: 7.3 lb/hr and 32.0 TPY. Previous BACT determination – permit issued 5/31/1992. Based on 69 ppmyd at 10% oxygen.

Proposed Title V Permit Limits of 16.3 lb/hr and 71.5 TPY based on 69 ppmvd at 10% oxygen and 54,200 dscf.

CO(hourly) =

$$\left(\frac{69\ \text{ft}^3}{10^6\,\text{ft}^3}(\text{ppmvd})\right)\left(\frac{2{,}116.8\ \text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\ \text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\ \text{R}}\right)\left(\frac{28\ \text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{54{,}200\ \text{dscf}}{\text{min}}\right)\left(\frac{60\,\text{min}}{\text{hr}}\right)=16.3\ \text{lb/hr}$$

$$\text{CO(annual)}=\left(16.3\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right)=71.5\ \text{TPY}$$

Volatile Organic Compound Emissions: Current Title V Permit Limits: 17.2 lb/hr and 75.3 TPY previous BACT determination – permit issued 5/31/1992 Based on 185 ppmvd @ 10% oxygen

Proposed Title V Permit Limits of 70 ppmvd (existing limit) or 9.4 lb/hr and 41.4 TPY based on 70 ppmv @ 10% oxygen and 54,200 dscf. Corresponding mass emission rate calculated as follows:

VOC(hourly) =

$$\left(\frac{70\ \text{ft}^3}{10^6\,\text{ft}^3}(\text{ppmvd})\right)\left(\frac{2{,}116.8\ \text{lb}}{\text{ft}^2}\right)\left(\frac{\text{lb}-\text{mole}-\text{R}}{1{,}545.6\ \text{ft}-\text{lb}_f}\right)\left(\frac{1}{528\ \text{R}}\right)\left(\frac{16\ \text{lb}}{\text{lb}-\text{mole}}\right)\left(\frac{54{,}200\ \text{dscf}}{\text{min}}\right)\left(\frac{60\ \text{min}}{\text{hr}}\right)=9.4\ \text{lb/hr}$$

$$\text{VOC(annual)}=\left(9.4\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right)=41.4\ \text{TPY}$$

Lead Emissions: Current Title V Permit Limits-None. Maximum emissions of 0.056 lb/hr and 0.25 TPY shown by the calculations listed below. Emission factor = $2.9\text{x}10^{-3}$ lb/ton CaO from NCASI TB #858, Table 16C, February 2003, using median of all oil-fired kilns.

$$\text{Pb(hourly)} = \left(\frac{2.9\text{x}10^{-3}\ \text{lb}}{\text{ton CaO}}\right)\left(\frac{19.44\ \text{ton CaO}}{\text{hr}}\right) = 0.056\ \text{lb/hr}$$

$$\text{Pb(annual)} = \left(0.056\ \frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\ \text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\ \text{lb}}\right) = 0.25\ \text{TPY}$$

Lime Kiln HAP Emission Estimates are included in Attachment A.

Caustic Area- Emissions Unit ID # 042 - This area includes a number of miscellaneous fugitive and point emission sources as listed below:

Lime (White Liquor) Slakers (Nos. 1 & 2)

Particulate Matter Emissions: Emission factor – NCASI TB 884, Table 4.14; mean = 0.031 lb/ton CaO. 170,334 ton CaO processed in both slakers.

$$\text{PM(hourly)} = \left(0.031\frac{\text{lb PM}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.60\text{ lb/hr}$$

$$\text{PM(annual)} = \left(0.60\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 2.6\text{ TPY}$$

PM_{10} assumed to be 100% PM.

$$\text{PM}_{10}\text{(hourly)} = \left(0.60\frac{\text{lb}}{\text{hr}}\right)\text{x}1 = 0.60\text{ lb/hr}$$

$$\text{PM}_{10}\text{(annual)} = (2.6\text{ TPY})\text{x}1 = 2.6\text{ TPY}$$

Volatile Organic Compound Emissions: Emission factor = 0.041 lb/ton CaO, NCASI TB 676, Table VII.A.5, Mill M (only mill with separate slaker and causticizer exhausts); mean value.

$$\text{VOC(hourly)} = \left(0.041\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.80\text{ lb/hr}$$

$$\text{VOC(annual)} = \left(0.80\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 3.5\text{ TPY}$$

Total Reduced Sulfur Emissions: Emission factor = 0.045 lb/ton CaO, NCASI TB 849, Table 24, mean value.

$$\text{TRS(hourly)} = \left(0.045\frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.88\text{ lb/hr}$$

$$\text{TRS(annual)} = \left(0.88\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 3.8\text{ TPY}$$

Hazardous Air Pollutant Emissions: Emission factors – NCASI TB 676, Table VII.A.5, Mill M (only mill with separate slaker and causticizer exhausts), mean values; emission factors listed as below the detection limit are not used.

HAP	Emission Factor (lb/ton CaO)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Acetaldehyde	5.30E-02	1.03E+00	4.51E+00
Methanol	5.30E-02	1.03E+00	4.51E+00
Methyl Ethyl Ketone	1.20E-03	2.33E-02	1.02E-01
Benzene	1.30E-04	2.53E-03	1.11E-02
Toluene	3.10E-04	6.03E-03	2.64E-02
Styrene	1.10E-03	2.14E-02	9.37E-02

White Liquor Storage Tanks (5 units)

Volatile Organic Compound Emissions: Emission factor – NCASI TB 858, Table A-17 = 0.0056 lb/ton CaO (mean value).

$$\text{VOC(hourly)} = \left(0.0056\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{170{,}334\ \text{ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\,\text{hr}}\right) = 0.11\ \text{lb/hr}$$

$$\text{VOC(annual)} = \left(0.11\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\,\text{hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\,\text{lb}}\right) = 0.48\,\text{TPY}$$

Hazardous Air Pollutant Emissions: Emission factors – NCASI TB 858, Table A-17, mean values; emission factors listed as below the detection limit are not used.

HAP	Emission Factor (lb/ton CaO)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Benzene	2.9E-05	5.64E-04	2.47E-03
Formaldehyde	2.2E-03	4.28E-02	1.87E-01
Methanol	1.5E-02	2.92E-01	1.28E+00
Methyl Ethyl Ketone	1.6E-04	3.11E-03	1.36E-02
Styrene	4.9E-05	9.53E-04	4.17E-03
o-Xylene	6.2E-05	1.21E-03	5.28E-03

White Liquor Clarifiers (East and West Units)

Volatile Organic Compound Emissions: Emission factor – NCASI TB 858, Table A-17 = 0.0056 lb/ton CaO, mean value.

$$\text{VOC(hourly)} = \left(0.0056\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.11\text{ lb/hr}$$

$$\text{VOC(annual)} = \left(0.11\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 0.48\text{ TPY}$$

Hazardous Air Pollutant Emissions: Emission factors – NCASI TB 858, Table A-17, mean values; emission factors listed as below the detection limit are not used.

HAP	Emission Factor (lb/ton CaO)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Benzene	2.9E-05	5.64E-04	2.47E-03
Formaldehyde	2.2E-03	4.28E-02	1.87E-01
Methanol	1.5E-02	2.92E-01	1.28E+00
Methyl Ethyl Ketone	1.6E-04	3.11E-03	1.36E-02
Styrene	4.9E-05	9.53E-04	4.17E-03
o-Xylene	6.2E-05	1.21E-03	5.28E-03

Lime Mud Washer Tanks (4 units)

Volatile Organic Compound Emissions: Emission factor = 0.085 lb VOC/ton CaO processed NCASI TB #676, Table VIII.A.1-DCA3 (mean value).

$$\text{VOC(hourly)} = \left(0.085\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 1.65\text{ lb/hr}$$

$$\text{VOC(annual)} = \left(1.65\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 7.2\text{ TPY}$$

Total Reduced Sulfur Emissions: Emission factor from NCASI TB# 676, Table VIII.A.1-DCA3, mean values, with values less than the detection limit represented as zero.

Dimethyl sulfide – $1.2\text{x}10^{-3}$ lb/ton CaO
Methyl mercaptan – $7.4\text{x}10^{-4}$ lb/ton CaO

Total TRS Compounds = $1.9\text{x}10^{-3}$ lb/ton CaO

$$\text{TRS(hourly)} = \left(0.0019\frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.04\text{ lb/hr}$$

$$\text{TRS(annual)} = \left(0.04\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 0.16\text{TPY}$$

Hazardous Air Pollutant Emissions: Emission factors NCASI TB # 676, Table VIII.A.1-DCA3, mean values; emission factors listed as below the detection limit are not used.

HAP	Emission Factor (lb/ton CaO)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Acetaldehyde	2.00E-04	3.89E-03	1.70E-02
Benzene	1.40E-05	2.72E-04	1.19E-03
Methanol	9.30E-02	1.81E+00	7.92E+00
Methyl Ethyl Ketone	2.60E-04	5.05E-03	2.21E-02
Methyl Isobutyl Ketone	1.20E-05	2.33E-04	1.02E-03
Styrene	9.90E-05	1.92E-03	8.43E-03
Toluene	3.50E-05	6.80E-04	2.98E-03
m, p-Xylene	1.40E-05	2.72E-04	1.19E-03
o-Xylene	1.60E-05	3.11E-04	1.36E-03

Lime Mud Splitter Box Tank

Volatile Organic Compound Emissions: Emission factor = 0.085 lb VOC/ton CaO processed NCASI TB #676, Table VIII.A.1-DCA3, mean value.

$$\text{VOC(hourly)} = \left(0.085\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 1.65\text{ lb/hr}$$

$$\text{VOC(annual)} = \left(1.65\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 7.2\text{TPY}$$

Total Reduced Sulfur Emissions: Emission factor from NCASI TB# 676, Table VIII.A.1-DCA3, mean values, with values less than the detection limit represented as zero.

Dimethyl sulfide – 1.2×10^{-3} lb/ton CaO
Methyl mercaptan – 7.4×10^{-4} lb/ton CaO

Total TRS Compounds = 1.9×10^{-3} lb/ton CaO

$$\text{TRS(hourly)} = \left(0.0019\frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.04\text{ lb/hr}$$

$$\text{TRS(annual)} = \left(0.04\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 0.16\text{ TPY}$$

Hazardous Air Pollutant Emissions: Emission factors NCASI TB # 676, Table VIII.A.1-DCA3, mean values; emission factors listed as below the detection limit are not used.

HAP	Emission Factor (lb/ton CaO)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Acetaldehyde	2.00E-04	3.89E-03	1.70E-02
Benzene	1.40E-05	2.72E-04	1.19E-03
Methanol	9.30E-02	1.81E+00	7.92E+00
Methyl Ethyl Ketone	2.60E-04	5.05E-03	2.21E-02
Methyl Isobutyl Ketone	1.20E-05	2.33E-04	1.02E-03
Styrene	9.90E-05	1.92E-03	8.43E-03
Toluene	3.50E-05	6.80E-04	2.98E-03
m, p-Xylene	1.40E-05	2.72E-04	1.19E-03
o-Xylene	1.60E-05	3.11E-04	1.36E-03

Causticizer Tanks (Nos. 1A, 1B, 2,3)

Volatile Organic Compound Emissions: Emission factor – NCASI TB 676, Table VII.A.5, Mill M (only mill with separate slaker and causticizer exhausts); mean = 0.00083 lb/ton CaO.

$$\text{VOC(hourly)} = \left(0.00083\frac{\text{lb VOC}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.016\text{ lb/hr}$$

$$\text{VOC(annual)} = \left(0.016\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 0.07\text{ TPY}$$

Total Reduced Sulfur Emissions: Emission factor – NCASI TB 849, Table 24; mean = 0.019 lb/ton CaO (as sulfur); factor as hydrogen sulfide = 0.019 x 34/32 = 0.020 lb/ton CaO.

$$\text{TRS(hourly)} = \left(0.020\frac{\text{lb TRS}}{\text{ton CaO}}\right)\left(\frac{170{,}334\text{ ton CaO}}{\text{yr}}\right)\left(\frac{\text{yr}}{8{,}760\text{ hr}}\right) = 0.39\text{ lb/hr}$$

$$\text{TRS(annual)} = \left(0.39\frac{\text{lb}}{\text{hr}}\right)\left(\frac{8{,}760\text{ hr}}{\text{yr}}\right)\left(\frac{\text{ton}}{2{,}000\text{ lb}}\right) = 1.7\text{ TPY}$$

Hazardous Air Pollutant Emissions: Emission factors - NCASI TB 676, Table VII.A.5, Mill M (only mill with separate slaker and causticizer exhausts), mean values; emission factors listed as below the detection limit are not used.

HAP	Emission Factor (lb/ton CaO)	Hourly Emission Rate (lbs/hour)	Annual Emission Rate (tons/year)
Acetaldehyde	1.0E-03	1.94E-02	8.51E-02
Methanol	5.5E-04	1.07E-02	4.68E-02
Methyl Ethyl Ketone	7.0E-06	1.36E-04	5.96E-04
Benzene	6.8E-07	1.32E-05	5.79E-05
Methyl Isobutyl Ketone	1.6E-06	3.11E-05	1.36E-04
m,p-Xylene	1.2E-06	2.33E-05	1.02E-04
Styrene	2.2E-05	4.28E-04	1.87E-03

ATTACHMENT C

AIR QUALITY ANALYSIS

ATTACHMENT C
AIR QUALITY ANALYSIS
PALATKA, FL OPERATIONS

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) and Florida Department of Environmental Protection (FDEP) rules require major new facilities and major modifications of existing facilities to undergo several analyses for emission increases subject to Prevention of Significant Deterioration (PSD) review. These analyses determine whether significant air quality deterioration will result from the new or modified facility. As described elsewhere in the application, the proposed modifications at the GP Palatka Mill will result in emissions increases above the significant emission rate for several pollutants. Taking into account all contemporaneous emission increases and decreases within the past 5-years (see Section 5, Table 5-1) the following pollutants will have net emission increases above the significant emission rate:

- nitrogen oxides (NO_x),
- carbon monoxide (CO),
- particulate matter - total suspended (PM)
- particulate matter less than or equal to 10 microns in diameter (PM_{10}),
- ozone (based on the increase in volatile organic compound (VOC) emissions), and
- sulfuric acid mist (SAM).

Therefore, the project is subject to PSD review for these pollutants. In addition to an analysis of control technology discussed in other attachments, PSD review requires GP to conduct the following analyses:

- Source impact analysis,
- Good engineering practice stack height (GEP) analysis,
- Air quality analysis (monitoring), and
- Additional impact analyses.

EPA regulations (40 CFR 52.21(k)) require that an applicant perform a source impact analysis for each applicable pollutant. The PSD regulations specifically provide for the use of atmospheric dispersion models in performing impact analyses, estimating baseline and future air quality levels, and determining compliance with National Ambient Air Quality Standards (NAAQS) and allowable PSD increments. Section 2.9 of this attachment presents the Source Impact Analysis results.

PSD regulations require that the modeling analysis, and any emission limits resulting from the analysis, reflect stack heights that do not exceed GEP stack height (refer to 40 CFR 52.21(h)). To demonstrate this, GP performed an analysis of the physical arrangement of stacks and solid physical structures that may affect dispersion and computed GEP stack heights for each stack. All the emission unit stacks at the GP Palatka Mill are existing stacks, and some are affected by building downwash (see results below). Section 3.0 of this attachment presents the GEP analysis.

The third analysis is specified by EPA regulation 40 CFR 52.21(m). In addition to predicting source impacts, a PSD permit application must contain an analysis of continuous ambient air quality data in the area affected by the project. The regulation presents the conditions that require pre-construction and post-construction monitoring of ambient air. Section 4.0 of this attachment presents the Ambient Air Quality Analysis.

Lastly, EPA regulations (40 CFR 52.21(o)) require an analysis of additional impacts. Section 5.0 presents an analysis of the impacts on soils and vegetation, growth, and impairment to visibility that would occur as a result of the project in the vicinity of the Mill. Section 6.0 presents an analysis of the project's impact on existing air quality, visibility, and deposition in the Class I areas.

2.0 SOURCE IMPACT ANALYSIS

GP conducted the Source Impact Analysis in two phases: 1) impact of the project, and 2) full impact analysis. The first phase determines the impact from the change in emissions associated with the proposed GP projects alone. GP compared these impacts to EPA thresholds for significance and ambient monitoring criteria. If the project impacts exceed the Significant Impact Levels (SILs), then GP conducts a full impact analysis. A full impact analysis predicts impacts from the sources across the entire Mill, as well as certain off-site air emission sources. GP compares these impacts to state and national ambient air quality standards. The following sections discuss the methodology, data inputs, and techniques for the Source Impact Analysis.

2.1 Air Modeling Methodology

The general modeling approach follows EPA and FDEP modeling guidelines for determining compliance with the state AAQS and PSD Increments. In general, current policies stipulate that the highest annual average and highest, second-highest short-term (*i.e.,* 24 hours or less) concentrations be compared to the applicable standard when 5 years of meteorological data are used. The highest, second-highest concentration (HSH) is calculated for a receptor field by:

1. Eliminating the highest concentration predicted at each receptor,
2. Identifying the second-highest concentration at each receptor, and
3. Selecting the highest concentration among these second-highest concentrations.

This approach is consistent with the air quality standards, which permit a short-term average concentration to be exceeded once per year at each receptor.

2.2 Model Selection

GP selected an air dispersion model based on the model's ability to simulate air quality impacts in areas surrounding the Palatka Mill. The area surrounding the Mill is mostly rural and flat. The Mill is located on the western side of the St. John's River. A topographic map of the GP Palatka Mill vicinity is presented in Figure C-1. Based on these features, GP selected the AERMOD dispersion model (Version 04300) to evaluate the pollutant impacts due to the GP Palatka facility alone and in combination with other emission sources.

On November 9, 2005, the EPA implemented AERMOD into its *Guideline of Air Quality Models (Appendix W to 40 CFR Part 51)* as the recommended model for regulatory modeling applications. The Florida Department of Environmental Protection (FDEP) has agreed to allow the use of AERMOD for the GP projects, as it is recognized as containing the latest scientific algorithms for simulating plume behavior in all types of terrain.

For evaluating plume behavior within the building wake of structures, the AERMOD model incorporates the Plume Rise Model Enhancement (PRIME) downwash algorithm developed by the Electric Power Research Institute (EPRI). AERMOD can predict pollutant concentrations for averaging times of annual and 24-, 8-, 3-, and 1-hours. The predicted concentrations are compared to applicable significant impact levels, NAAQS and allowable PSD Class II increments that exist for the respective averaging times.

For this analysis, the EPA regulatory default options were used to predict all maximum impacts.

These options include:

- Final plume rise at all receptor locations
- Stack-tip downwash
- Buoyancy-induced dispersion
- Default wind speed profile coefficients
- Default vertical potential temperature gradients
- Calm wind processing

2.3 Meteorological Data

Impacts were predicted using an hourly meteorological data record for the five-year period 2001 through 2005 developed by the FDEP. The nearest site to the Palatka Mill for surface observations is located approximately 57 km to the west in Gainesville. However, FDEP has routinely recommended analyses for Palatka apply surface observations from Jacksonville International Airport (JAX). While the distance between GP and JAX is approximately 92 km, GP and FDEP consider JAX to be more representative than Gainesville surface observations. While both JAX and GP are less than 40 km from the Atlantic coastline, Gainesville is over 95 km from the coastline. The analysis applied meteorological data comprised of hourly surface and upper air data collected from JAX. These data were processing into a format suitable for input to the AERMOD model by the FDEP.

2.4 Background Concentrations

Background concentrations are necessary to determine total ambient air quality impacts to demonstrate compliance with the NAAQS. "Background concentrations" are defined as concentrations due to sources other than those specifically included in the modeling analysis. For example, background concentration would account for other small point sources not included in the modeling, fugitive emission sources, and natural background sources (*e.g.*, mobile sources).

Existing ambient air quality data were reviewed in the selection of background concentrations. Data collected included monitor locations, their proximity to the Palatka Mill, data quality, and how recent the data was collected. Table C-1 presents the values for background concentrations in micrograms per cubic meter ($\mu g/m^3$). These values reflect the most current years of available data by each representative monitor.

2.5 Building Downwash

In accordance with current EPA policy, the effect of building downwash effects on predicted air quality concentration levels was evaluated. Building dimensions for all key GP Palatka buildings were entered into the EPA-developed Building Profile Input Program (BPIP, Version 04274) to obtain direction-specific building heights, lengths, and widths for all GP Palatka Mill point sources. The BPIP model was used in its PRIME mode to generate the appropriate PRIME downwash input dimensions for the AERMOD model. The direction-specific building dimensions are input for H_b and l_b for 36 radial directions, with each direction representing a 10-degree sector. The H_b is the building height and l_b is the lesser of the building height or projected width. In addition, the AERMOD model inputs three additional building parameters that further describe the building/wake configuration:

- Projected length of the building along the flow direction,
- Along-flow distance from the stack to the center of the upwind face of the projected building, and
- Cross-flow distance from the stack to the center of the upwind face of the projected building.

The building dimensions used in the modeling for the buildings and structures associated with the GP Palatka Mill are presented in Table C-2, and are portrayed in Figure C-2.

2.6 Significant Impact Analysis

2.6.1 Purpose and Methodology

The significant impact analysis is the first phase of the Source Impact Analysis and determines two results: 1) the maximum impacts due to the proposed project emissions and 2) the location of predicted impacts that are greater than significant impact levels (SILs). The area of these impacts defines the impact area of the project and the significant impact distance (SID). For the purposes of this report, the significant impact analysis includes all emission increases associated with the No. 4 Recovery Boiler project, emission increases associated with other GP projects being planned within the same general time frame (No. 4 Lime Kiln and No. 4 Combination Boiler), as well as all other contemporaneous project emission increases or decreases.

A significant impact analysis was performed to determine whether the proposed project's emissions increase results in maximum predicted impacts greater than the PSD modeling SILs or the EPA monitoring deminimis concentrations. Current EPA and FDEP policies stipulate that the highest annual and highest short-term predicted impacts are to be compared to these impact levels. The SILs and deminimis concentrations are presented in Table C-3 for the pollutants for which the proposed projects trigger PSD review.

2.6.2 Model Inventory

For the significant impact analysis, the emission inventory includes all sources that will experience an increase or decrease in emissions due to the proposed GP and contemporaneous projects. The emission increase represents the difference between the potential emissions and the actual emissions during the baseline period. The baseline must reflect conditions prior to any modifications or physical changes. For this analysis, the average of 2004 and 2005 operations was selected to represent the baseline. A summary of the maximum 3-hour short-term (i.e., lb/hr) emission increases and decreases due to all proposed GP projects and contemporaneous emissions changes is presented in Table C-4. A summary of the maximum 24-hour lb/hr emission increases and decreases due to all proposed GP projects and contemporaneous emissions changes is presented in Table C-5, and the annual (i.e., TPY) emission increases and decreases due to the projects and contemporaneous changes are presented in Table C-6. Supporting documentation is included in a separate attachment to this PSD application.

2.6.3 Project Source Modeling Parameters

Stack location and parameter data for the proposed GP sources and the contemporaneous sources are included in Table C-7. The point source data include stack location, stack height, diameter, exit temperature, and velocity. The area source data include the source location, release height and initial sigma-z. The volume source data include release height, side length, initial sigma-y and initial sigma-y.

2.6.4 Receptor Locations

The modeling analysis used Universal Transverse Mercator (UTM) coordinates from zone 17, North American Datum 1927 (NAD27). Nested Cartesian receptor grids were used in addition to discrete Cartesian receptors along the Mill fenceline. The significant impact analysis used the following receptor spacing:

- 50-m intervals along the fenceline
- 100-m intervals beyond the fenceline to 2 km from the Mill
- 250-m intervals from 2 to 4 km from the Mill

The receptor grid used for the significant impact analysis is depicted in Figure C-3. Receptor elevations and hill scale heights for all receptors were obtained from 7.5 minute USGS Digital Elevation Model (DEM) data using the AERMOD terrain preprocessor program AERMAP, Version 04300.

To determine the location of the maximum impact from the significant impact analysis, concentration plot files were written into and analyzed in a spreadsheet. The location of all receptors and the maximum concentrations at each receptor were plotted over a base map. The receptors where predicted concentrations exceeded the SIL were identified. Based on this analysis, it was determined that the maximum predicted PM_{10} and NO_2 concentrations exceeded the SIL and that all receptors exceeding a particular SIL were located within 2 km of the modeling origin (i.e., the No. 4 Lime Kiln stack). Since this area of the receptor grid has a resolution of 100 m or less, additional air modeling refinements were not required. It was also determined that maximum predicted CO concentrations occurred within 2 km of the modeling origin and did not exceed the SIL.

2.7 NAAQS Modeling Analysis

2.7.1 Purpose and Methodology

As discussed in the results section (Section 2.9), preliminary modeling of the proposed project's emissions exceeded the SIL for PM_{10} and NO_2. Therefore, PSD review requires that a full air quality analysis be performed to demonstrate compliance with the NAAQS for these pollutants. The NAAQS impact analysis predicts the maximum ambient air concentration due to 1) all GP Palatka Mill sources emitting at maximum potential emission rates, 2) off-site sources at maximum permitted rates, and 3) other PM_{10} and NO_2 emissions not explicitly included in the modeling analysis. The sum of these concentrations must be less than the NAAQS. The applicable NAAQS for this project are presented in Table C-8.

2.7.2 Inventory - GP

For the NAAQS impact analysis, the model inventory includes all emission sources from the entire Mill at their potential emission rates. The inventory does not include any offset or negative emission sources. The analysis also included PM_{10} emissions from Mill roads. The emission rate for each model road source is assumed constant along a particular truck route. There are five existing truck routes and one proposed petcoke truck route. All Mill roads are paved.

Tables C-9 and C-10 summarize the maximum potential PM_{10} and NO_X emission rates for the NAAQS analysis, respectively. Table C-11 summarizes the modeling parameters for the GP Palatka Mill future point sources and Figure C-4 presents the arrangement of these sources.

2.7.3 Fugitive Source Modeling Parameters

GP also calculated modeling parameters for fugitive sources that are modeled as either an AREAPOLY or VOLUME sources. The parameters for the areapoly sources are release height, number of corners, and initial vertical source dimension. The parameters for the volume sources are release height and initial lateral and vertical source dimensions. GP calculated values for the parameters in accordance with the ISCST3 manual and general EPA guidance. For the area source, the release height is the height of the expected release. For a volume source, the release height is at the center of the physical source. The modeling parameters for the future Mill fugitive sources are presented in Table C-12, and Figures C-4 and C-5 presents the arrangement of these sources.

2.7.4 Inventory – Competing Sources

A full analysis must include the emissions of competing sources located within the modeling screening area. The modeling screening area is unique for each pollutant, and is the area within a circle centered on the project with a radius equal to the SID for that pollutant plus 50 km, but not to exceed 100 km. The screening areas for PM_{10} and NO_2 are 51.0 and 50.8 km, respectively, based on significant impact distances of 1,000 m and 800 m, respectively. In addition to the sources within the screening area, larger sources that are located beyond the screening area are also considered.

The North Carolina Screening Technique was used to evaluate all sources within the screening area. The technique compares the annual emissions (in TPY) to a specific threshold. If the emissions for a facility are less than the threshold, then that facility is assumed to not have a significant interaction with the Palatka Mill. The threshold is equal to the quantity of 20 x (D-S), where D is the distance between the competing source and the Mill, and S is the SID. If the facility-wide permitted emission rate was above the threshold, that facility was included in the analysis.

Table C-13 presents the screening analysis for competing PM_{10} sources. Table C-14 presents the individual stack parameters for sources at the facilities that are to be included in the modeling analysis.

Among the competing sources to be modeled are Florida Rock and GP's Chip-n-saw Mill (Sawmill), both located within 3 km of the GP Mill. For Florida Rock, the potential emission rate in the FDEP's inventory database, 17 pounds per hour, was revised to 0.2 lb/hr, based on current information provided for the baghouse from Florida Rock. For GP's Sawmill, updated potential emission rates and source parameters were obtained from GP and this information has been included in Tables C-13 and C-14.

GP also determined source-specific building information for each GP Sawmill stack. A summary of the building dimensions at the Sawmill are provided in Appendix C-1. Florida Rock and the GP Sawmill were included in the modeling analyses because they are PSD sources nearby the GP Palatka Mill.

To reduce the number of model sources, GP first combined sources with identical stack parameters. Second, GP combined stacks at an individual facility using US EPA's method for merging sources (US EPA, 1992). For each stack, the parameter M was computed as:

$$M = (h_s)(V)(T_s)/(Q)$$

where:

M = merged stack parameter which accounts for the relative influence of stack height, plume rise, and emission rate on concentrations

h_s = stack height (m)

V = $(\pi/4)\, d_s^2 v_s$ = stack gas volumetric flow rate (m^3/s)

d_s = inside stack diameter (m)

v_s = stack gas exit velocity (m/s)

T_s = stack gas exit temperature (K)

Q = pollutant emission rate (g/s)

The stack with the lowest value of M is used as the representative stack. Then, the sum of the emissions from all applicable sources is modeled with the representative stack.

Table C-15 presents the screening analysis for NO_x competing sources. Table C-16 presents the individual stack parameters for sources at these facilities that were included in the air modeling analysis.

2.7.5 Receptors

For the NAAQS analyses, receptors grids were developed to extended out to a distance just beyond the respective SID. For PM_{10} and NO_2, receptor grid distances of 1 and 0.8 km were used for each respective modeling analysis. Receptors were spaced at 50 m or less intervals along the fenceline and at 100 m intervals beyond the fenceline. Fenceline receptors that lie well beyond the respective pollutant SID were also excluded from the modeling analyses.

2.8 PSD Class II Increment Analysis

2.8.1 Purpose and Methodology

As discussed in Section 2.10, the proposed project's emissions exceed the SIL for PM_{10} and NO_2. Therefore, PSD review requires that an air modeling analysis be performed to demonstrate compliance with the allowable PSD Class II increments for these pollutants. The increment analysis predicts the maximum ambient air concentration due to all Mill sources and off-site sources within the screening areas that affect consume increment. The sum of concentrations from the Mill and off-site sources must be less than the allowable PSD Class II increments, as listed in Table C-17.

2.8.2 Inventory - GP

For this project, the Increment analysis included all the future paper mill sources that were used in the NAAQS analysis and also all source emissions that occurred at the time of the PSD baseline date. The PSD baseline emissions are set to negative in the model and are subtracted from the future emissions to determine the amount of PSD increment that is consumed.

Because the Mill is a major source, all emission increases after the major source baseline due to a change in the method of operation consume PSD increment. Other types of emission increases, such as increase in utilization, only affect (*i.e.,* consume or expand) PSD increment after the minor source baseline date is set. Table C-18 summarizes the baseline dates. Therefore, the calculations to determine which GP emissions consume increment will vary by pollutant.

2.8.3 Particulate Matter

The 1974 PSD baseline emissions for the GP Palatka Mill are presented in Table C-19. The locations and stack parameters for the PSD baseline sources are presented in Table C-20.

2.8.4 Nitrogen Dioxide

The 1988 PSD baseline emissions for the GP Palatka Mill are presented in Table C-21. The locations and stack parameters for the PSD baseline sources are presented in Table C-22.

2.8.5 Inventory – Competing Sources

A full analysis must include the emissions of competing sources. In contrast to the NAAQS analysis, the PSD increment analysis only includes emissions from competing sources that affect PSD increment. A listing of PSD increment-affecting sources was obtained from prior modeling report and from discussions with the FDEP. Table C-23 presents a summary of the competing facilities in the vicinity of the Palatka Mill that affect PSD increment. Table C-24 presents the modeling parameters for the PSD-affecting sources that were included in the modeling analysis.

2.8.6 Receptors

For the PM_{10} and NO_2 PSD increment analyses, GP used the same receptor grids that were used for the PM_{10} and NO_2 NAAQS analyses, respectively.

2.9 Source Impact Analysis Results

2.9.1 Significant Impact Analysis

Particulate Matter

The maximum predicted concentrations for each year for the significant impact analysis are presented in Table C-25. The maximum 24-hour PM_{10} impact due to the proposed GP projects and contemporaneous emission changes is 11.9 $\mu g/m^3$, which is above the SIL of 5 $\mu g/m^3$ and the monitoring de minimis concentration of 10 $\mu g/m^3$. The maximum annual impact is 1.4 $\mu g/m^3$, which exceeds the annual SIL of 1 $\mu g/m^3$. Therefore, detailed NAAQS and PSD Class II increment analyses are required for PM_{10} and the project is potentially subject to ambient air monitoring requirements (see Section 4.0). Figure C-6 shows the receptor locations where the proposed project's impacts exceed the SIL. The SID for PM_{10} is 1.0 km.

Nitrogen Dioxide

The maximum predicted concentrations for each year for the NO_2 significant impact analysis are shown in Table C-26. The maximum impact due to the proposed GP projects and contemporaneous changes is 1.87 $\mu g/m^3$, which is above the SIL of 1 $\mu g/m^3$, but is below the monitoring de minimis concentration of 14 $\mu g/m^3$. Figure C-7 shows the receptor locations where the proposed project's impacts exceed the SIL. Because the project's maximum concentration is above the SIL, detailed NAAQS and PSD Class II increment analyses are required for NO_2. The SID for NO_2 is 0.8 km.

Carbon Monoxide

The maximum predicted concentrations for each year for the CO significant impact analysis are presented in Table C-27. The maximum 1-hour CO impact due to the proposed GP projects and contemporaneous changes is 79.1 $\mu g/m^3$, which is below the SIL of 2,000 $\mu g/m^3$. The maximum 8-hour impact is 67.2 $\mu g/m^3$, which is below the SIL of 500 $\mu g/m^3$ and the monitoring de minimis concentration of 575 $\mu g/m^3$. Therefore, the project's impacts are not significant for CO and detailed modeling analyses are not required for CO.

Summary

The significant impact analyses determined that the project's emission increase would result in maximum impacts that are above the PM_{10} and NO_2 SIL. Table C-28 summarizes the significant impact distance for each pollutant.

2.9.2 NAAQS Analysis

Particulate Matter

By modeling the potential GP Mill and competing source emissions, it was determined that the maximum predicted PM_{10} impacts were 42.4 and 11.0 $\mu g/m^3$, respectively, for the 24-hour and annual averaging times. The maximum impact locations were in an area that did not require additional refined receptor grids. Table C-29 summarizes the PM_{10} NAAQS modeling results.

Background concentrations of 62 and 25.7 $\mu g/m^3$ were added to the modeling results for the 24-hour and annual averaging periods, respectively. As summarized in Table C-30, the 24-hour and annual average total concentrations are 104.4 and 36.7 $\mu g/m^3$, respectively, which are below the respective NAAQS of 150 and 50 $\mu g/m^3$.

Nitrogen Dioxide

By modeling the total potential Mill emissions and competing source emissions, GP determined that the maximum predicted annual NO_2 impact is 9.9 $\mu g/m^3$. The maximum impact location is in an area that did not require additional refined receptor grids. Table C-31 summarizes the NO_2 NAAQS modeling results.

GP added a background concentration of 26.9 $\mu g/m^3$ to the modeling result. As summarized in Table C-32, when adding the background concentration, the annual concentration is 36.8 $\mu g/m^3$. This impact is below the NAAQS of 100 μg/m^3. Therefore, the Mill's emissions are in compliance with the NO_2. NAAQS.

2.9.3 PSD Class II Increment Analysis

Particulate Matter

By modeling the potential GP Mill and competing source emissions, it was determined that the maximum predicted PM_{10} PSD Class II increment consumption was 20.8 μg/m^3 and 0.02 μg/m^3, respectively, for the 24-hour and annual averaging times. The maximum impact locations were in an area that did not require additional refined receptor grids. Table C-33 summarizes the PM_{10} PSD increment modeling results. The maximum predicted 24-hour and annual increments are below allowable PSD Class II increments of 30 and 17 μg/m^3, respectively. Therefore, the Mill's PM_{10} emissions are in compliance with the allowable PSD Class II increments.

Nitrogen Dioxide

By modeling the increment-affecting emissions from the GP Mill and competing sources, it was determined that the predicted maximum annual average NO_2 PSD increment consumption is 2.7 μg/m^3. The maximum impact location is in an area that did not require additional refined receptor grids. Table C-34 summarizes the NO_2 model results. The maximum predicted impact is less than the allowable PSD Class II increment of 25 μg/m^3. Therefore, the Mill's NO_X emissions are in compliance of the allowable NO_2 PSD Class II increment.

3.0 GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

PSD review rules require that controls required for emission sources using the Best Available Control Technology cannot be affected by a stack height that exceeds Good Engineering Practice (GEP) or any other dispersion technique. In other words, emissions rates specified in a source impact analysis must demonstrate compliance with stack heights at or below GEP, even if the physical height of the stack is greater than GEP. On July 8, 1985, EPA defined GEP stack height in the final stack height regulations (see 40 CFR 51.100(hh)). GEP stack height is defined as:

The greater of:

(1) 65 meters, measured from the ground-level elevation at the base of the stack:

(2)(i) For stacks in existence on January 12, 1979, and for which the owner or operator had obtained all applicable permits or approvals required under 40 CFR parts 51 and 52, $Hg=2.5H$, provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation.

> Hg = good engineering practice stack height, measured from the ground-level elevation at the base of the stack
> H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack.

(ii) For all other stacks, $Hg = H + 1.5L$,

> L = lesser dimension, height or projected width, of nearby structure(s) provided that the EPA, State or local control agency may require the use of a field study or fluid model to verify GEP stack height for the source

(3) The height demonstrated by a fluid model or a field study approved by the EPA, State or local control agency, which ensures that the emissions from a stack do not result in excessive concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures or nearby terrain features. "Nearby" is defined as a distance up to five times the lesser of the height or projected width dimensions of a structure or terrain feature but not greater than 0.8 kilometer (km).

Because all point sources associated with the proposed GP projects and contemporaneous emission changes are either not affected by building structures or have stacks below the GEP stack height, the project stacks are in accordance with GEP regulations.

4.0 AMBIENT AIR QUALITY ANALYSIS

Rule 40 CFR 52.21(m) describes the analyses of ambient air quality data required by PSD regulations. These requirements include pre-application and post-application analyses. Both of these requirements are exempted by 40 CFR 52.21(i)(8) if the source impact analysis demonstrates that the emissions increase from the modification would cause air quality impacts less than the de minimis monitoring concentrations in all areas. As the source impact analysis (Section 2.0) for GP Palatka concluded that all maximum impacts from the proposed GP projects and contemporaneous changes except for PM_{10}

will be below the de minimis monitoring concentrations, air monitoring requirements are not required for NO_2 or CO.

PM_{10} emission increases due to the proposed and contemporaneous projects are subject to pre-application and post-application ambient monitoring. As such, GP requests that existing representative air monitoring data collected from Putnam County monitoring site 12-107-1008 in Palatka be used to satisfy any ambient monitoring requirements.

GP used existing ambient air monitoring data from site 12-107-1008 and the results of the source impact analysis together to assess the total air quality in the area that the project emissions could affect. GP Palatka does not operate any ambient air quality monitors, but the FDEP has operated the PM_{10} monitoring station in Palatka (Site ID 12-107-1008) for many years. To determine if existing data is appropriate, EPA guidance recommends three criteria: monitor location, data quality, and currentness of the data. GP reviewed these factors and selected the highest mean annual concentration reported for the past three years as being representative of the maximum annual background air quality concentration for the proposed projects. Additionally, GP selected the 6th-highest 24-hour concentration measured in the last 5 complete years (which excluded 2002) as being representative of the maximum 24-hour background concentration for the proposed projects. Table C-1 summarizes the background selections used for the air modeling analysis.

Since VOC emission increases due to the proposed and contemporaneous project exceed 100 TPY, ozone is subject to pre-application and post-application ambient monitoring. As such, GP requests that existing representative air monitoring data collected from Alachua County monitoring site 12-001-3011 in Gainesville be used to satisfy any ambient monitoring requirements. A summary of ozone data from this site is presented in Table C-1. This site is in the same geographical region as the GP Palatka Mill Site.

The post-application analysis determines post-construction ambient monitoring needs, such as quantifying the effect of the Mill-wide emissions on air quality. EPA guidance recommends that post-construction monitoring is appropriate when:

1. the NAAQS is threatened, or
2. the modeling databases contain significant uncertainties.

Because these conditions do not exist for this project, GP is proposing to use the existing air monitoring station data to satisfy any post-application requirement.

5.0 ADDITIONAL IMPACT ANALYSIS – CLASS II AREAS

5.1 Impacts upon Soils and Vegetation

5.1.1 Soils

Air contaminants can affect soils through fumigation by gaseous forms, accumulation of compounds transformed from the gaseous state, or by the direct deposition of PM or PM to which certain contaminants are absorbed. According to the Putnam County Soil Survey (1990), the soils in the vicinity of the GP Palatka Mill are dominated by Terra Ceia muck, with Cassia fine sand and Pamona fine sand also present.

The Terra Ceia muck, Cassia fine sand, and Pomona fine sand series are described in the Putnam County Soil Survey as follows:

Terra Ceia muck, frequently flooded

This soil is nearly level and very poorly drained, found on broad to narrow plains along the St. Johns River and its tributaries. Typically the upper part of this organic soil is dark reddish brown muck approximately 28 inches thick, while the lower portion to a depth of approximately 80 inches is black muck. This soil has a high water table at the surface except during extended dry periods. The available water capacity is very high, permeability is rapid, and natural fertility is moderate. Typical vegetation includes wetlands forested with sweetgum, red maple, cypress, bay, and cabbage palm. The soil reaction for Terra Ceia muck is classified as slightly acid within the top 28 inches, and mildly alkaline between 28 and 80 inches below the surface.

Pomona fine sand

This soil is nearly level and poorly drained, found in broad flatwoods areas. Typically this soil has a surface layer of black fine sand approximately 6 inches thick underlain by a subsurface layer of gray and light gray fine sand to a depth of 20 inches. In most years this soil has a high water table at a depth of less than 12 inches for 1 to 3 months. The available water capacity is very low, permeability is rapid, and natural fertility is low. Typical vegetation is pine flatwoods. The soil reaction for Pomona fine sand is classified as extremely acid within the top 6 inches, very strongly acidic between 6 to 10 inches, and strongly acidic between 10 and 20 inches below the surface.

Cassia fine sand

This soil is nearly level and somewhat poorly drained, found on small knolls within flatwoods and in low positions on uplands. Typically, this soil has a surface layer of gray fine sand approximately 4 inches thick, and a subsurface layer of light gray fine sand to a depth of 28 inches. In most years, this soil has a water table at a depth of 15 to 40 inches for about 6 months. The available water capacity is very low, permeability is rapid, and natural fertility is low. Natural vegetation includes pine flatwoods and oak. Cassia fine sand is classified as extremely acid within the top 4 inches, very strongly acidic between 4 to 9 inches, and strongly acidic between 9 and 24 inches below the surface.

The dominant soil in the vicinity of the GP facility, Terra Ceia muck, is a highly organic wetland soil and has an extremely high buffering capacity based on the cation exchange capacity, base saturation, and bulk density. Therefore, this soil would be relatively insensitive to atmospheric inputs. The maximum predicted CO concentrations in the vicinity of the site as a result of the proposed project are below the significant impact levels. The maximum predicted NO_2 and PM_{10} concentrations in the vicinity of the site are below the AAQS. Since the AAQS are designed to protect the public welfare, including effects on soils and vegetation, no detrimental effects on soils should occur in the vicinity of the GP Palatka Mill due to the proposed project.

5.1.2 Vegetation

In general, the effects of air pollutants on vegetation occur from SO_2, NO_2, O_3, and PM. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage that is considered to be the major pathway of exposure. For purposes of this analysis, it was assumed that 100 percent of each air contaminant of concern is accessible to the plants.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach. The following paragraphs address the effects of NO_2, PM, ozone, and sulfuric acid mist (SAM) concentrations due to the proposed project, since these pollutants are subject to PSD review.

Nitrogen Dioxide

A review of the literature indicates great variability in NO_2 dose-response relationship in vegetation. Acute NO_2 injury symptoms are manifested as water-soaked lesions, which first appear on the upper surface, followed by rapid tissue collapse. Low-concentration, long-term exposures as frequently encountered in polluted atmospheres often do not induce the lesions associated with acute exposures but may still result in some growth suppression. Citrus trees exposed to 470 $\mu g/m^3$ of NO_2 for 290 days showed injury (Thompson *et al.*, 1970). Sphagnum exposed for 18 months at an average concentration of 11.7 $\mu g/m^3$ showed reduced growth (Press *et al.*, 1986)

The maximum increase in ground-level annual average NO_2 concentration predicted to occur in the vicinity of the GP Palatka Mill due to the proposed projects is 1.9 $\mu g/m^3$ (see Table C-26). This maximum predicted concentration is well below the reported effects levels.

Carbon Monoxide

Concentrations of CO even in polluted atmospheres are not detrimental to vegetation (EPA, 1976). CO has not been found to produce detrimental effects on plants at concentrations below 100 ppm (114,500 $\mu g/m^3$) for exposures from 1 to 3 weeks (EPA, 1976). The predicted maximum concentrations due to the proposed projects, shown in Table C-27, are well below levels reported to cause detrimental effects.

Particulate Matter

Although information pertaining to the effects of particulate matter on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of particulate matter ranging from 210 to 366 $\mu g/m^3$ for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of particulate matter lower than 163 $\mu g/m^3$ did not appear to be injurious to the tested plants. The maximum predicted 24-hour and annual average PM_{10} concentrations due to the proposed projects of 11.9 $\mu g/m^3$, 24-hour average, and 1.4 $\mu g/m^3$, annual average (see Table C-25), are well below the injury thresholds reported in the literature.

VOC Emissions and Impacts on Ozone

It is difficult to predict what effect the proposed project's emissions of VOC will have on ambient O_3 concentrations from either a local or regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is formed down-wind from emission sources when VOC and NO_x emissions from the facility react in the presence of sunlight.

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface of leaves known as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early. A literature review suggests that exposure for 4 hours at levels of 0.04 to 11.0 ppm of O_3 will result in plant injury for sensitive plants. The extent of the injury depends on the plant species and environmental conditions prior to and during exposure.

Given that the O_3 measurements in the region comply with the NAAQS and the increase in VOC emissions for the project represents less than a 1-percent change in regional VOC emissions (407 TPY), no adverse effects on vegetation due to the project's VOC emissions are expected.

Sulfuric Acid Mist

Acidic precipitation or acid rain is coupled to SO_2 emissions, which is mainly formed during the burning of fossil fuels. SO_2 is oxidized in the atmosphere and dissolves in rain forming SAM, which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 emissions, which lead directly to the formation of SAM concentrations, are below the PSD significant emission rate, and the increase in direct SAM emissions due to the proposed projects is only 25.4 TPY.

Summary

In summary, GP expects that the project increase in emissions will not adversely impact the soils or vegetation in areas adjacent to the Palatka Mill.

5.2 Impacts Due to Additional Growth

5.2.1 Introduction

Rule 62-212.400(3)(h)(5), F.A.C., states that an application must include information relating to the air quality impacts of, and the nature and extent of all general, residential, commercial, industrial and other growth which has occurred since August 7, 1977, in the area the facility or modification would affect. This growth analysis considers air quality impacts due to emissions resulting from the industrial, commercial, and residential growth associated with the proposed expansion at the GP Palatka Mill. This information is consistent with the EPA Guidance related to this requirement in the *Draft New Source Review Workshop Manual* (EPA, 1990).

In general, there has been minimal growth in the GP Palatka Mill area since 1977. Putnam County is surrounded by Marion County to the south and west, Alachua County to the west, Clay County to the north, St. John's County to the north and east, Flagler County to the east, and Volusia County to the south. Putnam County encompasses an 827-square mile area including 733-square miles of land area.

The proposed projects are for the purpose of improving energy efficiency and combustion efficiency, reducing fuel oil consumption, and implementing needed repairs. Additional growth as a direct result of the proposed modification is not expected.

Construction of the projects will occur over a several year period, requiring variable number of workers during that time. It is anticipated that many of these construction personnel will commute to the site.

The projects will not require any additional operational workers once the projects are completed.

There are also expected to be no air quality impacts due to associated commercial and industrial growth given the location of the existing GP Palatka Mill. The existing commercial and industrial infrastructure should be adequate to provide any support services that the project might require and would not increase with the operation of the project.

The following discussion presents general trends in residential, commercial, industrial, and other growth that has occurred since August 7, 1977, in Putnam County. As such, the analysis presents information available from a variety of sources (*i.e.*, Florida Statistical Abstract, FDEP, etc.) that characterize Putnam County as a whole.

5.2.2 Residential Growth

Population and Household Trends

As an indicator of residential growth, the trend in the population and number of household units in Putnam County since 1977 are shown in Figure C-8. The county experienced a 47-percent increase in population for the years 1977 through 2000. During this period, there was an increase in population of about 22,600. Similarly, the number of households in the county increased by about 12,000, or 73 percent, since 1977.

Growth Associated with the Operation of the Project

Because there will be no additional workers needed to operate the project, there will be no residential growth due to the project.

5.2.3 Commercial Growth

Retail Trade and Wholesale Trade

As an indicator of commercial growth in Putnam County, the trends in the number of commercial facilities and employees involved in retail and wholesale trade are presented in Figure C-9. The retail trade sector comprises establishments engaged in retailing merchandise. The retailing process is the final step in the distribution of merchandise. Retailers are, therefore, organized to sell merchandise in small quantities to the general public. The wholesale trade sector comprises establishments engaged in wholesaling merchandise. This sector includes merchant wholesalers who buy and own the goods they sell; manufacturers' sales branches and offices that sell products manufactured domestically by their own company; and agents and brokers who collect a commission or fee for arranging the sale of merchandise owned by others.

Since 1977, retail trade has increased by about 14 establishments and 2,000 employees or 6 and 118 percent, respectively. For the same period, wholesale trade has increased by 28 establishments and 346 employees, or 82 and 126 percent, respectively.

Labor Force

The trend in the labor force in Putnam County since 1977 is shown in Figure C-10. The greatest number of persons employed in Putnam County has been in the manufacturing, government, and retail trade sectors. Between 1977 and 1999, approximately 5,000 persons were added to the available work force, for an increase of 34 percent.

Tourism

Another indicator of commercial growth in Putnam County is the tourism industry. As an indicator of tourism growth in the county, the trend in the number of hotels and motels and the number of units at the hotels and motels are presented in Figure C-11.

This industry comprises establishments primarily engaged in marketing and promoting communities and facilities to businesses and leisure travelers through a range of activities, such as assisting organizations in locating meeting and convention sites; providing travel information on area attractions, lodging accommodations, restaurants; providing maps; and organizing group tours of local historical, recreational, and cultural attractions.

Between 1978 and 2000, there was a decrease of 12 percent in the number of hotels and motels, and an increase of 14 percent in the number of units at those establishments in the county.

Transportation

As an indicator of transportation growth, the trend in the number of vehicle miles traveled (VMT) by motor vehicles on major roadways in Putnam County is presented in Figure C-12. The county's main roadways are U.S. Route 17 and SR 100.

Between 1977 and 2001, there was an increase of about 1,560,000 VMT, or 113 percent, on major roadways in the county.

Growth Associated with the Operation of the Project

The existing commercial and transportation infrastructure should be adequate to provide any support services that might be required during construction and operation of the project. The workforce needed to operate the proposed project represents a small fraction of the labor force present in the immediate and surrounding areas.

5.2.4 Industrial Growth

Manufacturing and Agricultural Industries

As an indicator of industrial growth, the trend in the number of employees in the manufacturing industry in Putnam County since 1977 is shown in Figure C-13. As shown, the manufacturing industry experienced a slight decrease in employees from 1977 through 2000.

As another indicator of industrial growth, the trend in the number of employees reported in the agricultural industry in Putnam County since 1977 is also shown in Figure C-13. As shown, the agricultural industry experienced an increase of about 400 employees from 1977 through 2000.

Utilities

Existing power plants in Putnam County include the following:

- Florida Power & Light's Putnam Plant;
- Seminole Electric Cooperative, Inc.'s Seminole Power Plant; and
- Georgia-Pacific Corporation's Palatka Operations.

Together, these power plants have an electrical nameplate generating capacity of over 1,800 megawatts (MW).

As an indicator of electrical utility growth, the electrical nameplate generating capacity in Putnam County since 1977 is shown in Figure C-14. As shown, the electrical nameplate generating capacity has increased by 1,585 MW, or 521 percent since 1977.

Growth Associated with the Operation of the Project

Since the PSD baseline date of August 7, 1977, there has been only one major facility built within a 35-km radius of the GP Palatka Mill site. This was the Seminole Electric Power Plant. There are a limited number of facilities located throughout the 35-km radius area surrounding the site. Based on the locations of nearby air emission sources, there has not been a concentration of industrial and commercial growth in the vicinity of the GP Palatka Mill site.

5.2.5 Air Quality Discussion

Air Emissions and Spatial Distribution of Major Facilities

The locations of major air pollutant facilities in Putnam County are presented in Tables C-13 and C-15. Based on actual emissions reported for 1999 (latest year of available data) by EPA on its AIRSdata website, total emissions from stationary sources in the county are as follows:

SO_2:	43,000 TPY
PM_{10}:	1,700 TPY
NO_x:	28,900 TPY
CO:	4,640 TPY

VOC: 800 TPY

Air Emissions from Mobile Sources

The trends in the air emissions of CO, VOC, and NO_x from mobile sources in Putnam County are presented in Figure C-15. Between 1977 and 2002, there were significant decreases in CO emissions, while there was a slight increase in NO_x and a slight decrease in VOC emissions during that same time period. The decrease in CO and VOC emissions were about 41 and 5 tons per day, respectively, which represent decreases from 1977 emissions of 48 and 42 percent, respectively. The increase in NO_x emissions was less than one half of a ton per day, which represents an increase of about 5 percent since 1977.

Air Monitoring Data

Since 1977, Putnam County has been classified as attainment for all criteria pollutants. Air quality monitoring data have been collected in Putnam County, primarily in the central portion of the county in and around the city of Palatka. For this evaluation, the air quality monitoring data collected at the monitoring station nearest to the GP Palatka Mill were used to assess air quality trends since 1977. Air quality monitoring data were based on the following monitoring stations:

- SO_2 and PM_{10} concentrations – Palatka,
- NO_2 concentrations – Palatka and Jacksonville,
- CO concentrations – Jacksonville, and
- O_3 concentrations – Gainesville and Jacksonville.

Data collected from these stations are considered to be generally representative of air quality in Putnam County. Because the monitoring stations in Jacksonville (NO_2, CO, and O_3) are located in more urbanized areas than the GP Palatka Mill, the reported concentrations for those stations are likely to be higher than that experienced at the site.

The air monitoring data indicate that the maximum air quality concentrations currently measured in the region comply with and are well below the applicable AAQS. These monitoring stations are located in areas where the highest concentrations of a measured pollutant are expected due to the combined effect of emissions from stationary and mobile sources, as well as the effects of meteorology. Therefore, the ambient concentrations in areas not monitored should have pollutant concentrations less than the monitored concentrations from these sites.

In addition, since 1988, PM in the form of PM_{10} has been collected at the air monitoring stations due to the promulgation of the PM_{10} AAQS. Prior to 1989, the AAQS for PM was in the form of total suspended particulates (TSP) concentrations, and this form was measured at the stations.

SO_2 Concentrations

The trends in the 3-hour, 24-hour, and annual average SO_2 concentrations measured in Putnam County since 1977 are presented in Figures C-16 through C-18, respectively. As shown in these figures, measured SO_2 concentrations have been and continue to be well below the AAQS.

PM_{10}/TSP Concentrations

The trends in the 24-hour and annual average PM_{10} and TSP concentrations since 1977 are presented in Figures C-19 and C-20, respectively. TSP concentrations are presented through 1988 since the AAQS was based on TSP concentrations through that year. In 1988, the TSP AAQS was revoked and the PM standard was revised to PM_{10}.

As shown in these figures, measured TSP concentrations were generally below the TSP AAQS. Since 1988 when PM_{10} concentrations have been measured, the PM_{10} concentrations have been and continue to be below the AAQS.

NO_2 Concentrations

The trends in the annual average NO_2 concentrations measured at the nearest monitors to the GP Palatka Mill are presented in Figure C-21. As shown in this figure, measured NO_2 concentrations have been well below the AAQS.

CO Concentrations

The trends in the 1-hour and 8-hour average CO concentrations measured since 1977 in Jacksonville are presented in Figures C-22 and C-23, respectively. As shown in these figures, measured CO concentrations have been well below the AAQS for the past several years.

Ozone Concentrations

The trends in the 1-hour average O_3 concentrations since 1977 are presented in Figure C-24. The trends in the 8-hour average O_3 concentrations since 1995 are presented in Figure C-25. As shown in these figures, even in the more urbanized areas of Jacksonville and Gainesville, the measured O_3 concentrations have primarily been below the 1-hour average AAQS and the new 8-hour average AAQS.

Air Quality Associated with the Operation of the Project

The air quality data measured in the region of the GP Palatka Mill indicate that the maximum air quality concentrations are well below and comply with the AAQS. Also, based on the trends presented of these maximum concentrations, the air quality has generally improved in the region since the baseline date of August 7, 1977. Because the maximum concentrations for the proposed modifications at the GP Mill are predicted to be below the significant impact levels except for PM_{10} and NO_x, air quality concentrations in the region are expected to remain below and comply with the AAQS when the project becomes operational. For PM_{10} and NO_x, the modeling analysis demonstrates compliance with AAQS. For ozone, VOC emissions are estimated to increase by 389 TPY due to the proposed projects. This represents about a 15 percent increase in county-wide VOC emissions (current emissions of 800 TPY point sources and 1,800 TPY mobile sources, or 2,600 TPY total). However, this increase due to the proposed projects is based on a comparison of past actual to future potential emissions, and the increase in future actual emissions is expected to be much lower.

5.3 Impacts on Visibility

The proposed projects only affect and modify existing sources, such as the No. 4 Lime Kiln, the No. 4 Recovery Boiler, the No. 4 Smelt Dissolving Tank, and the No. 4 Combination Boiler. The maximum permit limits for several emissions units are being reduced (for TRS and SO_2 emissions). The existing sources are in compliance with opacity regulations and should remain in compliance after the modification. As a result, GP does not expect any adverse impacts upon visibility.

6.0 ADDITIONAL IMPACT ANALYSIS – CLASS I AREAS

6.1 Introduction

Generally, if the facility undergoing the modification is within 200 kilometers of a PSD Class I area, then a significant impact analysis is also performed to evaluate the impact due to the project alone at the PSD Class I areas. The three PSD Class I areas that are located within 200 km of the Mill are:

- Okefenokee National Wilderness Area (NWA), 108 km north of the Mill;
- Wolf Island NWA, 186 km north of the Mill; and
- Chassahowitzka NWA, 137 km southwest of the Mill.

The maximum predicted impacts due to the proposed GP projects and contemporaneous emission changes at the Okefenokee, Wolf Island and Chassahowitzka NWAs are compared to EPA's proposed significant impact levels for PSD Class I areas. These recommended significant impact levels have never been promulgated as rules, but are the currently accepted criteria for determining whether a proposed project will incur a significant impact on a PSD Class I area.

If the project-only impacts at the PSD Class I areas are above the proposed EPA PSD Class I significant impact levels, then an analysis is performed to demonstrate compliance with allowable PSD Class I impacts at the PSD Class I areas. The proposed project's maximum emission increases are also evaluated at the PSD Class I areas to support the air quality related values (AQRV) analysis, which includes an evaluation of regional haze degradation, sulfur and nitrogen deposition, and impacts upon soils, vegetation and wildlife.

For predicting maximum impacts at the Okefenokee and Chassahowitzka NWA PSD Class I areas, the California Puff (CALPUFF) modeling system was used. CALPUFF, Version 5.754 (EPA, 2006), is a Lagrangian puff model that is recommended by the FDEP, in coordination with the Federal Land Manager (FLM) for the NWA, for predicting pollutant impacts at PSD Class I areas that are beyond 50 km from a project site. The following sections present a description of the CALPUFF model methodology.

6.2 General Air Modeling Approach

The methods and assumptions used in the CALPUFF model were based on the latest recommendations for a refined analysis as presented in the IWAQM Phase 2 Summary Report and the FLAG document.

The following sections present the methods and assumptions used to assess the impacts of the proposed project. The analysis is consistent with a "refined analysis" since it was performed using the detailed weather data from multiple surface and upper air stations as well as the MM4/MM5 prognostic with fields.

6.2.1 Model Selection and Settings

CALPUFF was used to model to assess the proposed project's impacts at the PSD Class I areas for comparison to the PSD Class I significant impact levels. CALPUFF is a non-steady state Lagrangian Gaussian puff long-range transport model that includes algorithms for building downwash effects as well as chemical transformations (important for visibility controlling pollutants), and wet/dry deposition.

The CALPUFF meteorological and geophysical data preprocessor, CALMET, is a diagnostic meteorological model that produces a three-dimensional field of wind and temperature and a two-dimensional field of other meteorological parameters. CALMET was designed to process raw meteorological, terrain and land-use databases to be used in the air modeling analysis.

The CALPUFF modeling system uses a number of FORTRAN preprocessor programs that extract data from large databases and converts the data into formats suitable for input to CALMET. The processed data produced from CALMET is input to CALPUFF to assess the pollutant specific impact. The CALPUFF modeling analysis used the 4-km modeling Florida domain developed by the VISTAS Workgroup for years 2001 to 2003.

6.2.2 CALPUFF Model Approaches and Settings

The IWAQM has recommended approaches for performing a Phase 2 refined modeling analyses. The specific settings used in the CALPUFF model are presented in Table C-35.

6.2.3 Emission Inventory and Building Wake Effects

The CALPUFF model included the facility's emission, stack, and operating data as well as building dimensions to account for the effects of building-induced downwash on the emission sources. Dimensions for all significant building structures were processed with the Building Profile Input Program modified to process additional direction-specific building information, and were included in the CALPUFF model input. The modeling presents a listing of the facility's emissions and structures included in the analysis.

6.2.4 Receptor Locations

All Class I receptor grids were obtained from the National Park Service (NPS). The grid for the Okeefenokee NWA was reduced to 180 receptors. The 180 receptors included all of the NPS boundary receptors and interior receptors with less resolution than the original set. Modeling at both the Chassahowitzka NWA and the Wolf Island NWA used all receptors developed by the NPS. This included 113 Chassahowitzka NWA receptors and 30 for the Wolf Island NWA. Therefore, pollutant concentrations were predicted with an array of 180 discrete receptors located at the Okefenokee NWA, 30 discrete receptors located at the Wolf Island NWA and 113 discrete receptors located at Chassahowitzka NWA.

6.2.5 Meteorological Data

CALMET-developed data for the years 2001 to 2003 were obtained from FDEP. These data were developed by the VISTAS program to assess regional haze from sources under the BART regulations.

The modeling domain includes the following meteorological and land use parameters:

- Surface weather data,
- Upper air data,
- A 1-degree land use data,
- A 1-degree Digital Elevation Model (DEM) terrain data,
- Mesoscale Model - Generation 5 (MM5) data (for initializing the wind field), and
- Hourly precipitation data.

The modeling domain consists of a rectangular 3-dimensional grid that extends from approximately 24 to 32 degrees N latitude and from 80 to 90 degrees W longitude. The domain grid resolution is 4 km and was developed in a Lambert Conformal Coordinate (LCC) system. Consequently, all source and receptor locations were converted to this LCC using a coordinate changing utility program.

6.3 Class I PSD Increment Analysis

The maximum PM_{10} and NO_2 concentrations predicted for the proposed GP projects and contemporaneous projects at each evaluated PSD Class I area, as compared with the EPA's proposed PSD Class I significance levels, are shown in Table C-36. The maximum PM_{10} and NO_2 concentrations were predicted to be below the significant impact levels at each PSD Class I area. Therefore, a full PSD Class I increment analysis was not required for these pollutants.

6.4 Deposition and Visibility Methodology and Model Results

The following sections summarize the processing methods for deposition and visibility impacts, and the impact results.

6.4.1 Deposition Methodology

As part of the AQRV analyses, total nitrogen (N) rates were predicted for the proposed project at each PSD Class I area evaluated. The deposition analysis criterion is based on the annual averaging period.

The total N deposition is estimated in units of kilogram per hectare per year (kg/ha/yr). The CALPUFF model is used to predict wet and dry deposition fluxes of various oxides of these elements.

For N deposition, the species include:

- Particulate ammonium nitrate (from species NO_3), wet and dry deposition;
- Nitric acid (species HNO_3), wet and dry deposition;
- NO_x dry deposition; and
- Ammonium sulfate (species SO_4), wet and dry deposition.

The CALPUFF model produces results in units of micrograms per square meter per second ($\mu g/m^2/s$). The modeled deposition rates are then converted to N deposition in kilograms per hectare, respectively, by using a multiplier equal to the ratio of the molecular weights of the substances (refer to the IWAQM Phase 2 report, Section 3.3).

The deposition analysis threshold (DAT) for N of 0.01 kg/ha/yr was provided by the USFWS (January 2002). A DAT is the additional amount of N deposition within a Class I area, below which estimated impacts from a proposed new or modified source are considered insignificant. The maximum N deposition predicted for the proposed GP project is, therefore, compared to the DAT or significant impact level.

6.4.2 Visibility Methodology

Based on the FLAG document, current regional haze guidelines characterize a change in visibility by the change in the light-extinction coefficient (bext). The bext is the attenuation of light per unit distance due to the scattering and absorption by gases and particles in the atmosphere. A change in the extinction coefficient produces a perceived visual change. An index that simply quantifies the percent change in visibility due to the operation of a source is calculated as:

$$\Delta\% = (b_{exts} / b_{extb}) \times 100$$

where: b_{exts} is the extinction coefficient calculated for the source, and

b_{extb} is the background extinction coefficient.

The purpose of the visibility analysis is to calculate the extinction at each receptor for each day (24-hour period) of the year due to the proposed project. The criteria to determine if the project's impacts are potentially significant are based on a change in extinction of 5 percent or greater for any day of the year.

The analysis of visibility impairment for this study was performed with the CALPUFF model and the CALPUFF post-processing program CALPOST. The analysis was conducted in accordance with the most recent guidance from the FLAG report (December 2000). The CALPUFF postprocessor model CALPOST is used to calculate the combined visibility effects from the different pollutants that are emitted from the proposed project. Based on recent discussions with the U.S. Fish and Wildlife Service (FWS, July, 2006) visibility impacts were predicted using both visibility Methods 2 and 6, within the CALPOST model. Using Method 2, daily background extinction coefficients are calculated on an hour-by-hour basis using hourly relative humidity data from CALMET and hygroscopic and non-hygroscopic extinction components specified in the FLAG document. For the Okefenokee, Wolf Island, and Chassahowitzka NWAs, the hygroscopic and non-hygroscopic components are 0.9 and 8.5 inverse megameter (Mm^{-1}). CALPOST then calculates the percent extinction change for each day of the year. The impacts predicted for Method 2 used a relative humidity cap of 95 percent.

Using Method 6, daily background extinction coefficients are calculated using monthly relative humidity factors (f(RH)) obtained from Table A-3 of the document "Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule (EPA, September, 2003)",

6.4.3 Impacts Method

Impacts for the proposed projects and contemporaneous changes only were compared to both the proposed EPA PSD Class I significance levels for PM_{10} and NO_2, the regional haze degradation criteria of 5 percent, and the N deposition criteria of 0.01 kilograms per hectare per year (kg/ha/yr).

6.4.4 Deposition and Visibility Impact Results

The maximum visibility impairment predicted for the proposed project at each evaluated PSD Class I area is shown in Table C-37. Results are presented for Method 2 (hourly relative humidity) and a relative humidity cap of 95 percent; the highest predicted concentration from Method 6; and the 98th-percentile concentration (8th-highest each year) from Method 6. The number of days where the visibility impairment exceeds 5 percent is shown in parentheses. As shown in Table C-37, each visibility method predicts some days over 5 percent, but the 98th-percentile concentration using Method 6 is below 5 percent at each evaluated PSD Class I area.

The maximum nitrogen deposition predicted for the proposed project only at each evaluated PSD Class I area is presented in Table C-38. The predicted impacts are less than the criteria of 0.01 kg/ha/yr.

6.5 Impacts on Soils, Vegetation and Wildlife – Okeefenokee and Wolf Island

6.5.1 Introduction

The facility is subject to the PSD new source review requirements for NO_x, PM, PM_{10}, CO, VOC, and SAM. The Class I area analysis addresses these pollutants. The analysis addresses the potential impacts on vegetation, soils, and wildlife of the Okefenokee NWA Class I area due to the proposed project. In addition, potential impacts upon visibility resulting from the proposed project are assessed. The Okefenokee NWA Class I area is located approximately 108 km north of the GP Palatka Mill. Although the Wolf Island NWA Class I area is located approximately 186 km north of the GP Palatka Mill, only the Okefenokee NWA Class I area was evaluated since it is much closer to the Mill than Wolf Island, and both have similar AQRVs.

The analysis demonstrates that the increase in impacts due to the proposed project is extremely low. Regardless of the existing conditions in the vicinity of the Class I area, the proposed project will not cause any significant adverse effects due to the predicted low impacts upon that area.

6.5.2 Soils, Vegetation, and AQRV Analysis Methodology

This analysis uses the maximum air quality impacts predicted to occur in the Class I area due to the proposed increase in emissions. These impacts are presented in Section 2.9, and summarized in Table C-36.

The analysis involved predicting worst-case maximum short- and long-term concentrations of pollutants in the Class I area and comparing the maximum predicted concentrations to lowest observed effect levels for AQRVs or analogous organisms. In conducting the assessment, several assumptions were made as to how pollutants interact with the different matrices, *i.e.*, vegetation, soils, wildlife, and aquatic environment.

A screening approach was used to evaluate potential effects by comparison of the maximum predicted ambient concentrations with effect threshold limits for the pollutants of concern, for both vegetation and wildlife, as reported in the scientific literature. A literature search was conducted which specifically addressed the effects of air contaminants on plant species reported to occur in the vicinity of the plant and the Class I area. It is recognized that effects threshold information is not available for all species found in the Okefenokee NWA, although studies have been performed on other similar species that may be used as models.

6.5.3 Identification of AQRVs and Methodology

An AQRV analysis was conducted to assess the potential risk to AQRVs of the Okefenokee NWA due to the proposed GP project. The U.S. Department of the Interior in 1978 administratively defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register 1978).*

Except for visibility, AQRVs were not specifically defined. However, odor, soil, flora, fauna, cultural resources, geological features, water, and climate generally have been identified by land managers as AQRVs. Since specific AQRVs have not been identified for the Okefenokee NWA, this AQRV analysis evaluates the effects of air quality on general soil and vegetation types and wildlife found in the Class I area.

Vegetation type AQRVs and their representative species types have been defined as:

- Freshwater Marsh - sawgrass, pickerelweed, and sand cordgrass
- Marsh Islands - cabbage palm and eastern red cedar
- Estuarine Habitat - black needlerush, salt marsh cordgrass, and wax myrtle
- Hardwood Swamp - red maple, red bay, sweet bay, and cabbage palm
- Upland Forests - live oak, scrub oak, longleaf pine, slash pine, wax myrtle, and saw palmetto

Wildlife AQRVs have been identified as endangered species, waterfowl, wading birds, shorebirds, reptiles, and mammals.

The maximum pollutant concentrations predicted for the project in the Okefenokee NWA are presented in Table C-36. These results were compared with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. While the literature search focused on such species as cabbage palm, eastern red cedar, lichens, and species of the hardwood swamplands and mangrove forest, no specific citations that addressed these species were found. Threshold information is not available for all species found in the Class I area, although studies have been performed on a few of the common species and on other similar species that can be used as indicators of effects.

6.5.4 Impacts to Soils

For soils, the potential and hypothesized effects of atmospheric deposition include:

- Increased soil acidification,
- Alteration in cation exchange,
- Loss of base cations, and
- Mobilization of trace metals.

The potential sensitivity of specific soils to atmospheric inputs is related to two factors. First, the physical ability of a soil to conduct water vertically through the soil profile is important in influencing the interaction with deposition. Second, the ability of the soil to resist chemical changes, as measured in terms of pH and soil cation exchange capacity (CEC), is important in determining how a soil responds to atmospheric inputs.

The soils of the Okefenokee NWA are generally classified as histosols. Histosols (peat soils) are organic and have extremely high buffering capacities based on their CEC, base saturation, and bulk density. Therefore, they would be relatively insensitive to atmospheric inputs.

The relatively low sensitivity of the soils to atmospheric inputs coupled with the extremely low ground-level pollutant concentrations due to the project for the Okefenokee NWA precludes any significant impact on soils.

6.5.5 Impacts to Vegetation

In general, the effects of air pollutants on vegetation occur primarily from SO_2, NO_2, O_3, and PM_{10}. Effects from minor air contaminants such as fluoride, chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure.

The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage, which is considered to be the major pathway of exposure.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach.

The response of vegetation and wildlife to atmospheric pollutants is influenced by the concentration of the pollutant, duration of exposure, and frequency of exposures. The pattern of pollutant exposure expected from the facility is that of a few episodes of relatively high ground-level concentration which occur during certain meteorological conditions interspersed with long periods of extremely low ground-level concentrations. If there are any effects of stack emissions on plants or animals, they will likely arise from the short-term, higher doses. A dose is the product of the concentration of the pollutant and duration of the exposure.

Nitrogen Dioxide

NO_2 can injure plant tissue with symptoms usually appearing as irregular white to brown collapsed lesions between the leaf veins and near the margins. Conversely, non-injurious levels of NO_2 can be absorbed by plants, enzymatically transformed into ammonia, and incorporated into plant constituents such as amino acids (Matsumaru *et al.*, 1979).

Plant damage can occur through either acute (short-term, high concentration) or chronic (long-term, relatively low concentration) exposure. For plants that have been determined to be more sensitive to NO_2 exposure than others, acute (1-, 4-, and 8-hour) exposure caused 5 percent predicted foliar injury at concentrations ranging from 3,800 to 15,000 $\mu g/m^3$ (Heck and Tingey, 1979). Chronic exposure of selected plants (some considered NO_2-sensitive) to NO_2 concentrations of 2,000 to 4,000 $\mu g/m^3$ for 213 to 1,900 hours caused reductions in yield of up to 37 percent and some chlorosis (Zahn, 1975).

The maximum 8-hour average NO_2 concentration due to the increase in emissions resulting from the proposed projects in the Okefenokee Class I area is predicted to be 0.13 $\mu g/m^3$ (Table C-36). This concentration is less than 0.006 percent of the levels that cause foliage injury in acute exposure scenarios. By comparison of published toxicity values for NO_2 exposure to long-term (annual averaging time) modeled concentrations, the possibility of plant damage in the Class I areas can be examined for chronic exposure situations. For a chronic exposure, the maximum annual average NO_2 concentration due to the proposed projects in the Okefenokee NWA Class I area is 0.0033 $\mu g/m^3$. This concentration is less than 0.0003 percent of the levels that cause foliage injury in chronic exposure scenarios.

Particulate Matter (PM_{10})

Although information pertaining to the effects of PM on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of PM ranging from 210 to 366 $\mu g/m^3$ for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of PM lower than 163 $\mu g/m^3$ did not appear to be injurious to the tested plants.

By comparison of these published toxicity values for PM exposure (*i.e.*, concentrations for an 8-hour averaging time), the possibility of plant damage in the Okefenokee NWA can be determined. The maximum predicted 8-hour PM_{10} concentration due to the increase in emissions resulting from the proposed project at the Class I area is 0.032 $\mu g/m^3$ (Table C-36). This concentration is less than 0.02 percent of the lower threshold value that reportedly affects plant foliage. As a result, no effects to vegetative AQRVs are expected from the project's emissions.

Carbon Monoxide

As with PM_{10}, information pertaining to the effects of CO on plants is scarce. The main effect of high concentrations of CO is the inhibition of cytochrome *c* oxidase, the terminal oxidase in the mitochondrial electron transfer chain. Inhibition of cytochrome *c* oxidase depletes the supply of adenosine triphosphate (ATP), the principal donor of free energy required for cell functions. However, this inhibition only occurs at extremely high concentrations of CO. Pollok *et al.* (1989) reported that exposure to $CO:O_2$ ratio of 25 (equivalent to an ambient CO concentration of 6.85×10^6 $\mu g/m^3$) resulted in stomatal closure in the leaves of the sunflower (*Helianthus annuus*). Naik *et al.* (1992) reported cytochrome *c* oxidase inhibition in corn, sorghum, millet, and Guinea grass at $CO:O_2$ ratios of 2.5

(equivalent to an ambient CO concentration of 6.85 x 10^5 µg/m^3). These plants were considered the species most sensitive to CO-induced inhibition of cytochrome *c* oxidase.

By comparison of published effect values for CO exposure, the possibility of plant damage in the Class I area can be determined. The maximum 1-hour (most conservative) estimated CO concentration due to the increase in emissions resulting from the proposed projects in the Okefenokee NWA Class I area is 1.04 µg/m^3. This concentration is less than 0.00004 percent of the value that caused inhibition in laboratory studies. The amount of damage sustained at this level (if any) for 1 hour would have negligible effects over an entire growing season. The predicted maximum annual CO concentration of 0.018 µg/m^3 reflects a more realistic (yet conservative) CO level for the Class I area. This concentration is less than 0.000007 percent of the value that caused cytochrome *c* oxidase inhibition.

Sulfuric Acid Mist

Acidic precipitation or acid rain is coupled to SO_2 emissions mainly formed during the burning of fossil fuels. This pollutant is oxidized in the atmosphere and dissolves in rain forming SAM, which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 concentrations, which lead directly to the formation of SAM concentrations, are predicted to be well below levels which have been documented as negatively affecting vegetation. During the last decade, much attention has been focused on acid rain. Acidic deposition is an ecosystem-level problem that affects vegetation because of some alterations of soil conditions such as increased leaching of essential base cations or elevated concentrations of aluminum in the soil water (Goldstein *et al.*, 1985). Although effects of acid rain in eastern North America have been well published and publicized, detrimental effects of acid rain on Florida vegetation are lacking documentation.

VOC Emissions and Impacts on Ozone

It is difficult to predict what effect the proposed increase in emissions of VOC will have on ambient O_3 concentrations on a regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is not directly emitted from fuel combustion, but is formed down-wind from emission sources when VOC and NO_x emissions react in the presence of sunlight. Natural (without man-made sources) ambient concentrations of O_3 are normally in the range of 20 to 39 µg/m^3 (0.01 to 0.02 ppm) (Heath, 1975).

The nearest monitors to the GP Palatka Mill that measure O_3 concentrations are located in Gainesville (AIRS No. 12-001-0025 and 12-001-3011). These stations measure concentrations according to EPA procedures. Based on the O_3 monitoring concentrations measured over the last several years in Gainesville (see Table C-1), the region is in attainment of the existing 1-hour O_3 AAQS as well as the new 8-hour O_3 AAQS.

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface leaves know as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early.

As described in Section 5.2.5, the VOC emissions due to the proposed GP projects represents less than a 15-percent increase in regional VOC emissions, based on future potential emissions. However, future actual emissions are expected to be lower. Therefore, the effects of O_3, as a result of VOC emissions from the project, are expected to be insignificant.

Summary

In summary, the phytotoxic effects from the project's emissions are minimal. It is important to note that the elements were conservatively modeled with the assumption that 100 percent was available for plant uptake. This is rarely the case in a natural ecosystem.

6.5.6 Impacts to Wildlife

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the National AAQS. This occurs in non-attainment areas, *e.g.*, Los Angeles Basin. Risks to wildlife also may occur for wildlife living in the vicinity of an emission source that experiences frequent upsets or episodic conditions resulting from malfunctioning equipment, unique meteorological conditions, or startup operations (Newman and Schreiber, 1988). Under these conditions, chronic effects (*e.g.*, particulate contamination) and acute effects (*e.g.*, injury to health) have been observed (Newman, 1981).

A wide range of physiological and ecological effects to fauna has been reported for gaseous and particulate pollutants (Newman, 1981; Newman and Schreiber, 1988). The most severe of these effects have been observed at concentrations above the secondary AAQS. Physiological and behavioral effects have been observed in experimental animals at or below these standards.

For impacts on wildlife, the lowest threshold values of NO_2, PM_{10}, and SO_2 that are reported to cause physiological changes are shown in Table C-39. These values are up to orders of magnitude larger than maximum concentrations predicted due to the GP projects in the Okefenokee NWA Class I area. No effects on wildlife AQRVs from NO_2, CO, and particulates are expected. The proposed project's contribution to cumulative impacts is expected to be negligible.

Research with primates shows that O_3 penetrates deeper into non-ciliated peripheral pathways and can cause lesions in the respiratory bronchioles and alveolar ducts as concentrations increase from 0.2 to 0.8 ppm (Paterson, 1997). These bronchioles are the most common site for severe damage. In rats, the Type I cells in the proximal alveoli (where gas exchange occurs) were the primary site of action at concentrations between 0.5 and 0.9 ppm (Paterson, 1997). Work with rats and rabbits suggest that the mucus layer that lines the large airways does not protect completely against the effects of O_3, and desquamated cells were found from acute exposures at 0.25, 0.5, and 1.0 ppm. In animal research, O_3 has been found to increase the susceptibility to bacterial pneumonia (Paterson, 1997). During the last decade, there has also been growing concern with the possibility that repeated or long-term exposure to elevated O_3 concentrations may be causing or contributing to irreversible chronic lung injury.

The project's contribution to ground level O_3 is expected to be very low and dispersed over a large area. Coupled with the historical ambient data, mobility of wildlife, the potential for exposure of wildlife to the facility's impacts that lead to high concentration is extremely unlikely.

6.6 Impacts on Soils, Vegetation and Wildlife - Chassahowitzka

6.6.1 Introduction

The GP Palatka Mill is subject to the PSD new source review requirements for NO_x, PM, PM_{10}, CO, VOC, and SAM. The analysis presented in this section addresses the potential impacts on vegetation, soils, and wildlife of the Chassahowitzka NWA Class I area due to the proposed GP Palatka Mill projects. The Chassahowitzka NWA is located approximately 137 km southwest of the GP Palatka Mill.

The analysis demonstrates that the increase in impacts due to the proposed project is extremely low. Regardless of the existing conditions in the vicinity of the Class I area, the proposed project will not cause any significant adverse effects due to the predicted low impacts upon these areas.

6.6.2 Soil, Vegetation, and AQRV Analysis Methodology

This analysis uses the maximum air quality impacts predicted to occur in the Chassahowitzka NWA Class I area due to the increase in the proposed project's emissions. These impacts are summarized in Section 6.3 and Table C-36.

The analysis involved predicting worst-case maximum short- and long-term concentrations of pollutants in the Class I area and comparing the maximum predicted concentrations to lowest observed effect levels for AQRVs or analogous organisms. In conducting the assessment, several assumptions were made as to how pollutants interact with the different matrices, *i.e.*, vegetation, soils, wildlife, and aquatic environment.

A screening approach was used to evaluate potential effects by comparison of the maximum predicted ambient concentrations with effect threshold limits for the pollutant of concern, for vegetation and wildlife, as reported in the scientific literature. A literature search was conducted which specifically addressed the effects of air contaminants on plant species reported to occur in the Class I area. It was recognized that effects threshold information is not available for all species found in the Chassahowitzka NWA, although studies have been performed on a few of the common species and on other similar species, which can be used as models.

6.6.3 Identification of AQRVs and Methodology

An AQRV analysis was conducted to assess the potential risk to AQRVs of the Chassahowitzka NWA due to the proposed emissions from the GP project. The U.S. Department of the Interior in 1978 administratively defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register, 1978).*

Except for visibility, AQRVs were not specifically defined. However, odor, soil, flora, fauna, cultural resources, geological features, water, and climate generally have been identified by land managers as AQRVs. Since specific AQRVs have not been identified for the Chassahowitzka NWA, this AQRV analysis evaluates the effects of air quality on general soil and vegetation types and wildlife found in the Chassahowitzka NWA.

Vegetation type AQRVs and their representative species types have been defined by the USFWS as:

- Marshlands - black needlerush, saw grass, salt grass, and salt marsh cordgrass
- Marsh Islands - cabbage palm and eastern red cedar
- Estuarine Habitat - black needlerush, salt marsh cordgrass, and wax myrtle
- Hardwood Swamp - red maple, red bay, sweet bay, and cabbage palm
- Upland Forests - live oak, scrub oak, longleaf pine, slash pine, wax myrtle, and saw palmetto
- Mangrove Swamp - red, white, and black mangrove

The maximum pollutant concentrations predicted for the proposed GP projects in the Chassahowitzka NWA are presented in Table C-36. These results were compared with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. A literature search was conducted that specifically addressed the effects of air contaminants on plant species reported to occur in the Chassahowitzka NWA. While the literature search focused on such species as cabbage palm, eastern red cedar, lichens, and species of the hardwood swamplands and mangrove forest, no specific citations that addressed these species were found. It is recognized that effect threshold information is not available for all species found in the Chassahowitzka NWA, although studies have been performed on a few of the common species and on other similar species that can be used as indicators of effects.

6.6.4 Impacts to Soils

For soils, the potential and hypothesized effects of atmospheric deposition include:

- Increased soil acidification,
- Alteration in cation exchange,
- Loss of base cations, and
- Mobilization of trace metals.

The potential sensitivity of specific soils to atmospheric inputs is related to two factors. First, the physical ability of a soil to conduct water vertically through the soil profile is important in influencing the interaction with deposition. Second, the ability of the soil to resist chemical changes, as measured in terms of pH and soil cation exchange capacity (CEC), is important in determining how a soil responds to atmospheric inputs.

The soils of the Chassahowitzka NWA are generally classified as histosols. According to the U.S. Department of Agriculture (USDA) Soil Surveys of Citrus and Hernando Counties, nine soil complexes are found in the Chassahowitzka NWA. These include Aripeka fine sand, Aripeka-Okeelanta-Lauderhill, Hallendale-Rock outcrop, Homosassa mucky fine sandy loam, Lacooche, Okeelanta mucks, Okeelanta-Lauderdale-Terra Ceia mucks, Rock outcrop-Homosassa-Lacoochee, and Weekiwachee-Durbin mucks (Porter, 1996). The majority of the soil complexes found in the Chassahowitzka NWA are inundated by tidal waters, contain a relatively high organic matter content, and have high buffering capacities based on their CEC, base saturation, and bulk density. The regular flooding of these soils by the Gulf of Mexico regulates the pH and any change in acidity in the soil would be buffered by this activity. Therefore, they would be relatively insensitive to atmospheric inputs. However, Terra Ceia, Okeelanta, and Lauderdale freshwater mucks are present along the eastern border of the Chassahowitzka NWA, and may be more sensitive to atmospheric sulfur deposition (Porter, 1996). Although not tidally influenced, these freshwater mucks are highly organic and, therefore, have a relatively high intrinsic buffering capacity.

The relatively low sensitivity of the soils to atmospheric inputs coupled with the extremely low ground-level pollutant concentrations due to the project at the Chassahowitzka NWA precludes any significant impact on soils.

6.6.5 Impacts to Vegetation

In general, the effects of air pollutants on vegetation occur primarily from SO_2, NO_2, O_3, and PM. Effects from minor air contaminants, such as fluoride (F), chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides, have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage, which is considered to be the major pathway of exposure. For purposes of this analysis, it was assumed that 100 percent of each air contaminant of concern is accessible to the plants.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach.

The concentrations of the pollutants, duration of exposure and frequency of exposures influence the response of vegetation and wildlife to atmospheric pollutants. The pattern of pollutant exposure expected from the facility is that of a few episodes of relatively high ground-level concentrations, which occur during certain meteorological conditions interspersed with long periods of extremely low ground-level concentrations. If there are any effects of stack emissions on plants and animals they will be from the short-term, higher doses. A dose is the product of the concentration of the pollutant and duration of the exposure.

Nitrogen Dioxide

NO_2 can injure plant tissue with symptoms usually appearing as irregular white to brown collapsed lesions between the leaf veins and near the margins. Conversely, non-injurious levels of NO_2 can be absorbed by plants, enzymatically transformed into ammonia, and incorporated into plant constituents such as amino acids (Matsumaru *et al.*, 1979).

Plant damage can occur through either acute (short-term, high concentration) or chronic (long-term, relatively low concentration) exposure. For plants that have been determined to be more sensitive to NO_2 exposure than others, acute (1, 4, 8 hours) exposure caused 5 percent predicted foliar injury at concentrations ranging from 3,800 to 15,000 $\mu g/m^3$ (Heck and Tingey, 1979). Chronic exposure of selected plants (some considered NO_2-sensitive) to NO_2 concentrations of 2,000 to 4,000 $\mu g/m^3$ for 213 to 1,900 hours caused reductions in yield of up to 37 percent and some chlorosis (Zahn, 1975).

The maximum 8-hour average NO_2 concentration due to the increase in emissions from the GP project is predicted to be 0.122 $\mu g/m^3$ in the Chassahowitzka NWA (Table C-36). This concentration is less than 0.007 percent of the levels that cause foliar injury in acute exposure scenarios. By comparison of published toxicity values for NO_2 exposure to long-term (annual averaging time) modeled concentrations, the possibility of plant damage in the Chassahowitzka NWA Class I area can be examined for chronic exposure situations. For a chronic exposure, the maximum annual average NO_2 concentration due to the project in the Chassahowitzka NWA Class I area is 0.0018 $\mu g/m^3$. This value is less than 0.0004 percent of the levels that caused minimal yield loss and chlorosis in plant tissue. Average and maximum background 24-hour average concentrations of NO_2 reported in the Chassahowitzka NWA are 0.006 and 0.104 $\mu g/m^3$, respectively.

Although it has been shown that simultaneous exposure to SO_2 and NO_2 results in synergistic plant injury (Ashenden and Williams, 1980), the magnitude of this response is generally only 3 to 4 times greater than either gas alone and usually occurs at unnaturally high levels of each gas. Therefore, the concentrations within the Chassahowitzka NWA are still far below the levels that potentially cause plant injury for either acute or chronic exposure.

Particulate Matter (PM_{10})

Although information pertaining to the effects of PM on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of PM ranging from 210 to 366 $\mu g/m^3$ for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of PM lower than 163 $\mu g/m^3$ did not appear to be injurious to the tested plants.

By comparison of these published toxicity values for PM exposure (*i.e.*, concentrations for an 8-hour averaging time), the possibility of plant damage in the Chassahowitzka NWA can be determined. The maximum predicted 8-hour PM_{10} concentration due to the increase in emissions resulting from the proposed project at the Chassahowitzka NWA Class I area is 0.021 $\mu g/m^3$ (Table C-36). This concentration is only 0.02 to 0.04 percent of the lower threshold value that reportedly affects plant foliage. As a result, no effects to vegetative AQRVs are expected from the project's emissions.

Carbon Monoxide

As with PM_{10}, information pertaining to the effects of CO on plants is scarce. The main effect of high concentrations of CO is the inhibition of cytochrome *c* oxidase, the terminal oxidase in the mitochondrial electron transfer chain. Inhibition of cytochrome *c* oxidase depletes the supply of ATP, the principal donor of free energy required for cell functions. However, this inhibition only occurs at extremely high concentrations of CO. Pollok *et al.* (1989) reported that exposure to $CO:O_2$ ratio of 25 (equivalent to an ambient CO concentration of 6.85×10^6 µg/m^3) resulted in stomatal closure in the leaves of the sunflower (*Helianthus annuus*). Naik *et al.* (1992) reported cytochrome *c* oxidase inhibition in corn, sorghum, millet, and Guinea grass at $CO:O_2$ ratios of 2.5 (equivalent to an ambient CO concentration of 6.85×10^5 µg/m^3). These plants were considered the species most sensitive to CO-induced inhibition of cytochrome *c* oxidase.

By comparison of published effect values for CO exposure, the possibility of plant damage in the Class I area can be determined. The maximum 1-hour (most conservative) estimated CO concentration due to the increase in emissions resulting from the proposed project in the Chassahowitzka NWA Class I area is 0.7 µg/m^3 (see Table C-36). This concentration is less than 0.00005 percent of the value that caused inhibition in laboratory studies. The amount of damage sustained at this level (if any) for 1 hour would have negligible effects over an entire growing season. The predicted maximum annual CO concentration of 0.011 µg/m^3 reflects a more realistic (yet conservative) CO level for the Class I area. This concentration is less than 0.000007 percent of the value that caused cytochrome *c* oxidase inhibition.

Sulfuric Acid Mist

Acidic precipitation or acid rain is coupled to SO_2 emissions mainly formed during the burning of fossil fuels. This pollutant is oxidized in the atmosphere and dissolves in rain forming SAM, which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 concentrations, which lead directly to the formation of SAM concentrations, are predicted to be well below levels that have been documented as negatively affecting vegetation. During the last decade, much attention has been focused on acid rain. Acidic deposition is an ecosystem-level problem that affects vegetation because of some alterations of soil conditions such as increased leaching of essential base cations or elevated concentrations of aluminum in the soil water (Goldstein *et al.*, 1985). Although effects of acid rain in eastern North America have been well published and publicized, detrimental effects of acid rain on Florida vegetation are lacking documentation.

VOC Emissions and Impacts on Ozone

It is difficult to predict what effect the proposed increase in emissions of VOC will have on ambient O_3 concentrations on a regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is not directly emitted from fuel combustion, but is formed down-wind from emission sources when VOC and NO_x emissions react in the presence of sunlight. Natural (without man-made sources) ambient concentrations of O_3 are normally in the range of 20 to 39 $\mu g/m^3$ (0.01 to 0.02 ppm) (Heath, 1975).

The nearest monitors to the GP Palatka Mill that measure O_3 concentrations are located in Gainesville (AIRS No. 12-001-0025 and 12-001-3011). These stations measure concentrations according to EPA procedures. Based on the O_3 monitoring concentrations measured over the last several years in Gainesville (see Table C-1), the region is in attainment of the existing 1-hour O_3 AAQS as well as the new 8-hour O_3 AAQS.

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface leaves know as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early.

As described in subsection 5.2.5, the VOC emissions due to the proposed GP project represent less than a 15-percent increase in regional VOC emissions, based on future potential emissions. However, future actual emissions are expected to be lower. Therefore, the effects of O_3, as a result of VOC emissions from the projects, are expected to be insignificant.

Summary

In summary, the phytotoxic effects from the project's emissions are minimal. It is important to note that the emissions were conservatively modeled with the assumption that 100 percent was available for plant uptake. This is rarely the case in a natural ecosystem.

6.6.6 Impacts to Wildlife

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the NAAQS. This occurs in non-attainment areas, *e.g.*, Los Angeles Basin. Risks to wildlife also may occur for wildlife living in the vicinity of an emission source that experiences frequent upsets or episodic conditions resulting from malfunctioning equipment, unique meteorological conditions, or startup operations (Newman and Schreiber, 1988). Under these conditions, chronic effects (*e.g.*, particulate contamination) and acute effects (*e.g.*, injury to health) have been observed (Newman, 1981).

A wide range of physiological and ecological effects to fauna has been reported for gaseous and particulate pollutants (Newman, 1981; Newman and Schreiber, 1988). The most severe of these effects have been observed at concentrations above the secondary AAQS. Physiological and behavioral effects have been observed in experimental animals at or below these standards.

For impacts on wildlife, the lowest threshold values of SO_2, NO_2, and particulates that are reported to cause physiological changes are shown in C-39. These values are orders of magnitude larger than maximum concentrations predicted for the GP project at the Chassahowitzka NWA Class I area. No effects on wildlife AQRVs from NO_2, CO and particulates are expected. The proposed project's contribution to cumulative impacts is expected to be negligible.

Research with primates shows that O_3 penetrates deeper into non-ciliated peripheral pathways and can cause lesions in the respiratory bronchioles and alveolar ducts as concentrations increase from 0.2 to 0.8 ppm (Paterson, 1997). These bronchioles are the most common site for severe damage. In rats, the Type I cells in the proximal alveoli (where gas exchange occurs) were the primary site of action at concentrations between 0.5 and 0.9 ppm (Paterson, 1997). Work with rats and rabbits suggest that the mucus layer that lines the large airways does not protect completely against the effects of O_3, and desquamated cells were found from acute exposures at 0.25, 0.5, and 1.0 ppm. In animal research, O_3 has been found to increase the susceptibility to bacterial pneumonia (Paterson, 1997). During the last decade, there has also been growing concern with the possibility that repeated or long-term exposure to elevated O_3 concentrations may be causing or contributing to irreversible chronic lung injury.

The project's contribution to ground level O_3 is expected to be very low and dispersed over a large area. Coupled with the historical ambient data, mobility of wildlife, the potential for exposure of wildlife to the facility's impacts that lead to high concentration is extremely unlikely.

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TABLE C-1
SUMMARY OF BACKGROUND CONCENTRATIONS FOR NO_x, PM_{10} AND OZONE

Pollutant	**Monitor Description**	**Averaging Period**	**Background Concentration ($\mu g/m^3$)**
Ozone	12-001-3011 Alachua County, Gainesville, 200 Savannah Blvd.	1-hour	188 [a]
		8-hour	145 [b]
NO_x	12-031-0032 Duval County, Jacksonville, 2900 Bennett St.	Annual	26.9 [c]
PM_{10}	12-107-1008 Putnam County, Palatka, Comfort and Port Roads	24-hour	62 [d]
		Annual	25.7 [c]

Notes

[a] Highest second-highest, from 2001 - 2005. Highest occurred in 2001.

[b] 3-year average of 4th highest daily 8-hour max, 2001-2005. Highest period was 2001 - 2003.

[c] Highest annual mean from 2003-2005

[d] 6th-highest from last 5 years, 2001-2005

Source: Florida Department of Environmental Protection. Quick Look Reports. 2001-2005.

TABLE C-2
STRUCTURE DIMENSIONS USED IN THE MODELING ANALYSIS

Structure	Height		Length		Width	
	(ft)	(m)	(ft)	(m)	(ft)	(m)
RB4 Precipitator	85	25.9	123	37.5	58	17.6
RB4 Boiler Building	193.7	59.0	104	31.7	90	27.4
Power Plant Building	107.6	32.8	101	30.8	92	28.0
Pulp Dryer No. 3	84.5	25.8	275	83.7	157	47.9
Pulp Dryer No. 5	70.5	21.5	328	99.9	99	30.3
Pulp Dryer No. 4	73	22.3	265	80.7	125	38.2
Roll Storage Building	52	15.8	464	141.4	346	105.5
Tissue Converting & Finishing (White)	84	25.6	298	90.8	207	63.1
Towel & Napkin Warehouse (Green)	33.5	10.2	434	132.3	424	129.2
Towel & Napkin Converting & Finishing (Yellow)	48	14.6	377	114.9	422	128.6
Towel & Napkin Warehouse (Blue)	40	12.2	464	141.4	641	195.4
Towel & Napkin Warehouse (Gray)	28	8.5	434	132.3	481	146.6
Converting Operations	48	14.6	47	14.3	65	19.8
Building 63	40	12.2	134	40.8	148	45.1
Warehouse Complex 1	62.67	19.1	1,394	424.9	377	114.8
Warehouse Complex 2	46.8	14.3	924	281.5	425	129.5
Nos. 1 and 2 Machines Storage	71.16	21.7	225	68.6	407	124.2
Kraft Converting and Storage	60.75	18.5	310	94.4	524	159.9
Kraft Warehouse and Multi-Wall	56.7	17.3	290	88.4	521	158.7
Digester	62.2	19.0	264	80.4	33	10.1
No. 3 RB Building [a]	100	30.5	61	18.6	34	10.4
No. 2 RB Building [a]	100	30.5	58	17.7	73	22.3

[a] 1974 Baseline Only

TABLE C-3
SIGNIFICANT IMPACT LEVELS AND DE MINIMIS MONITORING CONCENTRATIONS FOR MODELED POLLUTANTS

Pollutant	**Averaging Time**	**Significant Impact Levels ($\mu g/m^3$)**	**De Minimis Monitoring Concentration ($\mu g/m^3$)**
PM_{10}	24-hour	5	10
	Annual	1	--
NO_x	Annual	1	14
CO	1-hour	2,000	--
	8-hour	500	575

TABLE C-4
3-HOUR EMISSIONS USED IN SIGNIFICANT IMPACT ANALYSIS, GP PALATKA COMBINED PROJECTS
(REVISED 6-29-06)

Source Description	Hourly Emissions									
	SO_2		NO_x		CO		PM_{10}		SAM	
	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s
Future Potential Emissions										
No 4 Combination Boiler Project										
No. 4 Combination Boiler - 2.35% S[c]	1,075.5	135.51	135.4	17.06	282.0	35.53	16.7	2.10	47.3	5.96
Other Affected Sources										
No. 4 Lime Kiln	9.1	1.15	67.9	8.56	16.3	2.05	29.2	3.68	0.4	0.05
Bark Handling System (March 2005)	--	--	--	--	--	--	3.2	0.40	--	--
No. 4 Recovery Boiler @ 150 ppmvd SO_2, 3-hour	439.4	55.36	168.5	21.23	1,025.4	129.20	56.7	7.14	3.6	0.45
No. 4 Smelt Dissolving Tank	7.7	0.97	15.9	2.00	2.6	0.33	11.3	1.42	--	--
Black Liquor/Green Liquor Tanks	--	--	--	--	--	--	--	--	--	--
Caustic Area	--	--	--	--	--	--	0.60	0.076	--	--
Total- Future Potential	**1,531.7**	192.99	**387.7**	48.85	**1,326.3**	167.11	117.7	14.83	**51.3**	6.46
Past Actual Emissions										
No. 4 Combination Boiler[c]	890.1	112.15	116.0	14.62	255.5	32.19	21.5	2.71	39.2	4.94
No. 4 Lime Kiln	0.01	0.0013	33.7	4.25	2.0	0.25	17.3	2.18	0.0004	0.00005
Bark Handling System	--	--	--	--	--	--	2.42	0.30	--	--
No. 4 Recovery Boiler	161.3	20.32	116.3	14.65	318.0	40.07	39.5	4.98	0.6	0.08
No. 4 Smelt Dissolving Tank	6.8	0.86	14.0	1.76	2.3	0.29	9.2	1.16	--	--
Black Liquor/Green Liquor Tanks	--	--	--	--	--	--	--	--	--	--
Caustic Area	--	--	--	--	--	--	0.4	0.050	--	--
Total- Past Actual	**1,058.2**	133.33	**280.0**	35.28	**577.8**	72.80	**90.3**	11.38	**39.8**	5.01
CONTEMPORANEOUS EMISSION CHANGES										
MACT I Compliance Project (9/00) (Permit nos. 1070005-007-AC and -017-AC) - startup 2002										
--Increase Due to New Thermal Oxidizer	--	--	[b]	[b]	2.0	0.25	7.0	0.88	--	--
--Increase Due to Modified No. 4 Comb. Boiler	626.4	78.93	[b]	[b]	--	--	--	--	25.1	3.16
--Increase Due to BSW System w/Condensate Treatment	--	--	--	--	--	--	--	--	--	--
--Decrease Due to Existing Thermal Oxidizer	-171.2	-21.57	[b]	[b]	-0.068	-0.009	-4.70	-0.59	-6.1	-0.77
--Decrease Due to Existing BSW System w/o Condensate Treatment	--	--	--	--	--	--	--	--		--
New Package Boiler (9/02) (Permit No. 1070005-018-AC) - startup Oct. 2002										
--Increase Due to New Package Boiler (EU 044)	0.15	0.02	48.90	6.16	20.5	2.58	1.9	0.239	--	--
--Decrease from old No. 6 Package Boiler	-0.062	-0.008	-10.43	-1.31	-2.50	-0.315	-0.10	-0.0030	--	--
Brown Stock Washer and Oxygen Delignification System (7/04) (Permit No. 1070005-024-AC) - not yet started										
--Increase Due to No. 5 Power Boiler	[b]	[b]	--	--	0.068	0.0086	--	--	3.30	0.095
--Increase Due to Pulp Storage Tanks	--	--	--	--	--	--	--	--	--	--
--Decrease from existing BSW System, BL Filter, etc.	--	--	--	--	--	--	--	--	--	--
No. 4 Power Boiler Shutdown (Sep. 2003)	-287.3	-36.20	-39.10	-4.93	-4.16	-0.52	-16.70	-2.10	-12.64	-1.59
Total Contemporaneous Emission Changes	168.0	21.17	**-0.6**	-0.08	**15.8**	2.00	**-12.6**	-1.59	9.7	1.22

[a] Modeled in previous PSD permitting.

[b] Modeled in previous PCP permit issued for Palatka Mill.

[c] Does not include NCG/SOG/DNCG burning in boiler.

TABLE C-5
24-HOUR EMISSIONS USED IN SIGNIFICANT IMPACT ANALYSIS, GP PALATKA COMBINED PROJECTS
(REVISED 6-29-06)

Source Description	Hourly Emissions									
	SO_2		NO_x		CO		PM_{10}		SAM	
	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s
Future Potential Emissions										
No.4 Combination Boiler Project										
No. 4 Combination Boiler - 2.35% S[c]	1,075.5	135.51	135.4	17.06	282.0	35.53	16.7	2.10	47.3	5.96
Other Affected Sources										
No. 4 Lime Kiln	9.1	1.15	67.9	8.56	16.3	2.05	29.2	3.68	0.4	0.05
Bark Handling System (March 2005)	--	--	--	--	--	--	3.2	0.40	--	--
No. 4 Recovery Boiler @ 100 ppmvd SO_2, 24-hour	292.8	36.89	168.5	21.23	512.7	64.60	56.7	7.14	3.6	0.45
No. 4 Smelt Dissolving Tank	7.7	0.97	15.9	2.00	2.6	0.33	11.3	1.42	--	--
Black Liquor/Green Liquor Tanks	--	--	--	--	--	--	--	--	--	--
Caustic Area	--	--	--	--	--	--	0.60	0.076	--	--
Total- Future Potential	1,385.1	174.52	387.7	48.85	813.6	102.51	117.7	14.83	51.3	6.46
Past Actual Emissions										
No. 4 Combination Boiler[c]	890.1	112.15	116.0	14.62	255.5	32.19	21.5	2.71	39.2	4.94
No. 4 Lime Kiln	0.01	0.001	33.7	4.25	2.0	0.25	17.3	2.18	0.0004	0.0001
Bark Handling System	--	--	--	--	--	--	2.42	0.30	--	--
No. 4 Recovery Boiler	24.8	3.12	116.3	14.65	318.0	40.07	39.5	4.98	0.6	0.08
No. 4 Smelt Dissolving Tank	6.8	0.86	14.0	1.76	2.3	0.29	9.2	1.16	--	--
Black Liquor/Green Liquor Tanks	--	--	--	--	--	--	--	--	--	--
Caustic Area	--	--	--	--	--	--	0.4	0.050	--	--
Total- Past Actual	921.7	116.14	280.0	35.28	577.8	72.80	90.3	11.38	39.8	5.01
CONTEMPORANEOUS EMISSION CHANGES										
MACT I Compliance Project (9/00) (Permit nos. 1070005-007-AC and -017-AC) - startup 2002										
--Increase Due to New Thermal Oxidizer	--	--	b	b	2.0	0.25	7.0	0.88	--	--
--Increase Due to Modified No. 4 Comb. Boiler	626.4	78.93	b	b	--	--	--	--	25.1	3.16
--Increase Due to BSW System w/Condensate Treatment	--	--	--	--	--	--	--	--	--	--
--Decrease Due to Existing Thermal Oxidizer	-171.2	-21.57	b	b	-0.068	-0.009	-4.70	-0.59	-6.1	-0.77
--Decrease Due to Existing BSW System w/o Condensate Treatment	--	--	--	--	--	--	--	--	--	--
New Package Boiler (9/02) (Permit No. 1070005-018-AC) - startup Oct. 2002										
--Increase Due to New Package Boiler (EU 044)	-0.15	0.02	48.90	6.16	20.5	2.58	1.9	0.239	--	--
--Decrease from old No. 6 Package Boiler	-0.062	-0.008	-10.43	-1.31	-2.50	-0.315	-0.10	-0.0030	--	--
Brown Stock Washer and Oxygen Delignification System (7/04) (Permit No. 1070005-024-AC) - not yet started										
--Increase Due to No. 5 Power Boiler	b	b	--	--	0.068	0.0086	--	--	3.30	0.095
--Increase Due to Pulp Storage Tanks	--	--	--	--	--	--	--	--	--	--
--Decrease from existing BSW System, BL Filter, etc.	--	--	--	--	--	--	--	--	--	--
No. 4 Power Boiler Shutdown (Sep. 2003)	-287.3	-36.20	-39.10	-4.93	-4.16	-0.52	-16.70	-2.10	-12.64	-1.59
Total Contemporaneous Emission Changes	168.0	21.17	-0.6	-0.08	15.8	2.00	-12.6	-1.59	9.7	1.22

[a] Modeled in previous PSD permitting.

[b] Modeled in previous PCP permit issued for Palatka Mill.

[c] Does not include NCG/SOG/DNCG burning in boiler.

TABLE C-6
ANNUAL EMISSIONS USED IN SIGNIFICANT IMPACT ANALYSIS, GP PALATKA COMBINED PROJECTS
(REVISED 6-29-06)

Source Description	Annual Emissions											
	SO_2		NO_x		CO		PM_{10}		TRS		SAM	
	TPY	g/s	TPY	g/s	TPY	g/s	TPY	g/s	TPY	g/s	TPY	g/s
Future Potential Emissions												
No. 4 Combination Boiler Project												
No. 4 Combination Boiler - 2.35% S [c]	1,023.7	29.45	496.5	14.28	1,010.5	29.07	59.8	1.72	--	--	45.0	1.29
Other Affected Sources												
No. 4 Lime Kiln	40.0	1.15	297.4	8.56	71.5	2.06	128.0	3.68	25.1	0.72	1.8	0.05
Bark Handling System (March 2005)	--	--	--	--	--	--	13.9	0.40	--	--	--	--
No. 4 Recovery Boiler @ 12 ppmvd SO_2 annual	153.9	4.43	738.1	21.23	2,245.6	64.60	248.3	7.14	34.2	0.98	15.9	0.46
No. 4 Smelt Dissolving Tank	33.7	0.97	69.6	2.00	11.4	0.33	49.7	1.43	14.9	0.43	--	--
Black Liquor/Green Liquor Tanks	--	--	--	--	--	--	--	--	3.7	0.11	--	--
Caustic Area	--	--	--	--	--	--	2.6	0.075	5.8	0.17	--	--
Total- Future Potential	**1,251.3**	36.00	**1,601.6**	46.07	**3,339.0**	96.05	**502.3**	14.45	**83.8**	2.41	**62.7**	1.80
Past Actual Emissions[b]												
No. 4 Combination Boiler[c]	820.4	23.60	413.2	11.89	780.3	22.45	71.9	2.07	--	--	36.1	1.04
No. 4 Lime Kiln	0.04	0.001	101.4	2.92	6.8	0.20	50.4	1.45	2.6	0.075	0.0018	0.0001
Bark Handling System	--	--	--	--	--	--	10.6	0.30	--	--	--	--
No. 4 Recovery Boiler	14.7	0.42	473.2	13.61	1,249.3	35.94	101.0	2.91	11.3	0.33	1.5	0.043
No. 4 Smelt Dissolving Tank	27.7	0.80	57.1	1.64	9.4	0.27	31.4	0.90	5.1	0.15	--	--
Black Liquor/Green Liquor Tanks	--	--	--	--	--	--	--	--	3.0	0.09	--	--
Caustic Area	--	--	--	--	--	--	1.7	0.049	4.0	0.11	--	--
Total- Past Actual	**862.8**	24.82	**1,044.9**	30.06	**2,045.8**	58.85	**267.0**	7.68	**26.0**	0.75	**37.6**	1.08
CONTEMPORANEOUS EMISSION CHANGES												
MACT I Compliance Project (9/00) (Permit nos. 1070005-007-AC and -017-AC) - startup 2002												
--Increase Due to New Thermal Oxidizer	109.7	3.16	[b]	[b]	8.8	0.25	30.7	0.88	0.89	0.03	7.7	0.22
--Increase Due to Modified No. 4 Comb. Boiler	548.7	15.78	[b]	[b]	--	--	--	--	0.47	0.01	21.9	0.63
--Increase Due to BSW System w/Condensate Treatment	--	--	--	--	--	--	--	--	58.7	1.69	--	--
--Decrease Due to Existing Thermal Oxidizer	-749.8	-21.57	[b]	[b]	-0.30	-0.0086	-20.6	-0.59	-0.30	-0.0086	-26.9	-0.77
--Decrease Due to Existing BSW System w/o Condensate Treatment	--	--	--	--	--	--	--	--	-62.9	-1.81	--	--
New Package Boiler (9/02) (Permit No. 1070005-018-AC) - startup Oct. 2002											--	
--Increase Due to New Package Boiler (EU 044)	0.1	0.0029	39.4	1.13	16.5	0.47	1.5	0.043	--	--	--	--
--Decrease from old No. 6 Package Boiler	-0.07	-0.0020	-9.2	-0.26	-2.1	-0.060	-0.15	-0.0043	--	--	--	--
Brown Stock Washer and Oxygen Delignification System (7/04) (Permit No. 1070005-024-AC) - not yet started												
--Increase Due to No. 5 Power Boiler	[b]	[b]	--	--	0.3	0.0086	--	--	17.1	0.49	9.5	0.27
--Increase Due to Pulp Storage Tanks	--	--	--	--	--	--	--	--	9.6	0.28	--	--
--Decrease from existing BSW System, BL Filter, etc.	--	--	--	--	--	--	--	--	-77.1	-2.22	--	--
No. 4 Power Boiler Shutdown (Sep. 2003)	-270.6	-7.78	-33.65	-0.97	-3.60	-0.10	-15.74	-0.45	--	--	-11.91	-0.34
Total Contemporaneous Emission Changes	**-362.0**	-10.41	**-3.5**	-0.10	19.6	0.56	**-4.3**	-0.12	**-53.5**	-1.54	0.3	0.0083

[a] Modeled in previous PSD permitting.

[b] Modeled in previous PCP permit issued for Palatka Mill.

TABLE C-7
SOURCE LOCATIONS AND SOURCE PARAMETER DATA USED FOR THE SIGNIFICANT IMPACT ANALYSIS - GP PALATKA MILL

				Stack Parameters							
		UTM NAD27		Physical				Operating			
Source	**Model**	**East**	**North**	**Height**		**Diameter**		**Temperature**		**Velocity**	
Description	**ID**	**(m)**	**(m)**	**(ft)**	**(m)**	**(ft)**	**(m)**	**(°F)**	**(K)**	**(fps)**	**(m/s)**
No. 4 Lime Kiln	LK4	434106.73	3283246.93	131	39.9	4.4	1.35	164	346.5	70.6	21.51
No. 4 Combination Boiler	CB4	433982.43	3283450.46	237	72.2	8	2.44	466	514	92.3	28.14
No. 4 Recovery Boiler	RB4	433882.28	3283437.93	230	70.1	12	3.66	425	491	65.9	20.08
No. 4 Smelt Dissolving Tanks	SDT4	433934.67	3283477.55	206	62.8	5	1.52	180	355	34.0	10.35
New Themal Oxidizer	TOX	433981.56	3283380.12	250	76.2	3.6	1.10	160	344.3	13.4	4.09
Old TRS Incinerator	TRSB	434083.59	3283347.55	250	76.2	3.1	0.94	533	551.5	105.1	32.03
No. 7 Package Boiler	PB7	433986.18	3283465.92	60	18.3	7.0	2.13	750	672.0	43.5	13.25
No. 6 Package Boiler	PB6B	433992.76	3283466.42	60	18.3	6.0	1.83	660	622.0	57.2	17.43
No. 4 Power Boiler	PB4B	433998.01	3283481.49	200	61.0	4	1.22	395	475	71.6	21.83

		UTM NAD27		Area Source Parameters			
Source	Model	East	North	Release Height		Initial Sigma-z	
Description	ID	(m)	(m)	(ft)	(m)	(ft)	(m)
Bark Pile Fugitives	BARKF	433967.81	3283305.26	30	9.1	14.0	4.25

		UTM NAD27		Volume Source Parameters							
Source	Model	East	North	Release Height		Length of Side		Initial Sigma-y		Initial Sigma-z	
Description	ID	(m)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)
Caustic Area	CAUSTIC	434059.87	3283312.76	20	6.1	16.4	5.00	3.8	1.16	4.7	1.42

TABLE C-8
STATE AND NATIONAL AMBIENT AIR QUALITY STANDARDS FOR MODELED POLLUTANTS

Pollutant	**Averaging Time**	**NAAQS/AAQS ($\mu g/m^3$)**	**Form of Standard**
PM_{10}	24-hour	150	Highest, 6th-highest in 5 years
	Annual	50	Annual Mean
NO_2	Annual	100	Annual Mean

TABLE C-9
SUMMARY OF MAXIMUM POTENTIAL EMISSIONS FOR PM$_{10}$ - GP PALATKA MILL

			Emission Rates	
Emission Pt ID	**Model ID**	**Source Description**	**(lb/hr)**	**(g/s)**
015	PB5	# 5 Power Boiler	56.89	7.17
016	CB4	# 4 Combination Boiler	16.70	2.10
018	RB4	# 4 Recovery Boiler	56.7	7.14
019	SDT4	# 4 Smelt Dissolving Tanks	11.3	1.42
044	PB7	# 7 Package Boiler	1.90	0.24
017	LK4	# 4 Lime Kiln	29.2	3.68
037	TOX	Thermal Oxidizer	7.00	0.88
	CAUSTIC	Caustic Area	0.60	0.08
039	BCYCL	Bark Handling Cyclone	3.2	0.40
039	BARKF	Chip Mill Fugitives	1.2	0.15
No. 5 Tissue Machine Sources				
043	TM5_3	[3] Stock Prep Area Exhaust Fan (FM1)	0.30	0.037
043	TM5_4	[4] Roof Exhaust Fan 776	0.30	0.037
043	TM5_9	[9] Former Area Exhaust Fan 2042	0.30	0.037
043	TM5_5	[5] AirCap Roof Exhaust Fan 2041(FM2)	0.08	0.010
043	TM5_10	[10] Roof Exhaust Fan 902	0.24	0.030
043	TM5_11	[11] Fan 778	0.35	0.045
043	TM5_12	[12] Roof Exhaust Fan 905	0.24	0.030
043	TM5_16	[16] Burner Area Exhaust Fan	0.35	0.045
043	TM5_7	[7] Winder Area Roof Exhaust Fan 2039	0.88	0.111
043	TM5_6	[6] Reel Roof Exhaust Fan 2040 (WND)	0.88	0.111
043	TM5_15	[15] Existing Wet & Dry Yankee Hood (YKD)-burner	1.20	0.151
043	TM5_14	[14] Afterdryer Hood Exhaust (MND)	0.33	0.042
045	CONV1	Converting Operations	0.5667	0.0714
045	CONV2	Converting Operations	0.5667	0.0714
045	CONV3	Converting Operations	0.5667	0.0714
045	TRIM1	Converting Operations	3.6	0.4536
045	TRIM2	Converting Operations	3.6	0.4536
045	TRIM3	Converting Operations	3.8	0.4788
	TM4	No. 4 Tissue Machine Combined Source	0.55	0.0693
	TM3	No. 3 Tissue Machine Combined Source	0.55	0.0693
Roads				
	GATE1***	Traffic Through Gate 1 (1.31 lb/day - 64 sources)	0.05458	0.00688
	GATE2***	Traffic Through Gate 2 (2.83 lb/day - 29 sources)	0.11792	0.01486
	GATE3***	Traffic Through Gate 3 (0.55 lb/day - 41 sources)	0.02292	0.00289
	GATE4***	Traffic Through Gate 4 (23.56 lb/day - 102 sources)	0.98167	0.12369
	GATE5***	Traffic Through Gate 5 (0.55 lb/day - 51 sources)	0.02292	0.00289
Total All Sources:			205.14	25.85

TABLE C-10
SUMMARY OF MAXIMUM POTENTIAL EMISSIONS FOR NOx - GP PALATKA MILL

Emission Pt ID	Model ID	Source Description	Emission Rates	
			(TPY)	(g/s)
015	PB5	# 5 Power Boiler	781.00	22.47
016	CB4	# 4 Combination Boiler	496.50	14.28
018	RB4	# 4 Recovery Boiler	738.1	21.23
019	SDT4	# 4 Smelt Dissolving Tanks	69.6	2.00
044	PB7	# 7 Package Boiler	39.40	1.13
017	LK4	# 4 Lime Kiln	297.4	8.56
043	TM5_15	[15] Existing Wet & Dry Yankee Hood (YKD)-burner	23.65	0.68
	TM4	No. 4 Tissue Machine Combined Source	10.80	0.31
	TM3	No. 3 Tissue Machine Combined Source	10.80	0.31
037	TOX	Thermal Oxidizer	151.36	4.35
Total All Sources:			2,619	75.33

TABLE C-11
LOCATIONS AND STACK PARAMETERS FOR POINT SOURCES FOR NAAQS IMPACT ANALYSIS - GP PALATKA MILL

		Stack Parameters									
		Source Location UTM		Stack Height		Stack Exit Temp		Stack Velocity		Stack Diameter	
Model ID	Description	East (m)	North (m)	(ft)	(m)	F	K	(fps)	(m/s)	(ft)	(m)
PB5	# 5 Power Boiler	433977.26	3283447.19	237	72.2	413	485	85.9	26.19	8	2.44
CB4	# 4 Combination Boiler	433982.43	3283450.46	237	72.2	466	514	92.3	28.14	8	2.44
RB4	# 4 Recovery Boiler	433882.28	3283437.93	230	70.1	425	491	65.9	20.08	12	3.66
SDT4	# 4 Smelt Dissolving Tanks	433934.67	3283477.55	206	62.8	180	355	34.0	10.35	5	1.52
PB7	# 7 Package Boiler	433986.18	3283465.92	60	18.3	750	672	43.5	13.25	7	2.13
LK4	# 4 Lime Kiln	434106.73	3283246.93	131	39.9	164	346.5	70.6	21.51	4.42	1.35
TOX	Thermal Oxidizer	433981.56	3283380.12	250	76.2	160	344	18.0	5.49	3.6	1.10
BCYCL	Bark Handling Cyclone	433966.62	3283485.19	117.6	35.85	77	298	23.6	7.20	3	0.91
TM5_3	TM-5 Stock Prep Area Exhaust Fan (FM1)	434234.62	3283507.73	94	28.65	115	319	39.2	11.94	5.7	1.74
TM5_4	TM-5 Roof Exhaust Fan 776	434245.04	3283495.24	94	28.65	115	319	39.2	11.94	5.7	1.74
TM5_9	TM-5 Former Area Exhaust Fan 2042	434245.04	3283486.71	94	28.65	120	322	39.2	11.94	5.7	1.74
TM5_5	TM-5 AirCap Roof Exhaust Fan 2041(FM2)	434256.99	3283477.82	94	28.65	115	319	39.2	11.94	5.7	1.74
TM5_10	TM-5 Roof Exhaust Fan 902	434255.09	3283473.87	94	28.65	115	319	38.4	11.71	4.7	1.43
TM5_11	TM-5 Fan 778	434258.43	3283468.66	94	28.65	115	319	39.2	11.94	5.7	1.74
TM5_12	TM-5 Roof Exhaust Fan 905	434261.04	3283465.13	94	28.65	115	319	38.4	11.71	4.7	1.43
TM5_16	TM-5 Burner Area Exhaust Fan	434251.74	3283469.22	84	25.60	115	319	39.2	11.94	5.7	1.74
TM5_7	TM-5 Winder Area Roof Exhaust Fan 2039	434280.95	3283445.22	94	28.65	115	319	38.4	11.71	4.7	1.43
TM5_6	TM-5 Reel Roof Exhaust Fan 2040 (WND)	434270.53	3283459.73	94	28.65	115	319	47.1	14.35	5.2	1.58
TM5_15	TM-5 Existing Wet & Dry Yankee Hood (YKD)-burne	434264.95	3283462.34	94	28.65	450	505	64.5	19.66	5	1.52
TM5_14	TM-5 Afterdryer Hood Exhaust (MND)	434266.06	3283458.25	94	28.65	180	355	56.7	17.29	3.8	1.16
CONV1	Converting Operations	434383.27	3283544.38	55.3	16.86	90	305	147.2	44.87	3.1	0.94
CONV2	Converting Operations	434389.22	3283548.48	55.3	16.86	90	305	147.2	44.87	3.1	0.94
CONV3	Converting Operations	434395.36	3283552.94	55.3	16.86	90	305	147.2	44.87	3.1	0.94
TRIM1	Converting Operations	434286.17	3283423.52	67	20.42	90	305	81.2	24.75	2.8	0.85
TRIM2	Converting Operations	434288.13	3283427.44	67	20.42	90	305	81.2	24.75	2.8	0.85
TRIM3	Converting Operations	434282.89	3283423.52	70.3	21.43	90	305	85.72	26.13	2.8	0.85
TM4	No. 4 Tissue Machine Combined Source	434302.09	3283502.61	94	28.65	450	505	64.5	19.66	5	1.52
TM3	No. 3 Tissue Machine Combined Source	434220.66	3283432.68	94	28.65	450	505	64.5	19.66	5	1.52

TABLE C-12
SUMMARY OF MODEL PARAMETERS FOR FUGITIVE SOURCES - GP PALATKA MILL

Model ID	**Source Description**	**Source Location UTM (m)**		**Release Ht (m)**	**Computed Initial Dispersion Coefficients (a)**	
		East	**North**		**Horizontal**	**Vertical**
BARKF[a]	Chip Mill Fugitives	433967.81	3283305.26	9.14	NA	4.25
CAUSTIC[b]	Caustic Area	434059.87	3283312.76	6.1	1.163	1.42
GATE#xxx[c]	All Paved Roads	Varies	Varies	2.29	varies	2.13

[a] Areapoly Source

[b] Volume Source

[c] Line Source Represented by Separated Volume Sources

TABLE C-13
NORTH CAROLINA TECHNIQUE SCREENING ANALYSIS FOR COMPETING SOURCES OF PARTICULATE MATTER

AIRS Number	Owner	Facility	Distance to GP (km)	Threshold (tpy)	Include in PM$_{10}$ NAAQS?	
					Emissions (tpy)	Emission > Threshold?
1070022	Florida Rock Industries, Inc. Putnam	Florida Rock -Comfort Rd	2.3	30.5	0.88	YES[a]
1070030	Georgia-Pacific Corporation	Georgia-Pacific Corp. Palatka Chipnsaw	2.7	37.8	64.3	YES
1070031	Cdr Systems Corporation	Cdr Systems Corporation	2.9	42.8	0.00	NO
1070028	Tarmac Florida, Inc. Palatka	Tarmac Florida, Inc. Palatka	3.0	43.4	0.00	NO
1070043	Price Brothers Company	Palatka Plant	4.0	64.0	39.90	NO
1070025	Seminole Electric Cooperative, Inc.	Seminole Power Plant	7.5	134.6	1330.00	YES
1070039	Lafarge North America, Inc.	Lafarge North America, Inc.	7.7	138.4	221.65	YES
1070014	Florida Power & Light (Ppn)	Putnam Power Plant	10.9	201.1	40.56	NO
1070029	Southern Crematory, Inc.	Watts Funeral Home	12.9	242.8	0.70	NO
0190007	Iluka Resources Inc.	Green Cove Springs	20.9	401.2	209.24	NO
1070038	Johnson-Overturf Funeral Home, Inc.	Johnson-Overturf Funeral Homes Inc	21.6	415.3	1.30	NO
1070041	Masters Funeral Home, P.A.	Palatka Facility	21.7	417.9	1.43	NO
1070007	Florida Rock Industries, Inc. Keuka Plt	Florida Rock Industries, Inc. Keuka Plt	24.5	473.9	21.46	NO
1070001	Feldspar Corp/Edgar Plastic Kaolin Div	Feldspar Corp/Edgar Plastic Kaolin Div	27.7	538.9	38.96	NO
0190027	Florida Rock Industries, Inc. Clay	Florida Rock Industries, Inc. Clay	31.7	618.2	0.00	NO
7775007	Hanson Pipe & Products, Inc.	Hanson Pipe & Products, Inc.	32.2	628.1	0.00	NO
0190031	Vac-Con	Vac-Con	32.7	638.3	0.01	NO
1070040	Delray Stake And Shavings, Inc.	Crescent City Mill	32.8	639.2	53.29	NO
0190068	Mobro Marine, Inc	Green Cove Springs	33.3	650.5	49.90	NO
0190019	Tamko Roofing Products, Inc.	Tamko Roofing Products, Inc.	33.4	652.4	63.06	NO
0190069	Redd Team Manufacturing, Inc.	Keystone Heights	33.4	652.9	24.00	NO
0190056	New Ngc, Inc.	Unifix Usa - National Gypsum Co. - Clay	33.5	654.1	0.02	NO
1090450	Tarmac America, Llc	St. Augustine Ii	33.6	655.1	0.00	NO
0190021	Pyramid Mouldings	Pyramid Mouldings	34.3	670.1	8.92	NO
0190070	Coastal Marine, Inc.	Coastal Marine Inc	34.4	672.2	7.80	NO
1090446	Hicks Trucking & Land Clearing	Hicks Trucking & Land Clearing	34.5	674.5	16.38	NO
7770007	Anderson Columbia, Inc. #9	#9 Ashpalt Plant	34.6	676.3	10.11	NO
1070015	Georgia-Pacific Corp. Plywood Plant	Georgia-Pacific Corp. Plywood Plant	35.7	698.3	232.45	NO
7775083	Pave-Tec, Inc.	Pave-Tec, Inc.	36.7	718.3	7.50	NO
1090037	V.J. Usina Contracting, Inc.	V.J.Usina Contracting, Inc.	37.8	739.6	41.60	NO
1090036	Lakeview Dirt Company, Inc.	Lakeview Dirt Company, Inc.	38.9	761.7	0.00	NO
1090019	Tarmac America, Inc. St. Augustine	Tarmac America, Inc. St. Augustine	38.9	762.4	0.00	NO
1090035	Masters Land Clearing, Inc.	Masters Land Clearing, Inc.	39.0	764.0	0.00	NO
1090444	St. Augustine Memorial Park & Crematory	St. Augustine Memorial Park & Crematory	39.2	767.3	0.75	NO
1090447	Halna, Inc.	Hydro Aluminum Of North America - St. Au	39.4	771.0	19.11	NO
1090018	Florida Rock Industries, Inc. St. Johns	Florida Rock Industries, Inc. St. Johns	39.9	782.0	29.65	NO
7775056	Apac-Southeast, Inc. - First Coast Div.	Apac-Southeast, Inc. -Plant No. 4	40.2	788.9	48.97	NO
0190032	Florida Army National Guard - Camp Blndg	Florida Army National Guard - Camp Blndg	40.7	798.5	7.49	NO
1090011	W.J. Development Corporation	St. Augustine Marine	41.8	819.6	0.00	NO
0190011	E.I. Dupont De Nemours & Co - Trailridge	E.I. Dupont De Nemours & Co - Trailridge	42.1	826.5	153.52	NO
1090015	Florida School For The Deaf & The Blind	Florida School For The Deaf & The Blind	43.7	858.9	3.17	NO
7775261	Florida Rock Industries, Inc.	Portable Redi-Mix	43.8	859.1	0.00	NO
0350002	Tarmac America, Inc. Bunnell	Tarmac America, Inc. Bunnell	44.4	871.0	0.00	NO
0830070	Florida Gas Transmission Company	Fgtc Station 17, Marion County	45.1	886.7	5.62	NO
7770037	Apac-Southeast, Inc. - First Coast Div.	Apac-Southeast Inc., First Coast Div.	45.3	889.3	24.25	NO
0190059	W.W.Carter Contracting	W.W.Carter Contractmasters Road Property	45.7	898.4	4.80	NO
0350004	Rinker Materials Corporation - Bunnell	Rinker Materials Corporation - Bunnell	45.8	900.1	0.00	NO
1090040	Rinker Materials Corporation	Rinker Materials #1 Plant	46.1	906.2	0.00	NO
7775001	American Concrete Products L.C.	American Concrete Products L.C.	47.1	926.1	2.12	NO
0070016	Owen Joist Corporation	Smi Joist Of Florida	49.8	979.0	1.46	NO
0070011	Florida Rock Industries, Inc. Bradford	Florida Rock Industries, Inc. Bradford	50.5	994.9	109.85	NO
0070004	Griffin Industries Of Florida	Griffin Industries Of Florida	50.7	998.8	116.43	NO
0190026	Tarmac Florida, Inc. Orange Park	Tarmac Florida, Inc. Orange Park	50.9	1002.2	0.00	NO
0830094	Bedrock Resources	Bedrock Resources/Citra Mine	51.3	1009.3	2.50	NO
0310225	Southern Culvert Division/Wheeler Cnsl.	Southern Culvert Division/Wheeler Cnsl.	53.0	1043.6	0.01	NO
7775240	Apac-Southeast, Inc. First Coast Divisi	Gainesville Asphalt Plant	53.5	1053.6	3.94	NO
0070001	E.I. Dupont De Nemours & Co Inc Highland	E.I. Dupont De Nemours & Co Inc Highland	54.6	1075.2	145.42	NO
0310462	First Coast Technology & Repair	First Coast Technology & Repair	54.6	1076.0	0.00	NO
7775041	Apac- Southeast, Inc.	Apac-Southeast, Inc.	55.0	1084.5	60.80	NO
1270096	Falcon Industries, Inc.	Falcon Industries, Inc.	55.0	1084.8	0.41	NO
0310208	Standard Precast, Inc.	Standard Precast, Inc.	55.4	1092.7	0.07	NO
0310250	Tarmac America, Inc.	Tarmac America, Inc.	55.5	1093.4	0.37	NO
0830045	Standard Sand & Silica Co	Standard Sand & Silica Co	56.3	1109.7	47.70	NO
0830062	Tru Balance Wheel Weights, Inc.	Tru Balance Wheel Weights, Inc.	56.3	1109.9	0.00	NO
0310277	Rinker Materials Corp.	Rinker Materials Corp.	57.1	1125.0	20.10	NO
0310043	Duval Asphalt Products	Phillips Highway Plant	57.1	1126.6	8.12	NO

TABLE C-13
NORTH CAROLINA TECHNIQUE SCREENING ANALYSIS FOR COMPETING SOURCES OF PARTICULATE MATTER

					Include in PM$_{10}$ NAAQS?	
AIRS Number	Owner	Facility	Distance to GP (km)	Threshold (tpy)	Emissions (tpy)	Emission > Threshold?
0310223	Cemex, Inc.	Cemex, Inc.(Florida Mining Blvd.)	57.6	1135.6	0.91	NO
0310293	Jaxson Brown, Inc.	Sunbeam Road Landfill	58.3	1150.7	0.00	NO
0310026	Atlantic Coast Asphalt, Inc.	Shad Asphalt Plant	58.4	1151.4	23.84	NO
0310171	Florida Rock Industries, Inc.	Capitol Concrete Plant # 3	58.7	1157.5	2.33	NO
0830051	Seilers Concrete	Seilers Concrete	59.0	1163.7	0.05	NO
0310341	Chancey Metal Products, Inc.	Chancey Metal Products, Inc.	59.0	1164.8	0.93	NO
0310215	United States Navy	Nas-Jacksonville	59.4	1172.0	104.01	NO
0010117	Garden Of Love Pet Memorial Park	Micanopy Facility	59.5	1174.8	1.14	NO
7775181	Anderson Materials Company Inc.	Concrete Plant No. 7	60.2	1188.0	15.00	NO
0190005	Gilman Building Products Co.	Gilman Building Products Co.	62.3	1230.3	13.72	NO
0830017	Mfm Industries Inc	Lowell Processing Plant	62.5	1233.3	87.60	NO
0830016	Franklin Industrial Minerals	Franklin Industrial/Lowell	63.0	1243.7	323.40	NO
1250007	Pride Enterprises	Pride - Union Metal	65.4	1292.0	0.00	NO
0830091	Dixie Lime & Stone	Cummer Limestone Mine	65.6	1295.3	10.50	NO
0830145	United States Plastic Lumber	Uspl	65.9	1302.2	0.00	NO
0830069	Delta Laboratories	Delta Laboratories/Ocala	66.8	1320.0	5.70	NO
0830059	Steven Counts, Inc. Fka Harlis Ellington	Steven Counts, Inc. Plant #1	67.0	1323.9	6.05	NO
0830064	Gmp Industries Inc	Aaa Ready Mix	67.0	1324.7	0.14	NO
0310503	Trend Offset Printing Services, Inc.	Trend Offset Printing Services, Inc.	67.5	1334.2	0.18	NO
0830093	Southeastern Mfg	Semco	67.7	1339.0	0.00	NO
0830134	Mickey Body Company	Mickey Body Company/Ocala	68.0	1344.7	0.42	NO
0830039	The Brewer Company	The Brewer Company	68.1	1345.3	147.70	NO
1270161	Prestige Gunite Inc	Prestige Gunite Of Ormond Beach	68.4	1351.2	0.00	NO
1270165	Set Materials Inc	Set Materials Inc	68.4	1351.6	0.88	NO
7770088	Steven Counts, Inc.	Clifton Mine	68.4	1352.2	12.80	NO
0830135	Anderson Columbia Company	Anderson Columbia Co Plant # 8	68.5	1353.8	8.09	NO
1270031	Halifax Paving, Inc.	Halifax Paving/Ormond Beach	68.5	1355.0	74.24	NO
1250008	New River Solid Waste Association	New River Regional Landfill	68.6	1356.1	4.60	NO
0830140	Ocala Lumber Sales Company	Ocala Lumber Sales	69.0	1364.9	0.00	NO
1270102	Florida Production Engineering, Inc.	Florida Production Engineering, Inc.	69.3	1370.2	2.60	NO
0830056	Hiers Funeral Home	Hiers Funeral Home/Ocala	69.7	1378.6	0.00	NO
0830131	Branch Properties Inc	Seminole Stores	69.8	1380.9	19.50	NO
1270090	Imperial Foam & Insulation Mfg. Co.	Imperial Foam & Insulation Mfg	69.9	1382.0	0.00	NO
0830010	Royal Oak Enterprises	Royal Oak Enterprises	70.0	1383.6	101.88	NO
0830007	Dayco Products Inc	Mark Iv Dayco	70.2	1388.0	105.06	NO
0830155	Florida Cremation Society	Florida Cremation Society	70.2	1388.2	2.00	NO
0830001	Counts Construction Company, Inc.	Counts Construction Company, Inc.	70.8	1400.7	0.36	NO
0830026	Cemex, Inc. Fka Southdown	Southdown/Ocala Plant	70.9	1402.2	4.47	NO
0830101	Skyline Corportation	Skyline/Hornette # 535	71.0	1404.9	0.34	NO
0830004	Stewart Enterprises Inc	Roberts Funeral Home	71.1	1405.8	2.00	NO
0830103	Lippert Components Inc	Lippert Components	71.5	1414.9	0.00	NO
0830128	Damar Manufacturing Inc	Damar Manufacturing	71.8	1419.2	1.00	NO
0830102	Skyline Corporation	Skyline/Cameron Homes # 538	71.9	1421.3	13.60	NO
0830100	Skyline Corporation	Skyline/Oak Springs # 531	71.9	1422.4	18.90	NO
0830027	Rinker Materials Corp	Rinker/Ocala	72.1	1426.1	2.29	NO
0830052	Closetmaid Fka Clairson Intl	Closetmaid	72.5	1433.8	21.15	NO
0830043	Golden Flake Snack Foods	Golden Flake Snack Foods	72.7	1437.8	25.72	NO
0830137	Merillat Corp	Merillat/Ocala	73.7	1457.8	1.20	NO
0830132	Florida Rock Industries	Florida Rock/Ocala	74.1	1466.7	0.00	NO
1270016	Rinker Materials Corp	Rinker/Ormond Beach	74.5	1473.2	88.08	NO
0830066	Emergency One, Inc.	Emergency One, Inc. - Body Plant	74.6	1476.5	0.00	NO
0830084	Flair Manufacturing	Flair Manufacturing	76.5	1514.2	0.10	NO
1270074	Crane Cams Inc	Crane Cams	77.7	1537.8	0.00	NO
0830082	Emergency One, Inc.	Emergency One, Inc. - Svo Facility	78.1	1545.1	0.00	NO
0830068	Evans Septic Tank & Ready Mix, Inc.	Evans Septic Tank & Ready Mix	79.0	1564.6	0.00	NO

Notes:

[a] Included in analysis because of proximity to Project

GP Palatka Paper Mill is located at UTM zone 17 coordinates (km):	East	434.0
	North	3283.4

Significant Impact Distance = 0.8 km

TABLE C-14
PM$_{10}$ NAAQS ANALYSIS MODELING PARAMETERS FOR COMPETING SOURCES

Facility Description	Model ID	PM$_{10}$ Emission	Release Height		Stack Diameter		Exit Temperature		Exit Velocity		Volume Source Dimensions (m)	
Stack Description	**ID Name**	**Rate (g/s)**	**(ft)**	**(m)**	**(ft)**	**(m)**	**(F)**	**(K)**	**(fps)**	**(m/s)**	**Sig y**	**Sig z**
1070022 Florida Rock -Comfort Rd												
Concrete Batch Plant (Ready Mix) W/Baghouse	FLROCK	0.025[a]	13	3.96	2	0.55	77	298.2	63	19.20	--	--
1070030 Georgia-Pacific Corp. Palatka Chipnsaw												
Planer Mill Cyclone	CNS04	0.750	80	24.38	7	2.04	68	293.2	18	5.49	--	--
Planer Mill Trim Hog Cyclone	CNS05	0.112	30	9.14	3	0.82	68	293.2	43	13.11	--	--
Chip Bin Cyclone	CNS08	0.066	63	19.2	1	0.40	68	293.2	101	30.66	--	--
Fuel Silo Cyclone	CNS03	0.517	80	24.38	2	0.67	80	299.8	12	3.66	--	--
Kiln 2 Source Vent 1	KILN2_1	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 2 Source Vent 2	KILN2_2	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 2 Source Vent 3	KILN2_3	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 2 Source Vent 4	KILN2_4	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 2 Source Vent 5	KILN2_5	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 2 Souree Vent 6	KILN2_6	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 1 Source Vent 1	KILN1_1	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 1 Source Vent 2	KILN1_2	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 1 Source Vent 3	KILN1_3	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 1 Source Vent 4	KILN1_4	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 1 Source Vent 5	KILN1_5	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Kiln 1 Source Vent 6	KILN1_6	0.0105	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
Cutoff Saws	F0103	0.0016	10	3.05	--	--	--	--	--	--	1.585	1.418
Debarker	F02	0.26	10	3.05	--	--	--	--	--	--	1.418	1.418
Mulch Hog + screen	F0405	2.0E-04	15	4.57	--	--	--	--	--	--	1.418	2.127
Mulch & Fuel Bin	F06	3.4E-05	14	4.27	--	--	--	--	--	--	1.736	1.985
Screen	F14	3.2E-03	8	2.44	--	--	--	--	--	--	1.228	1.134
Drum Screen	F15	3.2E-03	20	6.10	--	--	--	--	--	--	0.709	2.835
Chip Bin+Truck Spreader Loading	F1617	3.0E-03	14	4.27	--	--	--	--	--	--	1.736	1.985
Planer Shavings Bin	F22	1.8E-03	14	4.27	--	--	--	--	--	--	1.736	1.985
	F24	4.0E-04	14	4.27	--	--	--	--	--	--	1.736	1.985
1070025 Seminole Electic - Seminole Power Plant												
Steam Electric Generators No. 1 and 2	SEMELECT	54.220	675	205.74	36	10.97	128	326.5	26	7.92	--	--
Steam Electric Generator No. 3	SECIUN3	14.200	675	205.74	26	7.93	126	325.4	62	18.80	--	--
1070039 Lafarge North America, Inc.												
FGD Surge Bin (55-ton Bin)		0.007	50	15.24	1	0.15	68	293.2	42	12.92	--	--
Imp Mill Feed Silo A		0.007	60	18.29	1	0.15	130	327.6	42	12.92	--	--
Stucco Silo A		0.010	--	--		--	--	--	--	--	--	--
STARCH SILO		0.020	52	15.85	1	0.15	68	293.2	53	16.03	--	--
Norba Grinder and Hammermill System		0.065	50	15.24	1	0.30	68	293.2	64	19.42	--	--
Wallboard Dryer (4 Natural Gas Burners)		0.001	46	14.02	7	2.19	165	347.0	71	21.49	--	--
Ball Mills		0.024	--	--	--	--	--	--	--	--	--	--
Landplaster Bin		0.518	--	--	--	--	--	--	--	--	--	--
Additives System and Pin Mixer		0.259	--	--	--	--	--	--	--	--	--	--
IMP Mill Feed Silo B		0.007	--	--	--	--	--	--	--	--	--	--
Stucco Silo B		0.007	--	--	--	--	120	322.0	--	--	--	--
Cage Mill Flash Dryer System		1.404	--	--	--	--	--	--	--	--	--	--
Composite Stack 1	LNA1	2.327	50	15.24	1	0.15	68	293.2	42	12.92	--	--
Cage mill dryer system		1.404	130	39.62	5	1.55	190	360.9	54	16.43	--	--
Imp Mill Flash Calciner System A		0.281	130	39.62	4	1.22	325	435.9	23	7.10	--	--
Air Cooling System A		1.037	130	39.62	4	1.22	150	338.7	42	12.92	--	--
Imp Mill Flash Calciner System B		0.281	130	39.62	4	1.10	320	433.2	--	--	--	--
Air Cooling System B		1.037	130	39.62	4	1.22	155	341.5	--	--	--	--
Composite Stack 2	LNA2	4.039	130	39.62	4	1.22	325	435.9	23	7.10	--	--

[a] Maximum Potential Emissions

TABLE C-15
NORTH CAROLINA TECHNIQUE SCREENING ANALYSIS FOR COMPETING COURSES OF NO_x.

AIRS Number	Owner	Facility	Distance to GP (km)	Threshold (tpy)	Include in NO_x NAAQS? Emissions (tpy)	Emission > Threshold?
1070022	Florida Rock Industries, Inc. Putnam	Florida Rock -Comfort Rd	2.3	14.5	0	NO
1070030	Georgia-Pacific Corporation	Georgia-Pacific Corp. Palatka Chipnsaw	2.6	19.3	17	YES^a
1070031	Cdr Systems Corporation	Cdr Systems Corporation	2.9	26.8	0	NO
1070028	Tarmac Florida, Inc. Palatka	Tarmac Florida, Inc. Palatka	3.0	27.4	0	NO
1070043	Price Brothers Company	Palatka Plant	4.0	48.0	0	NO
1070025	Seminole Electric Cooperative, Inc.	Seminole Power Plant	7.5	118.6	23292	YES
1070039	Lafarge North America, Inc.	Lafarge North America, Inc.	7.7	122.4	163	YES
1070014	Florida Power & Light (Ppn)	Putnam Power Plant	10.9	185.1	876	YES
1070029	Southern Crematory, Inc.	Watts Funeral Home	12.9	226.8	0	NO
0190007	Iluka Resources Inc.	Green Cove Springs	20.9	385.2	67	NO
1070038	Johnson-Overturf Funeral Home, Inc.	Johnson-Overturf Funeral Homes Inc	21.6	399.3	3	NO
1070041	Masters Funeral Home, P.A.	Palatka Facility	21.7	401.9	0	NO
1070007	Florida Rock Industries, Inc. Keuka Plt	Florida Rock Industries, Inc. Keuka Plt	24.5	457.9	0	NO
1070001	Feldspar Corp/Edgar Plastic Kaolin Div	Feldspar Corp/Edgar Plastic Kaolin Div	27.7	522.9	0	NO
0190027	Florida Rock Industries, Inc. Clay	Florida Rock Industries, Inc. Clay	31.7	602.2	0	NO
7775007	Hanson Pipe & Products, Inc.	Hanson Pipe & Products, Inc.	32.2	612.1	0	NO
0190031	Vac-Con	Vac-Con	32.7	622.3	0	NO
1070040	Delray Stake And Shavings, Inc.	Crescent City Mill	32.8	623.2	0	NO
0190068	Mobro Marine, Inc	Green Cove Springs	33.3	634.5	0	NO
0190019	Tamko Roofing Products, Inc.	Tamko Roofing Products, Inc.	33.4	636.4	0	NO
0190069	Redd Team Manufacturing, Inc.	Keystone Heights	33.4	636.9	0	NO
0190056	New Ngc, Inc.	Unifix Usa - National Gypsum Co. - Clay	33.5	638.1	0	NO
1090450	Tarmac America, Llc	St. Augustine Ii	33.6	639.1	0	NO
0190021	Pyramid Mouldings	Pyramid Mouldings	34.3	654.1	0	NO
0190070	Coastal Marine, Inc.	Coastal Marine Inc	34.4	656.2	0	NO
1090446	Hicks Trucking & Land Clearing	Hicks Trucking & Land Clearing	34.5	658.5	0	NO
7770007	Anderson Columbia, Inc. #9	#9 Ashpalt Plant	34.6	660.3	0	NO
1070015	Georgia-Pacific Corp. Plywood Plant	Georgia-Pacific Corp. Plywood Plant	35.7	682.3	0	NO
7775083	Pave-Tec, Inc.	Pave-Tec, Inc.	36.7	702.3	0	NO
1090037	V.J. Usina Contracting, Inc.	V.J.Usina Contracting, Inc.	37.8	723.6	0	NO
1090036	Lakeview Dirt Company, Inc.	Lakeview Dirt Company, Inc.	38.9	745.7	0	NO
1090019	Tarmac America, Inc. St. Augustine	Tarmac America, Inc. St. Augustine	38.9	746.4	0	NO
1090035	Masters Land Clearing, Inc.	Masters Land Clearing, Inc.	39.0	748.0	0	NO
1090444	St. Augustine Memorial Park & Crematory	St. Augustine Memorial Park & Crematory	39.2	751.3	0	NO
1090447	Halna, Inc.	Hydro Aluminum Of North America - St. Au	39.4	755.0	0	NO
1090018	Florida Rock Industries, Inc. St. Johns	Florida Rock Industries, Inc. St. Johns	39.9	766.0	0	NO
7775056	Apac-Southeast, Inc. - First Coast Div.	Apac-Southeast, Inc. -Plant No. 4	40.2	772.9	61	NO
0190032	Florida Army National Guard - Camp Blndg	Florida Army National Guard - Camp Blndg	40.7	782.5	0	NO
1090011	W.J. Development Corporation	St. Augustine Marine	41.8	803.6	0	NO
0190011	E.I. Dupont De Nemours & Co - Trailridge	E.I. Dupont De Nemours & Co - Trailridge	42.1	810.5	34	NO
1090015	Florida School For The Deaf & The Blind	Florida School For The Deaf & The Blind	43.7	842.9	0	NO
7775261	Florida Rock Industries, Inc.	Portable Redi-Mix	43.8	843.1	0	NO
0350002	Tarmac America, Inc. Bunnell	Tarmac America, Inc. Bunnell	44.4	855.0	0	NO
0830070	Florida Gas Transmission Company	Fgtc Station 17, Marion County	45.1	870.7	900	YES
7770037	Apac-Southeast, Inc. - First Coast Div.	Apac-Southeast Inc., First Coast Div.	45.3	873.3	14	NO
0190059	W.W.Carter Contracting	W.W.Carter Contractmasters Road Property	45.7	882.4	0	NO
0350004	Rinker Materials Corporation - Bunnell	Rinker Materials Corporation - Bunnell	45.8	884.1	0	NO
1090040	Rinker Materials Corporation	Rinker Materials #1 Plant	46.1	890.2	0	NO
7775001	American Concrete Products L.C.	American Concrete Products L.C.	47.1	910.1	0	NO
0070016	Owen Joist Corporation	Smi Joist Of Florida	49.8	963.0	0	NO
0070011	Florida Rock Industries, Inc. Bradford	Florida Rock Industries, Inc. Bradford	50.5	978.9	0	NO
0070004	Griffin Industries Of Florida	Griffin Industries Of Florida	50.7	982.8	48	NO
0190026	Tarmac Florida, Inc. Orange Park	Tarmac Florida, Inc. Orange Park	50.9	986.2	0	NO
0830094	Bedrock Resources	Bedrock Resources/Citra Mine	51.3	993.3	23	NO
0310225	Southern Culvert Division/Wheeler Cnsl.	Southern Culvert Division/Wheeler Cnsl.	53.0	1027.6	0	NO
7775240	Apac-Southeast, Inc. First Coast Divisi	Gainesville Asphalt Plant	53.5	1037.6	9	NO
0070001	E.I. Dupont De Nemours & Co Inc Highland	E.I. Dupont De Nemours & Co Inc Highland	54.6	1059.2	0	NO
0310462	First Coast Technology & Repair	First Coast Technology & Repair	54.6	1060.0	0	NO
7775041	Apac- Southeast, Inc.	Apac-Southeast, Inc.	55.0	1068.5	48	NO
1270096	Falcon Industries, Inc.	Falcon Industries, Inc.	55.0	1068.8	0	NO
0310208	Standard Precast, Inc.	Standard Precast, Inc.	55.4	1076.7	0	NO
0310250	Tarmac America, Inc.	Tarmac America, Inc.	55.5	1077.4	0	NO
0830045	Standard Sand & Silica Co	Standard Sand & Silica Co	56.3	1093.7	87	NO
0830062	Tru Balance Wheel Weights, Inc.	Tru Balance Wheel Weights, Inc.	56.3	1093.9	0	NO
0310277	Rinker Materials Corp.	Rinker Materials Corp.	57.1	1109.0	0	NO
0310043	Duval Asphalt Products	Phillips Highway Plant	57.1	1110.6	18	NO

TABLE C-15
NORTH CAROLINA TECHNIQUE SCREENING ANALYSIS FOR COMPETING COURSES OF NO_x

AIRS Number	Owner	Facility	Distance to GP (km) [a]	Threshold (tpy)	Include in NO_x NAAQS? Emissions (tpy)	Emission > Threshold?
0310223	Cemex, Inc.	Cemex, Inc.(Florida Mining Blvd.)	57.6	1119.6	0	NO
0310293	Jaxson Brown, Inc.	Sunbeam Road Landfill	58.3	1134.7	4	NO
0310026	Atlantic Coast Asphalt, Inc.	Shad Asphalt Plant	58.4	1135.4	45	NO
0310171	Florida Rock Industries, Inc.	Capitol Concrete Plant # 3	58.7	1141.5	0	NO
0830051	Seilers Concrete	Seilers Concrete	59.0	1147.7	0	NO
0310341	Chancey Metal Products, Inc.	Chancey Metal Products, Inc.	59.0	1148.8	0	NO
0310215	United States Navy	Nas-Jacksonville	59.4	1156.0	120	NO
0010117	Garden Of Love Pet Memorial Park	Micanopy Facility	59.5	1158.8	0	NO
7775181	Anderson Materials Company Inc.	Concrete Plant No. 7	60.2	1172.0	0	NO
0190005	Gilman Building Products Co.	Gilman Building Products Co.	62.3	1214.3	6	NO
0830017	Mfm Industries Inc	Lowell Processing Plant	62.5	1217.3	36	NO
0830016	Franklin Industrial Minerals	Franklin Industrial/Lowell	63.0	1227.7	110	NO
1250007	Pride Enterprises	Pride - Union Metal	65.4	1276.0	0	NO
0830091	Dixie Lime & Stone	Cummer Limestone Mine	65.6	1279.3	0	NO
0830145	United States Plastic Lumber	Uspl	65.9	1286.2	0	NO
0830069	Delta Laboratories	Delta Laboratories/Ocala	66.8	1304.0	0	NO
0830059	Steven Counts, Inc. Fka Harlis Ellington	Steven Counts, Inc. Plant #1	67.0	1307.9	4	NO
0830064	Gmp Industries Inc	Aaa Ready Mix	67.0	1308.7	0	NO
0310503	Trend Offset Printing Services, Inc.	Trend Offset Printing Services, Inc.	67.5	1318.2	6	NO
0830093	Southeastern Mfg	Semco	67.7	1323.0	4	NO
0830134	Mickey Body Company	Mickey Body Company/Ocala	68.0	1328.7	4	NO
0830039	The Brewer Company	The Brewer Company	68.1	1329.3	0	NO
1270161	Prestige Gunite Inc	Prestige Gunite Of Ormond Beach	68.4	1335.2	0	NO
1270165	Set Materials Inc	Set Materials Inc	68.4	1335.6	0	NO
7770088	Steven Counts, Inc.	Clifton Mine	68.4	1336.2	17	NO
0830135	Anderson Columbia Company	Anderson Columbia Co Plant # 8	68.5	1337.8	0	NO
1270031	Halifax Paving, Inc.	Halifax Paving/Ormond Beach	68.5	1339.0	78	NO
1250008	New River Solid Waste Association	New River Regional Landfill	68.6	1340.1	11	NO
0830140	Ocala Lumber Sales Company	Ocala Lumber Sales	69.0	1348.9	0	NO
1270102	Florida Production Engineering, Inc.	Florida Production Engineering, Inc.	69.3	1354.2	0	NO
0830056	Hiers Funeral Home	Hiers Funeral Home/Ocala	69.7	1362.6	0	NO
0830131	Branch Properties Inc	Seminole Stores	69.8	1364.9	0	NO
1270090	Imperial Foam & Insulation Mfg. Co.	Imperial Foam & Insulation Mfg	69.9	1366.0	1	NO
0830010	Royal Oak Enterprises	Royal Oak Enterprises	70.0	1367.6	90	NO
0830007	Dayco Products Inc	Mark Iv Dayco	70.2	1372.0	18	NO
0830155	Florida Cremation Society	Florida Cremation Society	70.2	1372.2	3	NO
0830001	Counts Construction Company, Inc.	Counts Construction Company, Inc.	70.8	1384.7	8	NO
0830026	Cemex, Inc. Fka Southdown	Southdown/Ocala Plant	70.9	1386.2	0	NO
0830101	Skyline Corportation	Skyline/Homette # 535	71.0	1388.9	0	NO
0830004	Stewart Enterprises Inc	Roberts Funeral Home	71.1	1389.8	3	NO
0830103	Lippert Components Inc	Lippert Components	71.5	1398.9	0	NO
0830128	Damar Manufacturing Inc	Damar Manufacturing	71.8	1403.2	0	NO
0830102	Skyline Corporation	Skyline/Cameron Homes # 538	71.9	1405.3	0	NO
0830100	Skyline Corporation	Skyline/Oak Springs # 531	71.9	1406.4	0	NO
0830027	Rinker Materials Corp	Rinker/Ocala	72.1	1410.1	0	NO
0830052	Closetmaid Fka Clairson Intl	Closetmaid	72.5	1417.8	17	NO
0830043	Golden Flake Snack Foods	Golden Flake Snack Foods	72.7	1421.8	5	NO
0830137	Merillat Corp	Merillat/Ocala	73.7	1441.8	0	NO
0830132	Florida Rock Industries	Florida Rock/Ocala	74.1	1450.7	0	NO
1270016	Rinker Materials Corp	Rinker/Ormond Beach	74.5	1457.2	0	NO
0830066	Emergency One, Inc.	Emergency One, Inc. - Body Plant	74.6	1460.5	15	NO
0830084	Flair Manufacturing	Flair Manufacturing	76.5	1498.2	0	NO
1270074	Crane Cams Inc	Crane Cams	77.7	1521.8	0	NO
0830082	Emergency One, Inc.	Emergency One, Inc. - Svo Facility	78.1	1529.1	0	NO
0830068	Evans Septic Tank & Ready Mix, Inc.	Evans Septic Tank & Ready Mix	79.0	1548.6	0	NO

Notes:

[a] Included in analysis because of proximity to Project

GP Palatka Paper Mill is located at UTM zone 17 coordinates (km):		
	East	434.0
	North	3283.4

Significant Impact Distance = 1.6 km

TABLE C-16
NO$_x$ NAAQS ANALYSIS MODELING PARAMETERS FOR COMPETING SOURCES

Facility Description	**Model ID**	**NO$_x$ Emission**	**Release Height**		**Stack Diameter**		**Exit Temperature**		**Exit Velocity**	
Stack Description	**ID Name**	**Rate (g/s)**	**(ft)**	**(m)**	**(ft)**	**(m)**	**(F)**	**(K)**	**(fps)**	**(m/s)**
1070030 Georgia-Pacific Corp. Palatka Chipnsaw										
Kiln 2 Source Vent 1	KILN2_1	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 2 Source Vent 2	KILN2_2	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 2 Source Vent 3	KILN2_3	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 2 Source Vent 4	KILN2_4	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 2 Source Vent 5	KILN2_5	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 2 Source Vent 6	KILN2_6	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 1 Source Vent 1	KILN1_1	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 1 Source Vent 2	KILN1_2	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 1 Source Vent 3	KILN1_3	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 1 Source Vent 4	KILN1_4	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 1 Source Vent 5	KILN1_5	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
Kiln 1 Source Vent 6	KILN1_6	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02
1070025 Seminole Power Plant										
Steam Electric Generators No. 1 and 2	SEMELECT	603.90	675	205.74	36	10.97	128	326.5	26	7.92
Steam Electric Generator No. 3	SECIUN3	66.150	675	205.74	26	7.93	126	325.4	62	18.80
1070039 Lafarge North America, Inc.										
Wallboard Dryer (4 Natural Gas Burners)		2.34	46	14.02	7	2.19	165	347.0	71	21.49
Cage Mill Flash Dryer System		0.83	46	14.02	7	2.19	165	347.0	71	21.49
Combined Stack 1	LNA1	3.17	46	14.02	7	2.19	165	347.0	71	21.49
Cage mill dryer system		0.76	130	39.62	5	1.55	190	360.9	54	16.43
Imp Mill Flash Calciner System A		0.38	130	39.62	4	1.22	325	435.9	23	7.10
Imp Mill Flash Calciner System B		0.38	130	39.62	4	1.10	320	433.2	23	7.10
Combined Stack 2	LNA2	1.51	130	39.62	4	1.10	325	435.9	23	7.10
1070014 FPL Putnam Power Plant										
Ductburners for CC HRSG11, Phase II Acid Rain Unit		6.30	73	22.25	10	3.15	328	437.6	192	58.61
Ductburners for CC HRSG12, Phase II Acid Rain Unit		6.30	73	22.25	10	3.15	328	437.6	200	61.08
Ductburners for CC HRSG21, Phase II Acid Rain Unit		6.30	73	22.25	10	3.15	328	437.6	192	58.61
Ductburners for CC HRSG22, Phase II Acid Rain Unit		6.30	73	22.25	10	3.15	328	437.6	200	61.08
Combined Stack	FPLPUT	25.20	73	22.25	10	3.15	328	437.6	192	58.61
0830070 FGTC Station 17, Marion County										
FGTC Engine 1701 - 2000 bhp RICE compressor engine		6.11	28	8.53	1	0.40	875	741.5	147	44.81
FGTC Engine 1702 - 2000 bhp RICE compressor engine		6.11	28	8.53	1	0.40	875	741.5	147	44.81
FGTC Engine 1703 - 2000 bhp RICE compressor engine		6.11	28	8.53	1	0.40	875	741.5	147	44.81
FGTC Engine 1704 - 2000 bhp RICE compressor engine		4.45	28	8.53	1	0.40	875	741.5	147	44.81
Combined Stack	FGTC1_4	22.78	28	8.53	1	0.40	875	741.5	147	44.81
FGTC Engine 1705 - 2400 bhp RICE compressor engine	FGTC5	1.33	40	12.19	1	0.40	695	641.5	180	54.86
FGTC Engine 1706 - 15,700 bhp gas turbine compressor engine	FGTC8	1.78	61	18.59	8	2.32	910	760.9	79	24.11

TABLE C-17
PSD CLASS II INCREMENTS FOR MODELED POLLUTANTS

Pollutant	Averaging Time	Allowable PSD Increment (μg/m^3)	Form of Standard
PM_{10}	24-hour	30	High-second-highest for each year
	Annual	17	Annual Mean
NO_2	Annual	25	Annual Mean

TABLE C-18
SUMMARY OF PSD CLASS II INCREMENT BASELINE DATES

Pollutant	Major Source Baseline Date	Minor Source Baseline Date
PM_{10}	January 6, 1975	December 27, 1977
NO_2	February 8, 1988	March 28, 1988

TABLE C-19
SUMMARY OF 1974 PM_{10} BASELINE EMISSIONS - GP PALATKA MILL

Model ID	Source Description	Emission Rates	
		(lb/hr)	(g/s)
RB1B	# 1 Recovery Boiler	67.80	8.54
RB2B	# 2 Recovery Boiler	86.60	10.91
RB3B	# 3 Recovery Boiler	93.70	11.81
RB4B	# 4 Recovery Boiler	143.20	18.04
SDT1B	# 1 Smelt Dissolving Tanks	2.10	0.26
SDT2B	# 2 Smelt Dissolving Tanks	3.10	0.39
SDT3B	# 3 Smelt Dissolving Tanks	2.80	0.35
SDT4B	# 4 Smelt Dissolving Tanks	35.10	4.42
LK1B	# 1 Lime Kiln	154.80	19.50
LK2B	# 2 Lime Kiln	81.70	10.29
LK3B	# 3 Lime Kiln	80.00	10.08
LK4B	# 4 Lime Kiln	27.20	3.43
PB4B	# 4 Power Boiler	100.60	12.68
PB5B	# 5 Power Boiler	43.90	5.53
CB4B	# 4 Combination Boiler	612.10	77.12
TM3B	# 3 Tissue Machine Combined Source	1.74	0.219
TM5B	# 5 Tissue Machine Combined Source	1.69	0.213
Roads			
GATE1***	Traffic Through Gate 1 (1.86 lb/day - 64 sources)	0.07750	0.00977
GATE2***	Traffic Through Gate 2 (4.0 lb/day - 29 sources)	0.16667	0.02100
GATE3***	Traffic Through Gate 3 (0.78 lb/day - 41 sources)	0.03250	0.00410
GATE4***	Traffic Through Gate 4 (33.38 lb/day - 102 sources)	1.39083	0.17525
GATE5***	Traffic Through Gate 5 (0.78 lb/day - 51 sources)	0.03250	0.00410
Total Emissions		1539.83	194.02

Note: PM10 assumed 86 percent of total particulates for point source 1974 PSD Baseline emissions
PSD Baseline road emissions are 40.8 lb/day

TABLE C-20
LOCATIONS AND STACK PARAMETERS FOR 1974 PM$_{10}$ PSD BASELINE POINT SOURCES - GP PALATKA MILL

Model ID	Description	Stack Parameters									
		Source Location UTM		Stack Height		Stack Exit Temp		Stack Velocity		Stack Diameter	
		East (m)	North (m)	(ft)	(m)	F	K	(fps)	(m/s)	(ft)	(m)
RB1B	# 1 Recovery Boiler	434053.59	3283407.35	250	76.2	188	360	28.9	8.80	12.0	3.66
RB2B	# 2 Recovery Boiler	434053.59	3283407.35	250	76.2	210	372	28.9	8.80	12.0	3.66
RB3B	# 3 Recovery Boiler	434019.49	3283384.85	133	40.5	210	372	23.9	7.28	11.2	3.41
RB4B	# 4 Recovery Boiler	433882.28	3283437.93	230	70.1	394	474	55.3	16.86	12.0	3.66
SDT1B	# 1 Smelt Dissolving Tanks	434059.29	3283411.15	100	30.5	199	366	24.7	7.53	2.5	0.76
SDT2B	# 2 Smelt Dissolving Tanks	434059.29	3283411.15	100	30.5	215	375	31.2	9.51	3.0	0.91
SDT3B	# 3 Smelt Dissolving Tanks	434025.29	3283388.55	109	33.2	205	369	11.7	3.57	2.5	0.76
SDT4B	# 4 Smelt Dissolving Tanks	433934.67	3283477.55	206	62.8	163	346	27.1	8.26	5.0	1.52
LK1B	# 1 Lime Kiln	434121.89	3283301.05	50	15.2	262	401	17.2	5.24	4.2	1.28
LK2B	# 2 Lime Kiln	434117.39	3283298.85	52	15.8	154	341	35	10.67	5.6	1.71
LK3B	# 3 Lime Kiln	434119.29	3283270.45	52	15.8	156	342	27.8	8.47	5.6	1.71
LK4B	# 4 Lime Kiln	434106.73	3283246.93	149	45.4	172	351	54.0	16.46	4.3	1.31
PB4B	# 4 Power Boiler	433998.01	3283481.49	122	37.2	399	477	47.7	14.54	4.0	1.22
PB5B	# 5 Power Boiler	433977.26	3283447.19	232	70.7	476	520	52.4	15.97	9.0	2.74
CB4B	# 4 Combination Boiler	433982.43	3283450.46	237	72.2	399	477	34.5	10.52	10.0	3.05
TM3B	# 3 Tissue Machine Combined Source	434220.66	3283432.68	94	28.65	450	505	64.5	19.66	5.0	1.52
TM5B	# 5 Tissue Machine Combined Source	434264.95	3283462.34	94	28.65	450	505	64.5	19.66	5.0	1.52

TABLE C-21
SUMMARY OF 1988 PSD BASELINE NO$_x$ EMISSIONS - GP PALATKA MILL

Model ID	Source Description	Emission Rates (lb/hr)	Emission Rates (g/s)
RB4B	# 4 Recovery Boiler	117.40	14.80
SDT4B	# 4 Smelt Dissolving Tanks	2.66	0.34
LK4B	# 4 Lime Kiln	47.44	5.98
PB4B	# 4 Power Boiler	21.77	2.74
PB5B	# 5 Power Boiler	108.02	13.62
CB4B	# 4 Combination Boiler	56.40	7.11
TM3B	# 3 Tissue Machine Combined Source	10.77	1.36
TM4B	# 4 Tissue Machine Combined Source	10.77	1.36
TM5B	# 5 Tissue Machine Combined Source	7.57	0.95
Total Emissions		382.80	48.27

TABLE C-22
LOCATIONS AND STACK PARAMETERS FOR 1988 BASELINE SOURCES - GP PALATKA MILL

Model ID	Description	Stack Parameters									
		Source Location UTM		Stack Height		Stack Exit Temp		Stack Velocity		Stack Diameter	
		East (m)	North (m)	(ft)	(m)	F	K	(fps)	(m/s)	(ft)	(m)
RB4B	# 4 Recovery Boiler	433882.28	3283437.93	230	70.1	400	478	63.7	19.42	12.0	3.66
SDT4B	# 4 Smelt Dissolving Tanks	433934.67	3283477.55	206	62.8	160	344	21.2	6.46	5.0	1.52
LK4B	# 4 Lime Kiln	434106.73	3283246.93	131	39.9	150	339	60.8	18.53	4.3	1.31
PB4B	# 4 Power Boiler	433998.01	3283481.49	122	37.2	395	475	71.6	21.82	4.0	1.22
PB5B	# 5 Power Boiler	433977.26	3283447.19	232	70.7	445	503	60.6	18.47	9.0	2.74
CB4B	# 4 Combination Boiler	433982.43	3283450.46	237	72.2	440	500	71.8	21.88	10.0	3.05
TM3B	# 3 Tissue Machine Combined Source	434220.66	3283432.68	94	28.65	450	505	64.5	19.66	5.0	1.52
TM5B	# 5 Tissue Machine Combined Source	434264.95	3283462.34	94	28.65	450	505	64.5	19.66	5.0	1.52
TM4B	No. 4 Tissue Machine Combined Source	434302.09	3283502.61	94	28.65	450	505	64.5	19.66	5.0	1.52

TABLE C-23
SUMMARY OF PSD-CONSUMING EMISSIONS FROM COMPETING SOURCES

AIRS Number	Owner	Facility	Emissions Affecting Increment (tpy)	
			PM_{10}	NO_x
1070022	Florida Rock Industries, Inc. Putnam	Florida Rock -Comfort Rd	0.9	-
1070030	Georgia-Pacific Corporation	Georgia-Pacific Corp. Palatka Chipnsaw	62.3	17.2
1070025	Seminole Electric Cooperative, Inc.	Seminole Power Plant	1330.0	2300.0
1070039	Lafarge North America, Inc.	Lafarge North America, Inc.	221.4	162.7

TABLE C-24
PSD INCREMENTS ANALYSES MODELING PARAMETERS FOR COMPETING SOURCES

Facility Description		Model ID	Emission Rate (g/s)		Release Height		Stack Diameter		Exit Temperature		Exit Velocity		Volume Source Dimensions (m)	
Stack Description		ID Name	PM_{10}	NO_x	(ft)	(m)	(ft)	(m)	(F)	(K)	(fps)	(m/s)	Sig y	Sig Z
1070022 Florida Rock -Comfort Rd														
	Concrete Batch Plant (Ready Mix) W/Baghouse	FLROCK	0.025	--	13	3.96	2	0.55	77	298.2	63	19.20	--	--
1070030 Georgia-Pacific Corp. Palatka Chipnsaw														
	Planer Mill Cyclone	CNS04	0.75	--	80	24.38	7	2.04	68	293.15	18	5.49	--	--
	Planer Mill Trim Hog Cyclone	CNS05	0.112	--	30	9.14	3	0.82	68	293.15	43	13.11	--	--
	Chip Bin Cyclone	CNS08	0.066	--	63	19.2	1	0.4	68	293.15	101	30.66	--	--
	Fuel Silo Cyclone	CNS03	0.517	--	80	24.38	2	0.67	80	299.82	12	3.66	--	--
	Kiln 2 Source Vent 1	KILN2_1	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 2 Source Vent 2	KILN2_2	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 2 Source Vent 3	KILN2_3	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 2 Source Vent 4	KILN2_4	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 2 Source Vent 5	KILN2_5	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 2 Source Vent 6	KILN2_6	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 1 Source Vent 1	KILN1_1	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 1 Source Vent 2	KILN1_2	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 1 Source Vent 3	KILN1_3	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 1 Source Vent 4	KILN1_4	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 1 Source Vent 5	KILN1_5	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Kiln 1 Source Vent 6	KILN1_6	0.0105	0.0412	31	9.45	3	0.80	210	372.0	6.6	2.02	--	--
	Cutoff Saws	F0103	0.0016	--	--	--	--	--	--	--	--	--	1.585	1.418
	Debarker	F02	0.26	--	--	--	--	--	--	--	--	--	1.418	1.418
	Mulch Hog + screen	F0405	2.0E-04	--	--	--	--	--	--	--	--	--	1.418	2.127
	Mulch & Fuel Bin	F06	3.4E-05	--	--	--	--	--	--	--	--	--	1.736	1.985
	Screen	F14	3.2E-03	--	--	--	--	--	--	--	--	--	1.228	1.134
	Drum Screen	F15	3.2E-03	--	--	--	--	--	--	--	--	--	0.709	2.835
	Chip Bin+Truck Spreader Loading	F1617	3.0E-03	--	--	--	--	--	--	--	--	--	1.736	1.985
	Planer Shavings Bin	F22	1.8E-03	--	--	--	--	--	--	--	--	--	1.736	1.985
	Planer Mill Fugitives	F24	4.0E-04	--	--	--	--	--	--	--	--	--	1.736	1.985
1070025 Seminole Electic - Seminole Power Plant														
	Steam Electric Generators No. 1 and 2	SEMELECT	24.05	--	675	205.74	36	10.97	128	326.5	26	7.92	--	--
	Steam Electric Generator No. 3	SECIUN3	14.2	66.15	675	205.74	26	7.93	126	325.4	62	18.80	--	--
1070039 Lafarge North America, Inc.														
	Composite Stack 1	LNA1	2.330	3.170	50	15.24	1	0.15	68	293.2	42	12.92	--	--
	Composite Stack 2	LNA2	4.040	1.510	130	39.62	4	1.22	325	435.9	23	7.10	--	--

TABLE C-25
SIGNIFICANT IMPACT ANALYSIS RESULTS FOR PM_{10}

Averaging Period	Year	Maximum Predicted Impact (mg/m^3)	Receptor Location[a]		Period Ending (YYMMDDHH)	Significant Impact Level (mg/m^3)	Monitoring de Minimis Concentration (mg/m^3)
			East (m)	North (m)			
24-hour High 1st High	2001	10.3	434277	3282907	01092524	5	10
	2002	10.7	434277	3282907	02101724		
	2003	11.9	434354	3282989	03011124		
	2004	9.9	434300	3282949	04022824		
	2005	8.7	434277	3282907	05122024		
Annual	2001	1.4	434620	3283189	01123124	1	--
	2002	1.4	434300	3282949	02123124		
	2003	1.4	434420	3283039	03123124		
	2004	1.2	434620	3283189	04123124		
	2005	1.3	434647	3283209	05123124		

Note:

[a] UTM coordinates in Zone 17

YY =Year, MM=Month, DD=Day, HH=Hour

TABLE C-26
SIGNIFICANT IMPACT ANALYSIS RESULTS FOR NO_2

Averaging Period	Year	Maximum Predicted Impact (mg/m^3)	Receptor Location[a]		Significant Impact Level (mg/m^3)	Monitoring de Minimis Concentration (mg/m^3)
			East (m)	North (m)		
Annual	2001	1.86	434620	3283189	1	14
	2002	1.75	434580	3283159		
	2003	1.87	434580	3283159		
	2004	1.73	434620	3283189		
	2005	1.72	434580	3283159		

Note:

[a] UTM coordinates in Zone 17

TABLE C-27
SIGNIFICANT IMPACT ANALYSIS RESULTS FOR CO

Averaging Period	Year	Maximum Predicted Impact (mg/m^3)	Receptor Location[a]		Period Ending (YYMMDDHH)	Significant Impact Level (mg/m^3)	Monitoring de Minimis Concentration (mg/m^3)
			East (m)	North (m)			
1-hour High 1st High	2001	79.1	434380	3283009	1041611	2000	--
	2002	76.8	434327	3282969	2020414		
	2003	77.1	434580	3283159	3021015		
	2004	77.5	434327	3282969	4102011		
	2005	78.5	434420	3283039	5032914		
8-hour High 1st High	2001	67.2	434400	3283000	1041616	500	575
	2002	49.2	434300	3282949	2101716		
	2003	47.5	434580	3283159	3022316		
	2004	49.2	434620	3283189	4112516		
	2005	54.7	434242	3282833	5012316		

Note:

[a] UTM coordinates in Zone 17

YY =Year, MM=Month, DD=Day, HH=Hour

TABLE C-28
SUMMARY OF SIGNIFICANT IMPACT DISTANCE RESULTS

Pollutant	Significant Impact Distance (km)
NO_2	0.8
PM_{10}	1.0
CO	not significant

TABLE C-29
PM_{10} NAAQS SCREENING ANALYSIS RESULTS

Averaging Period	Year	Maximum Predicted Impact ($\mu g/m^3$)	Receptor Location[a]		Period Ending (YYMMDDHH)
			East (m)	North (m)	
Annual	2001	10.83	434800	3283300	--
	2002	10.99	434800	3283300	--
	2003	10.37	434800	3283300	--
	2004	10.17	434807.19	3283328.25	--
	2005	10.30	434780.5	3283308.25	--
24-Hour High 6th High	2001	42.37	434513.69	3283108.5	01122024

Note:

[a] **UTM coordinates in Zone 17**

YY =Year, MM=Month, DD=Day, HH=Hour

TABLE C-30
PM_{10} NAAQS TOTAL RESULTS

Averaging Period	Maximum Predicted Impact (mg/m^3)	Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	NAAQS (µg/m^3)
Annual	10.99	25.7	36.7	50
24-Hour High 6th High	42.37	62	104.4	150

TABLE C-31
NO_2 NAAQS ANALYSIS RESULTS

Averaging Period	**Year**	**Maximum Predicted Impact (mg/m^3)**	**Receptor Location**[a]	
			East (m)	**North (m)**
Annual	2001	9.7	434674	3283229
	2002	9.5	434620	3283189
	2003	9.9	434580	3283159
	2004	9.4	434674	3283229
	2005	9.8	434620	3283189

Note:

[a] UTM coordinates in Zone 17

TABLE C-32
NO_2 NAAQS TOTAL RESULTS

Averaging Period	Maximum Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Annual	9.86	26.9	36.8	100

TABLE C-33
PM_{10} PSD CLASS II INCREMENT ANALYSIS RESULTS

Averaging Period	Year	Maximum Predicted Impact (mg/m^3)	Receptor Location (a)		Period Ending (YYMMDDHH)	Allowable Increment ($\mu g/m^3$)
			East (m)	North (m)		
Annual	2001	<0	0	0	--	17
	2002	<0	0	0	--	
	2003	<0	0	0	--	
	2004	<0	0	0	--	
	2005	0.02	436460	3288178	05123124	
24-Hour High 2nd High	2001	18.8	435824	3284180	01082224	30
	2002	21.5	435800	3284200	02062324	
	2003	19.3	435823	3284134	03090124	
	2004	20.8	434540	3283129	04022824	
	2005	20.5	435800	3284200	05072424	

Note:

[a] UTM coordinates in Zone 17

YY =Year, MM=Month, DD=Day, HH=Hour

TABLE C-34
NO_2 PSD CLASS II INCREMENT ANALYSIS RESULTS

Averaging Period	Year	Maximum Predicted Impact (mg/m^3)	Receptor Location (a)		Allowable Increment (mg/m^3)
			East (m)	North (m)	
Annual	2001	2.7	434674	3283229	25
	2002	2.5	434620	3283189	
	2003	2.6	434580	3283159	
	2004	2.4	434674	3283229	
	2005	2.5	434701	3283249	

Note:

[a] UTM coordinates in Zone 17

TABLE C-35
CALPUFF MODEL SETTINGS

Parameter	**Setting**
Pollutant Species	SO_2, SO_4, NO_x, HNO_3, NO_3, PM_{10}.
Chemical Transformation	MESOPUFF II scheme including hourly ozone data.
Deposition	Include both dry and wet deposition, plume depletion.
Meteorological/Land Use Input	CALMET
Plume Rise	Transitional, Stack-tip downwash, Partial plume penetration.
Dispersion	Puff plume element, PG /MP coefficients, rural mode, ISC building downwash scheme.
Terrain Effects	Partial plume path adjustment.
Output	Create binary concentration file including output species for SO_4, NO_3, PM_{10}, SO_2, and NO_x; process for visibility change using Method 2 and FLAG background extinctions.
Model Processing	For haze: highest predicted 24-hour extinction change (%) for the year.
	For significant impact analysis: highest predicted annual and highest short-term averaging time concentrations for SO_2, NO_x, and PM_{10}.
Background Values	Ozone: hourly ozone data; Ammonia: 0.5 ppb.

TABLE C-36
SUMMARY OF MAXIMUM POLLUTANT CONCENTRATIONS PREDICTED FOR THE PROPOSED GP AND CONTEMPORANEOUS PROJECTS

Pollutant	Averaging Time	Concentrations [a] (μg/m^3)									EPA Class I Significant Impact Levels (μg/m^3)
		Okefenokee NWA			Wolf Island NWA			Chassahowitzka NWA			
		2001	2002	2003	2001	2002	2003	2001	2002	2003	
PM$_{10}$	Annual	0.0007	0.0008	0.0008	0.0003	0.0003	0.0003	0.0005	0.0006	0.0004	0.2
	24-Hour	0.011	0.013	0.013	0.004	0.006	0.005	0.009	0.011	0.008	0.3
	8-Hour	0.025	0.032	0.028	0.009	0.008	0.009	0.021	0.020	0.018	
	3-Hour	0.039	0.074	0.041	0.018	0.025	0.012	0.032	0.026	0.023	
	1-Hour	0.073	0.092	0.101	0.028	0.035	0.016	0.041	0.034	0.034	
NO$_x$	Annual	0.0026	0.0033	0.0032	0.0007	0.0009	0.0008	0.0018	0.0017	0.0016	0.1
	24-Hour	0.0704	0.0483	0.050	0.0186	0.0147	0.039	0.0436	0.0449	0.0380	
	8-Hour	0.1272	0.1105	0.118	0.0407	0.0359	0.090	0.0943	0.1221	0.1036	
	3-Hour	0.1656	0.1622	0.182	0.0655	0.0755	0.146	0.1211	0.1443	0.1450	
	1-Hour	0.2471	0.2943	0.273	0.0874	0.1235	0.164	0.1547	0.1754	0.2056	
CO	Annual	0.0165	0.0181	0.0181	0.0070	0.0083	0.0092	0.0111	0.0112	0.0094	NA
	24-Hour	0.2889	0.2444	0.246	0.0963	0.1032	0.141	0.2000	0.1911	0.1617	
	8-Hour	0.5853	0.5981	0.458	0.1658	0.2198	0.342	0.4241	0.3899	0.3425	
	3-Hour	0.6933	0.8996	0.601	0.2870	0.4343	0.533	0.5497	0.4671	0.4825	
	1-Hour	0.8407	1.0408	0.976	0.3881	0.6289	0.624	0.6996	0.6010	0.6347	
SO$_4$	Annual	0.0043	0.0049	0.0045	0.0023	0.0028	0.0026	0.0032	0.0030	0.0025	NA
	24-Hour	0.1193	0.1423	0.137	0.0528	0.0618	0.037	0.0755	0.0654	0.0552	
	8-Hour	0.2087	0.3592	0.283	0.1067	0.1032	0.064	0.1488	0.1391	0.0805	
	3-Hour	0.3021	0.4818	0.475	0.1294	0.2567	0.158	0.1837	0.1980	0.1045	
	1-Hour	0.3622	0.5338	0.558	0.1721	0.4094	0.180	0.2060	0.2155	0.1276	

NWA= National Wilderness Area

[a] Concentrations are the highest impacts predicted with the CALPUFF model and 2001, 2002, and 2003 CALMET Wind Fields.

NA = Not Applicable

TABLE C-37
MAXIMUM 24-HOUR AVERAGE VISIBILITY IMPAIRMENT PREDICTED FOR THE PROPOSED GP AND CONTEMPORANEOUS PROJECTS EMISSIONS AT THE OKEFENOKEE, WOLF ISLAND AND CHASSAHOWITZKA NWA PSD CLASS I AREAS

Area	**Visibility Impairment (%)** [a]			**Visibility Impairment Criteria (%)**
	2001	**2002**	**2003**	
BACKGROUND EXTINCTION CALCULATIONS: METHOD 2 WITH RHMAX = 95 PERCENT				
Okefenokee NWA	6.91 (8/0)	16.73 (6/2)	12.56 (4/2)	5.0
Wolf Island NWA	3.17	5.88 (2/0)	3.07	5.0
Chassahowitzka NWA	8.80 (4/0)	3.83	5.31 (1/0)	5.0
BACKGROUND EXTINCTION CALCULATIONS: METHOD 6 WITH MONTHLY F(RH) FACTORS - HIGHEST				
Okefenokee NWA	9.06 (4/0)	10.34 (4/1)	8.52 (3/0)	5.0
Wolf Island NWA	4.03	4.25	2.80	5.0
Chassahowitzka NWA	5.67 (1/0)	4.66	4.07	5.0
BACKGROUND EXTINCTION CALCULATIONS: METHOD 6 WITH MONTHLY F(RH) FACTORS - 98TH PERCENTILE				
Okefenokee NWA	4.56	3.57	3.40	5.0
Wolf Island NWA	1.74	1.80	1.67	5.0
Chassahowitzka NWA	2.50	2.13	2.07	5.0

[a] Concentrations are highest predicted using the VISTAS 4-km Florida Domains, 2001 to 2003.
Background extinctions calculated using FLAG Document (December 2000) and stated method
NWA = National Wilderness Area
(#/#) = Number of Predicted Days > (5/10) %

TABLE C-38
ANNUAL NITROGEN DEPOSITION RATES PREDICTED AT THE OKEFENOKEE, WOLF ISLAND AND CHASSAHOWTZKA NWA PSD CLASS I AREAS
GP PALATKA LK4 AND CONTEMPORANEOUS PROJECTS

	Total Deposition (Wet & Dry)						Deposition Analysis Threshold[b]
	2001		2002		2003		
PSD Class I Area	($g/m^2/s$)	(kg/ha/yr)	($g/m^2/s$)	(kg/ha/yr)	($g/m^2/s$)	(kg/ha/yr)	(kg/ha/yr)
Okefenokee NWA	5.192E-12	0.0016	6.535E-12	0.0021	7.270E-12	0.0023	0.01
Wolf Island NWA	1.772E-12	0.0006	2.335E-12	0.0007	2.540E-12	0.0008	0.01
Chassahowitzka NWA	2.724E-12	0.0009	2.931E-12	0.0009	1.929E-12	0.0006	0.01

[a] Conversion factor is used to convert $g/m^2/s$ to kg/hectare (ha)/yr using following units:

$g/m^2/s$ x 0.001 kg/g
x 10000 m^2/hectare
x 3600 sec/hr
x 8760 hr/yr =kg/ha/yr
or
$g/m^2/s$ x 3.1536E+08 = kg/ha/yr

[b] Deposition analysis thresholds (DAT) for nitrogen and sulfur deposition provided by the U.S. Fish and Wildlife Service, January 2002. A DAT is the additional amount of N or S deposition within a Class I area, below which estimated impacts from a proposed new or modified source are considered insignificant.

TABLE C-39

EXAMPLES OF REPORTED EFFECTS OF AIR POLLUTANTS AT CONCENTRATIONS BELOW NATIONAL SECONDARY AMBIENT AIR QUALITY STANDARDS

Pollutant	Reported Effect	Concentration ($\mu g/m^3$)	Exposure
SO_2[1]	Respiratory stress in guinea pigs.	427 to 854	1 hour
	Respiratory stress in rats.	267	7 hours/day; 5 day/week for 10 weeks
	Decreased abundance in deer mice.	13 to 157	Continually for 5 months
NO_2[2,3]	Respiratory stress in mice.	1,917	3 hours
	Respiratory stress in guinea pigs.	96 to 958	8 hours/day for 122 days
Particulates[1]	Respiratory stress, reduced respiratory disease defenses.	120 PbO_3	Continually for 2 months
	Decreased respiratory disease defenses in rats, same with hamsters.	100 $NiCl_2$	2 hours

Sources: [1] Newman and Schreiber, 1988.
[2] Gardner and Graham, 1976.
[3] Trzeciak *et al.*, 1977.

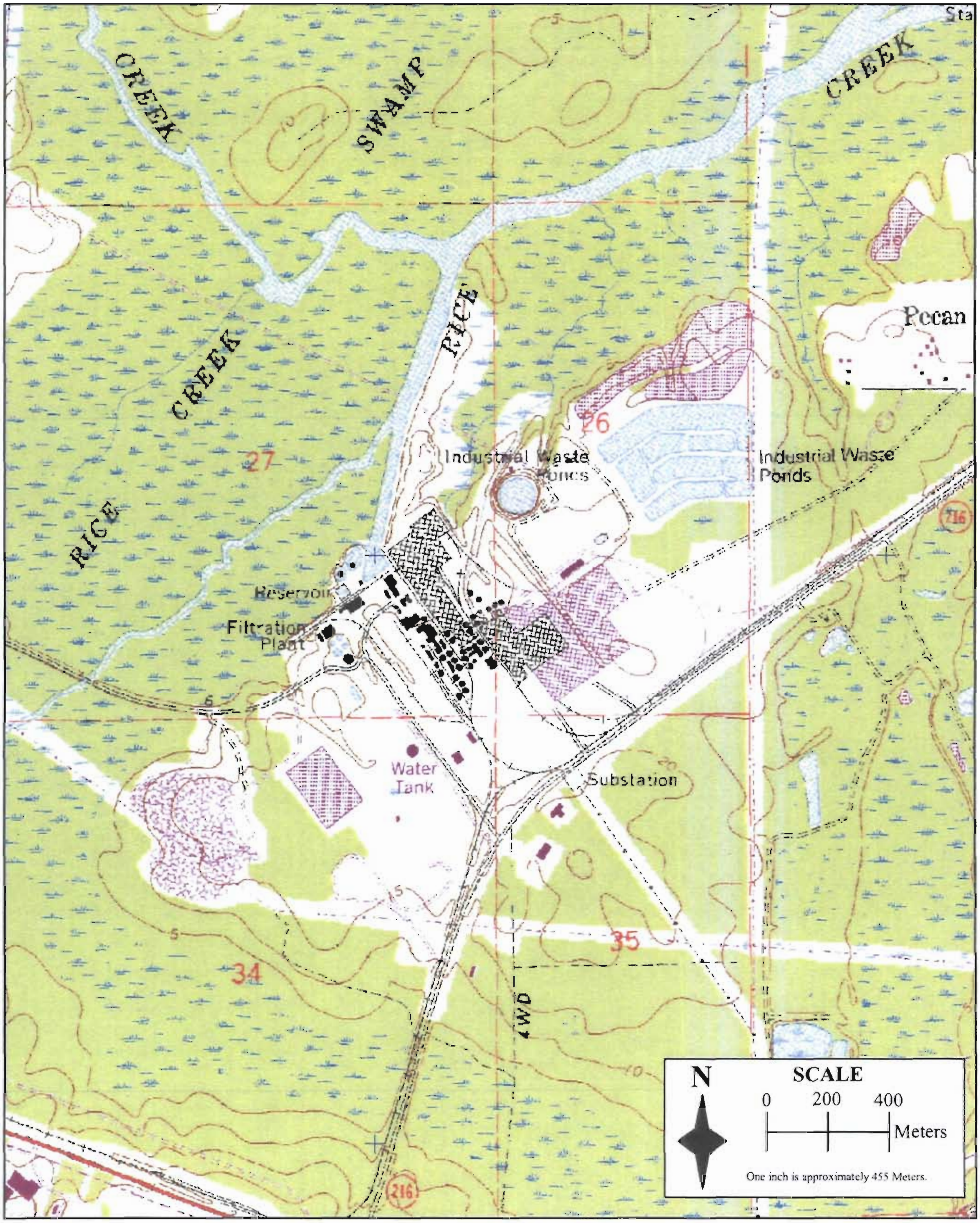
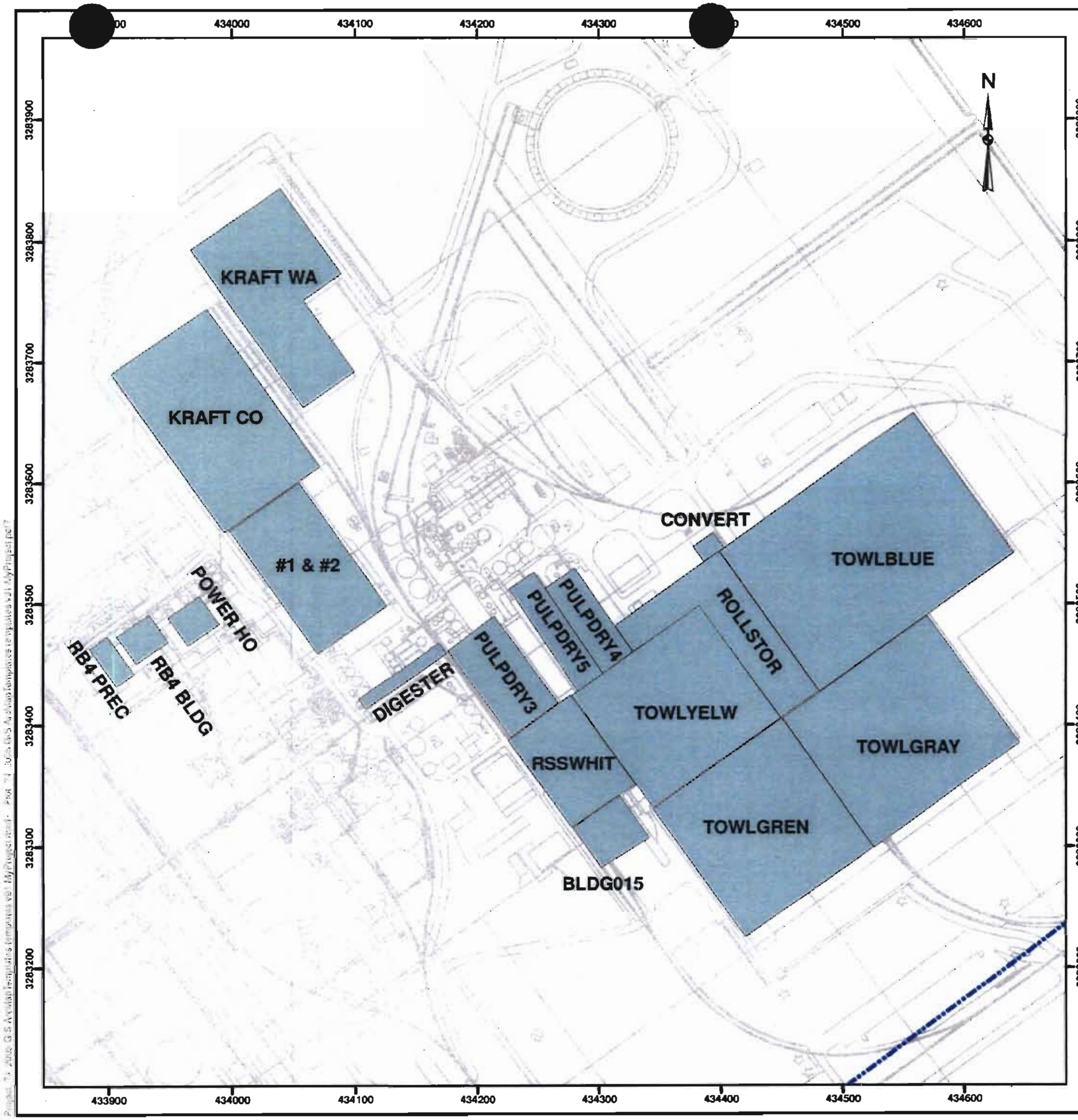


Figure C-1
Area Map
Georgia-Pacific Corporation, Palatka Paper Mill

0537627/0300/Attachment C/Figure C-1.doc



LEGEND

▨ Buildings

⬚ Property Boundary

REFERENCE

Projection. Transverse Mercator Datum: NAD 27 Coordinate System: UTM Zone 17

0 37.5 75 150 Meters

PROJECT

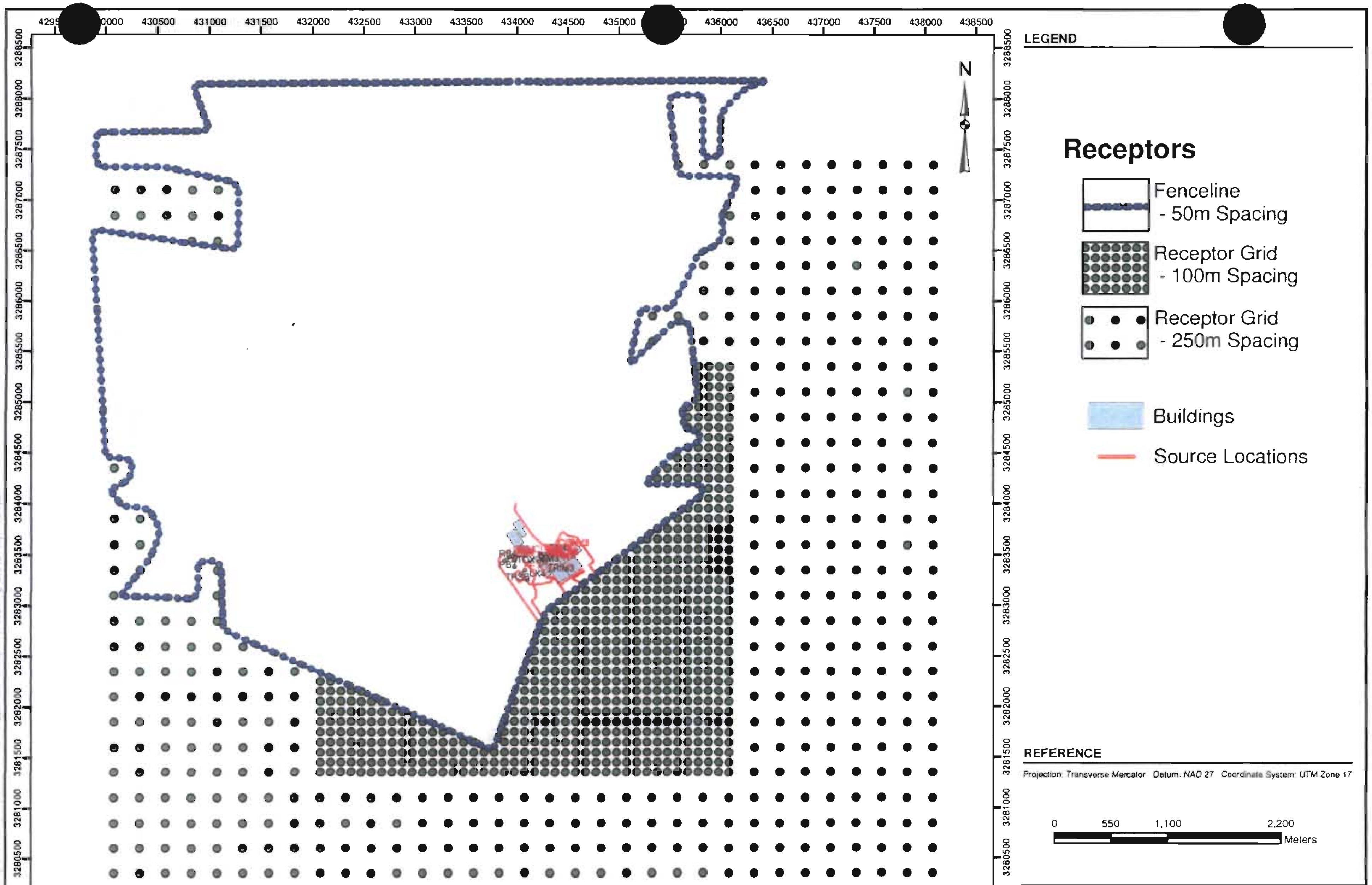
GP PALATKA PROPOSED AND
CONTEMPORANEOUS PROJECTS

TITLE

Building Considered in Downwash Analysis

Golder Associates
Gainesville, Florida

PROJECT No. 053-7609-0100			SCALE AS SHOWN	REV 0
GIS	AB	10 Nov. 2005	**FIGURE: C-2**	



PROJECT

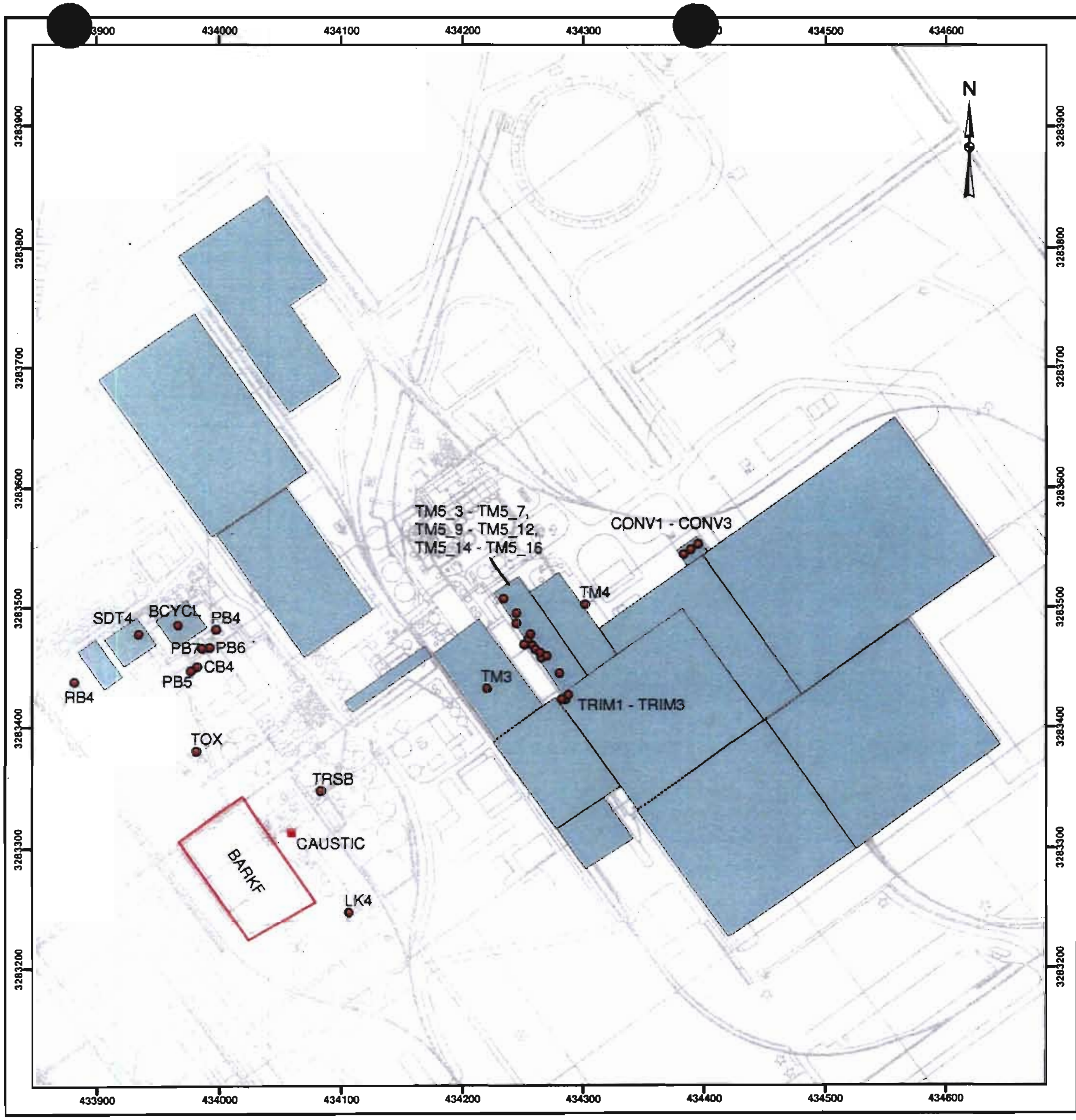
GP PALATKA PROPOSED AND
CONTEMPORANEOUS PROJECTS

TITLE

Receptor Grid Used for the
Significant Impact Analysis

Golder Associates
Gainesville, Florida

PROJECT No. 053-7609-0100			SCALE AS SHOWN	REV 0
GIS	AB	10 Nov. 2005	**FIGURE: C-3**	



LEGEND

● Point Sources

— Area Source

— Volume Source

▨ Buildings

REFERENCE

Projection: Transverse Mercator Datum: NAD 27 Coordinate System: UTM Zone 17

0 45 90 180 Meters

PROJECT

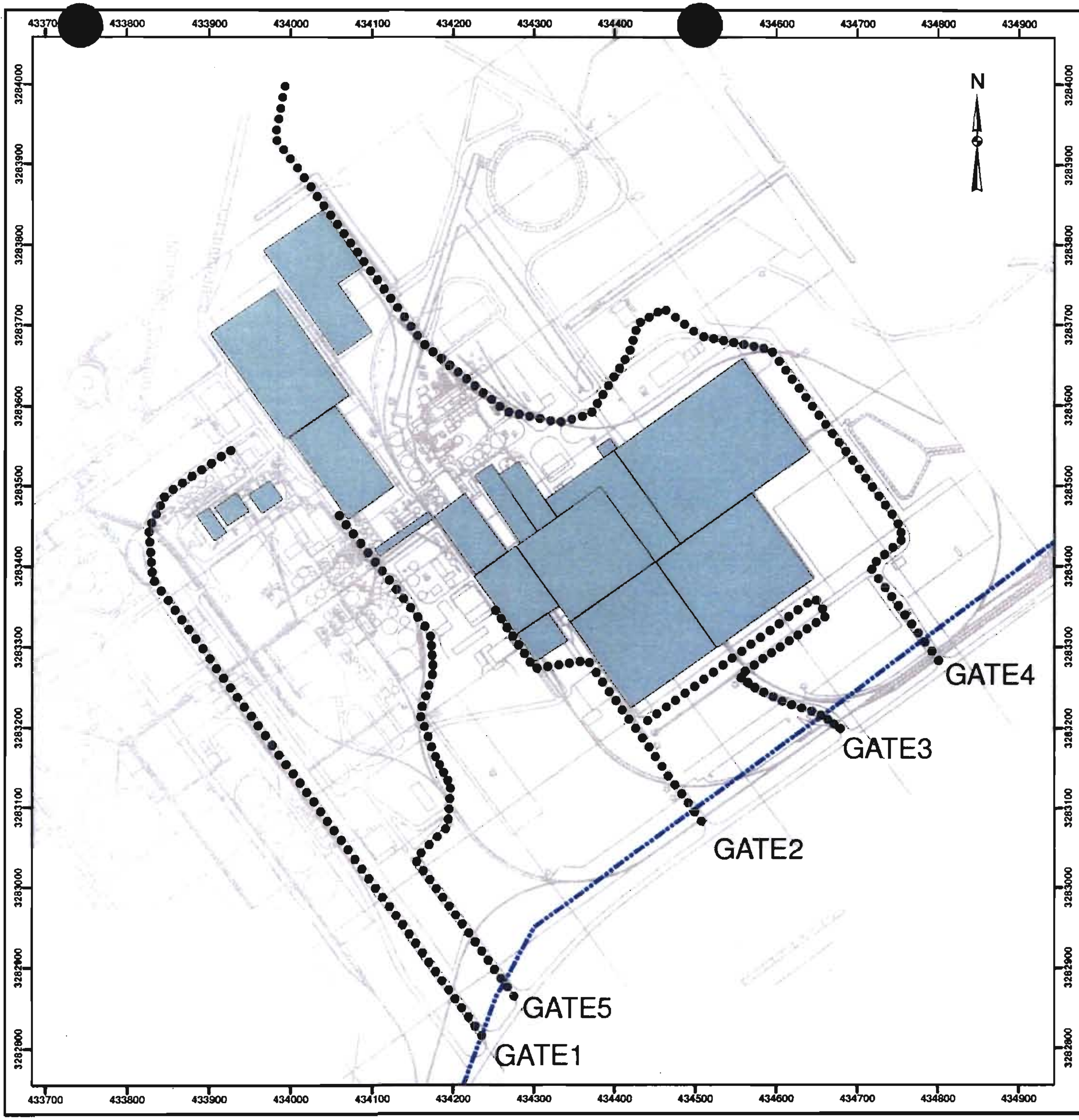
GP PALATKA PROPOSED AND
CONTEMPORANEOUS PROJECTS

TITLE

**Point, Area and Non-Road Volume
Source Arrangement**

Golder Associates
Gainesville, Florida

PROJECT No. 053-7609-0100			SCALE AS SHOWN	REV 0
GIS	AB	06 Jul. 2006	**FIGURE: C-4**	



LEGEND

- ● Road Volume Sources
- 🟦 Buildings
- ⬚ Property Boundary

REFERENCE

Projection: Transverse Mercator Datum: NAD 27 Coordinate System: UTM Zone 17

0 75 150 300 Meters

PROJECT

GP PALATKA PROPOSED AND
CONTEMPORANEOUS PROJECTS

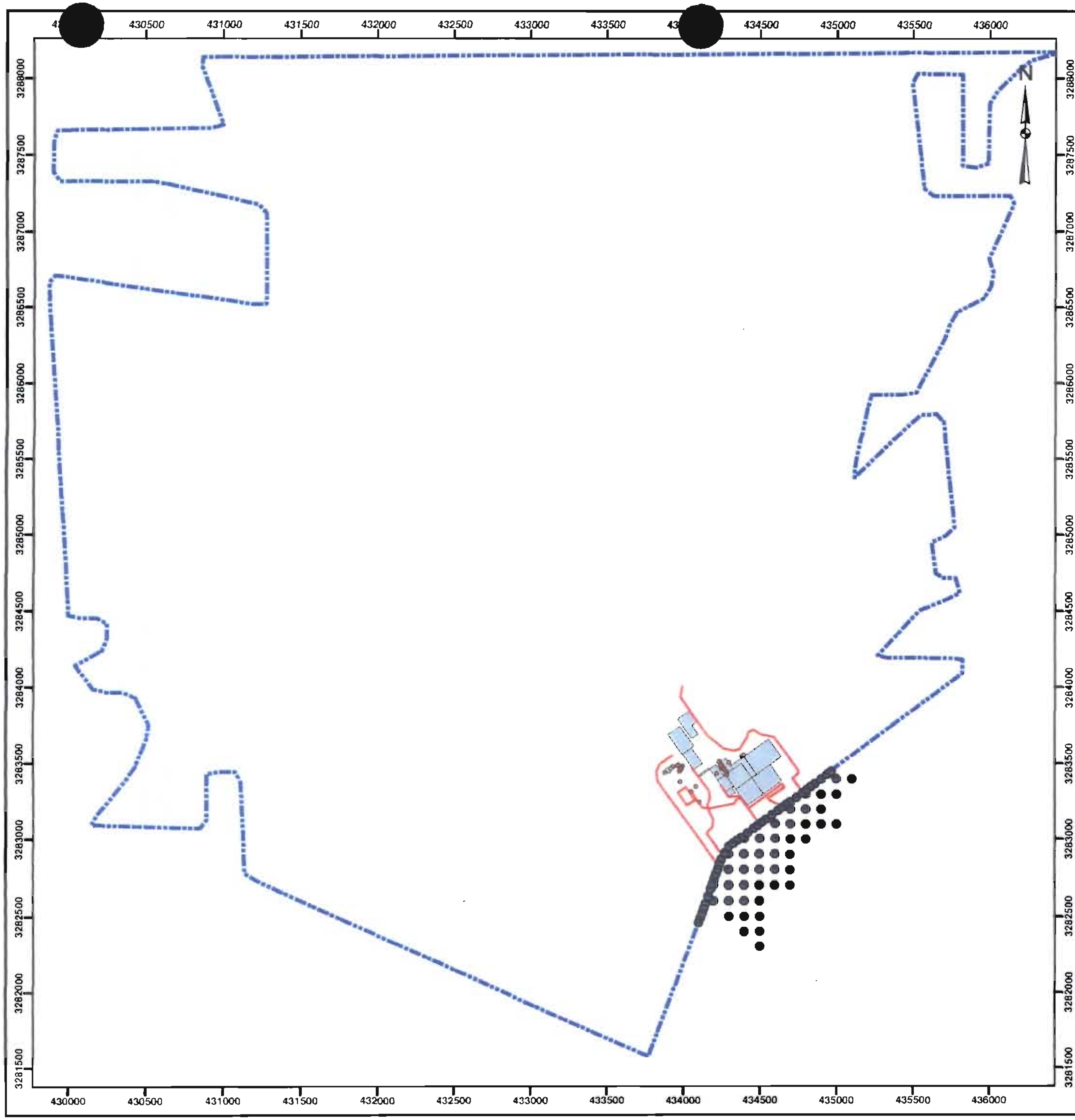
TITLE

Road Volume Source Arrangement

Golder Associates
Gainesville, Florida

PROJECT No. 053-7609-0100			SCALE AS SHOWN	REV 0
GIS	AB	06 Jul. 2006	**FIGURE: C-5**	

0537627/0300/Attachment C/Figure C-5



REFERENCE

Projection: Transverse Mercator Datum: NAD 27 Coordinate System: UTM Zone 17

PROJECT

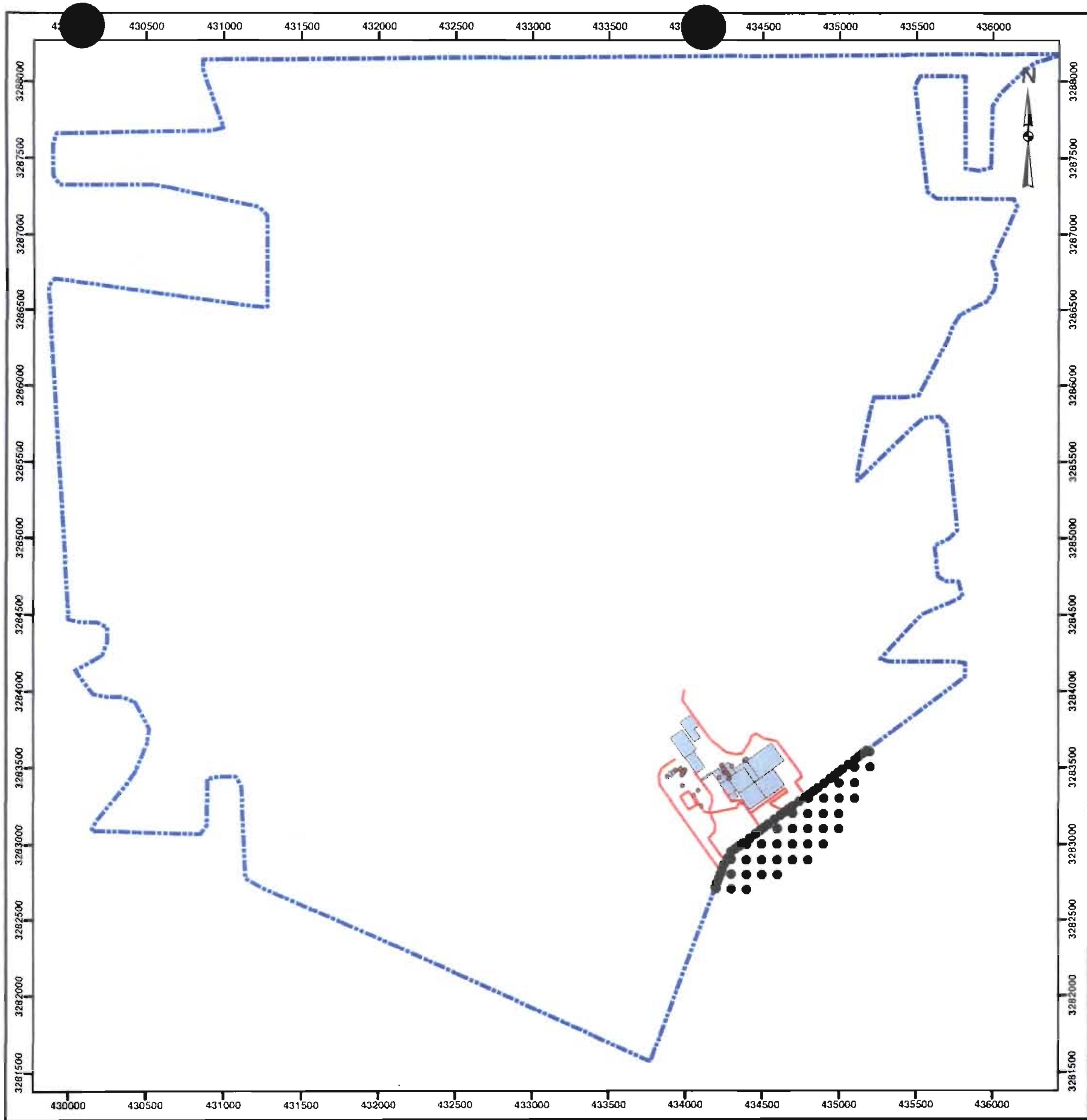
GP PALATKA PROPOSED AND
CONTEMPORANEOUS PROJECTS

TITLE

Receptors with Concentrations > PM_{10} SIL

Golder Associates
Gainesville, Florida

PROJECT No. 053-7609-0100			SCALE AS SHOWN	REV. 0
GIS	AB	05 Jul. 2006	**FIGURE: C-6**	



LEGEND

●	Receptors with Concentrations > NO_2 SIL
🟦	Buildings
▬	Source Locations
-··-	Property Boundary

REFERENCE

Projection: Transverse Mercator Datum: NAD 27 Coordinate System: UTM Zone 17

0 425 850 1,700
Meters

PROJECT
GP PALATKA PROPOSED AND
CONTEMPORANEOUS PROJECTS

TITLE
Receptors with Concentrations > NO_2 SIL

Golder Associates
Gainesville, Florida

PROJECT No. 053-7609-0100			SCALE AS SHOWN	REV 0
GIS	AB	05 Jul. 2006	**FIGURE: C-7**	

FIGURE C-8
POPULATION AND HOUSEHOLD UNIT TRENDS IN PUTNAM COUNTY

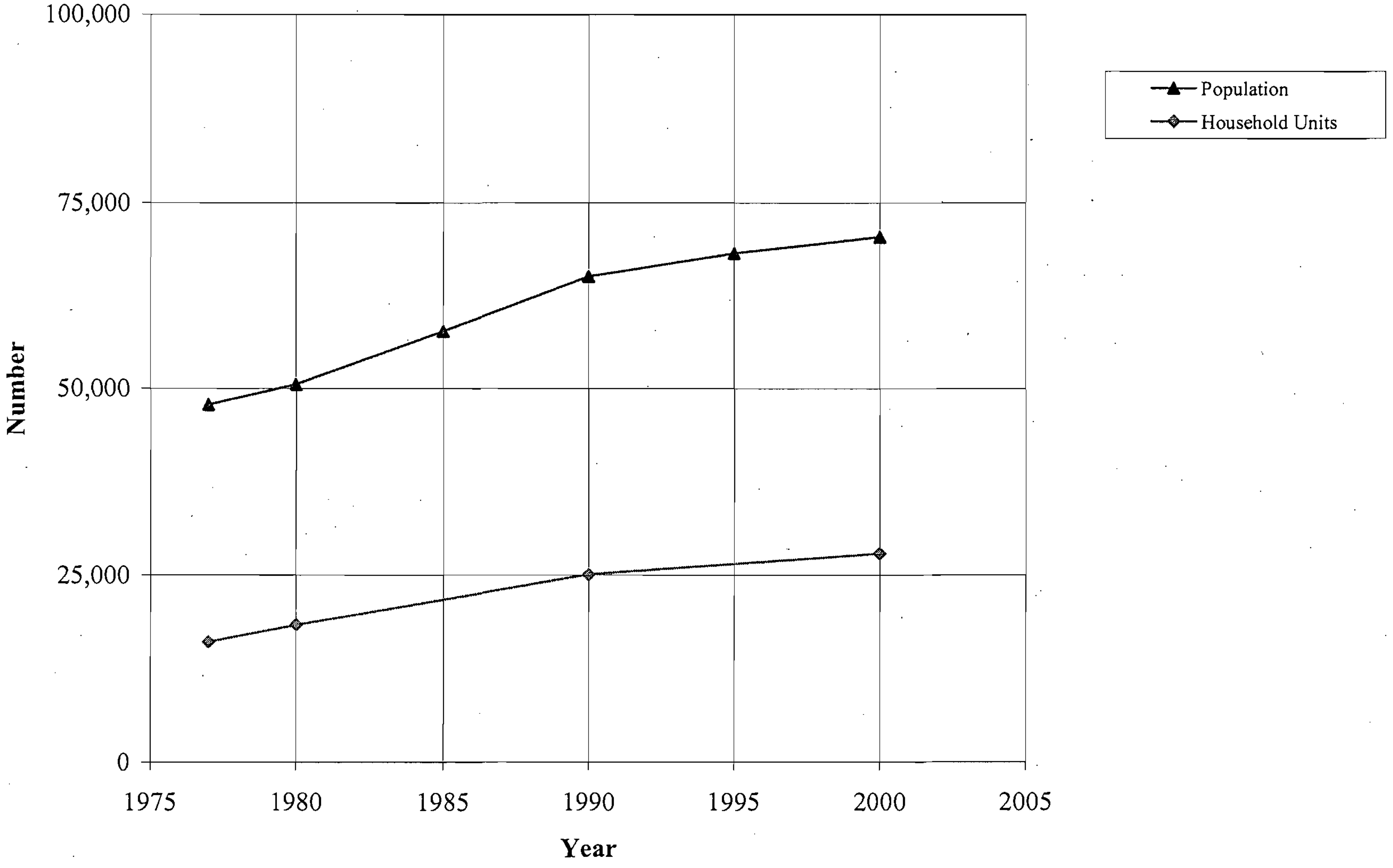


FIGURE C-9.
RETAIL AND WHOLESALE TRADE TRENDS IN PUTNAM COUNTY

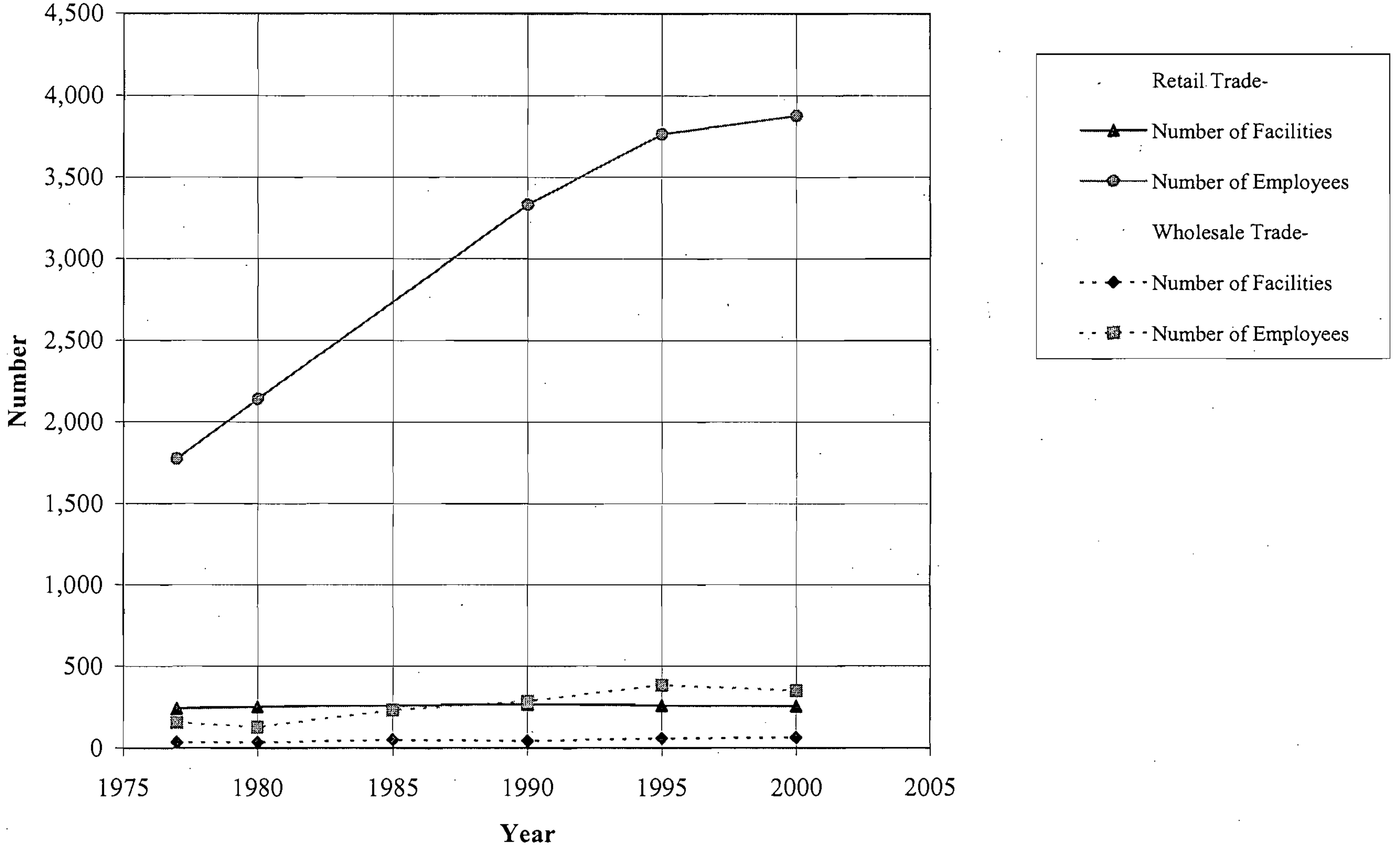


FIGURE C-10
LABOR FORCE TREND IN PUTNAM COUNTY

FIGURE C-11
HOTEL AND MOTEL TREND IN PUTNAM COUNTY

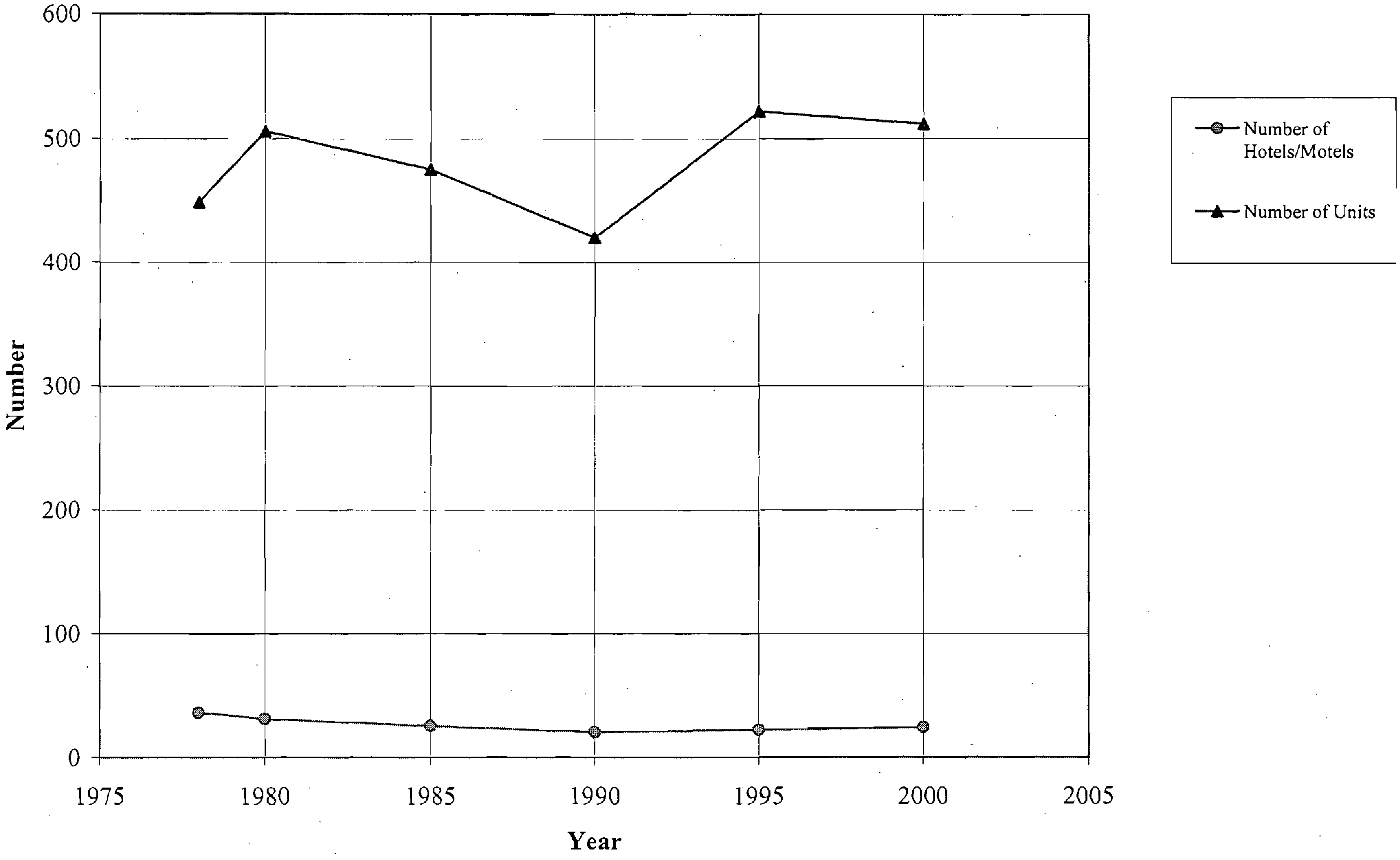


FIGURE C-12
VEHICLE MILES TRAVELED (VMT) ESTIMATES FOR MOTOR VEHICLES FOR PUTNAM COUNTY

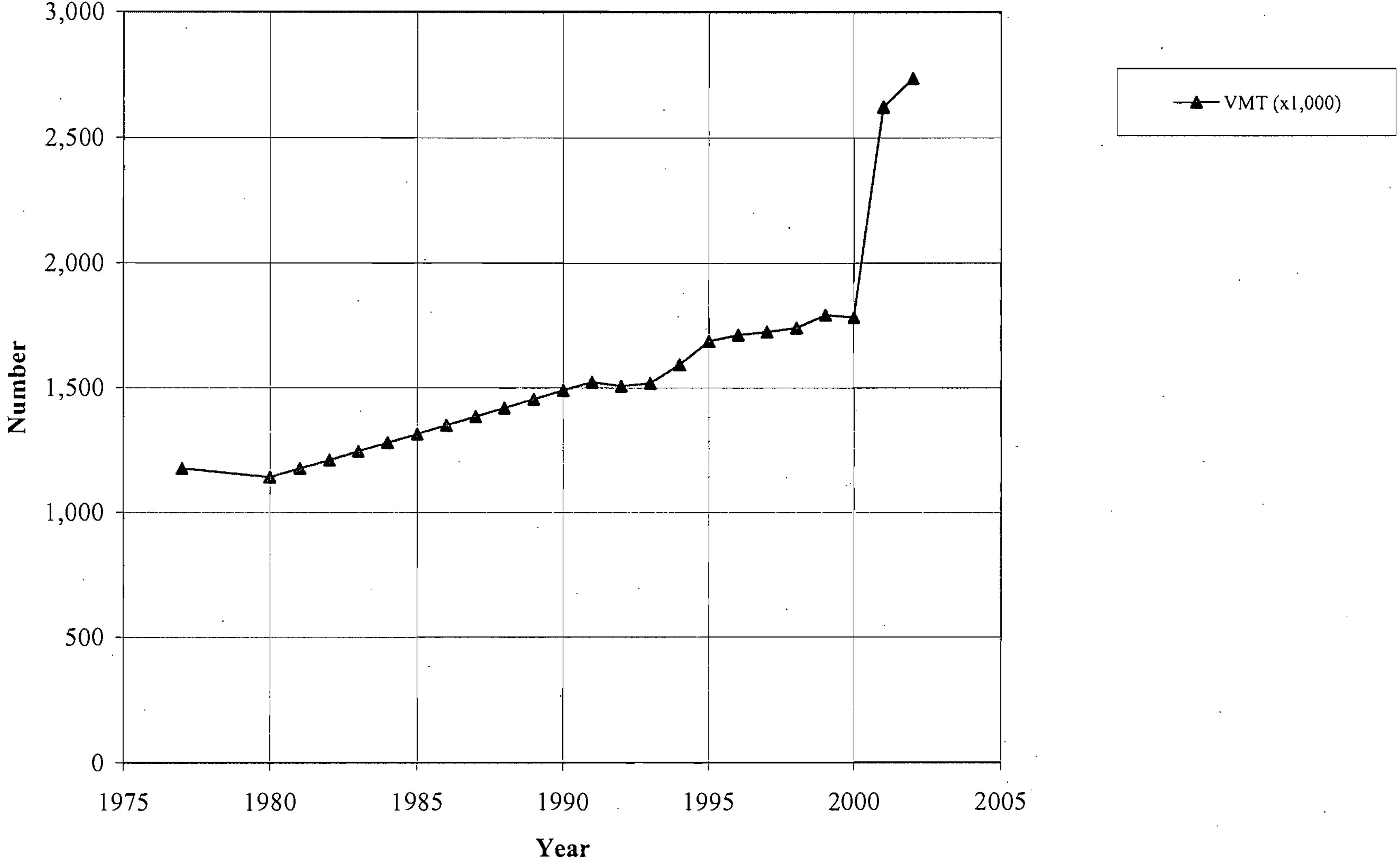


FIGURE C-13
MANUFACTURING AND AGRICULTURE TRENDS
IN PUTNAM COUNTY

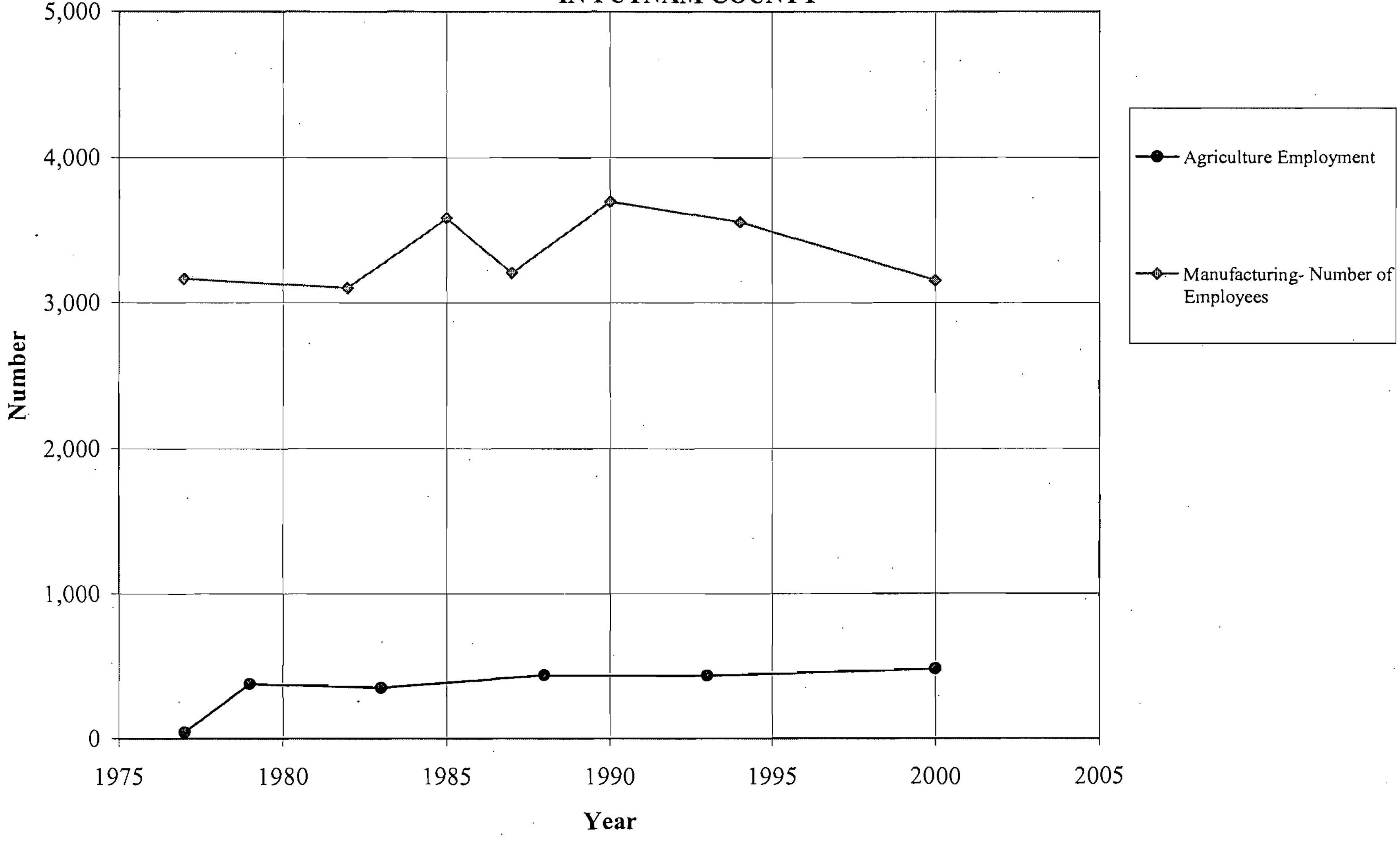


FIGURE C-14
ELECTRICAL POWER GENERATION CAPACITY
IN PUTNAM COUNTY

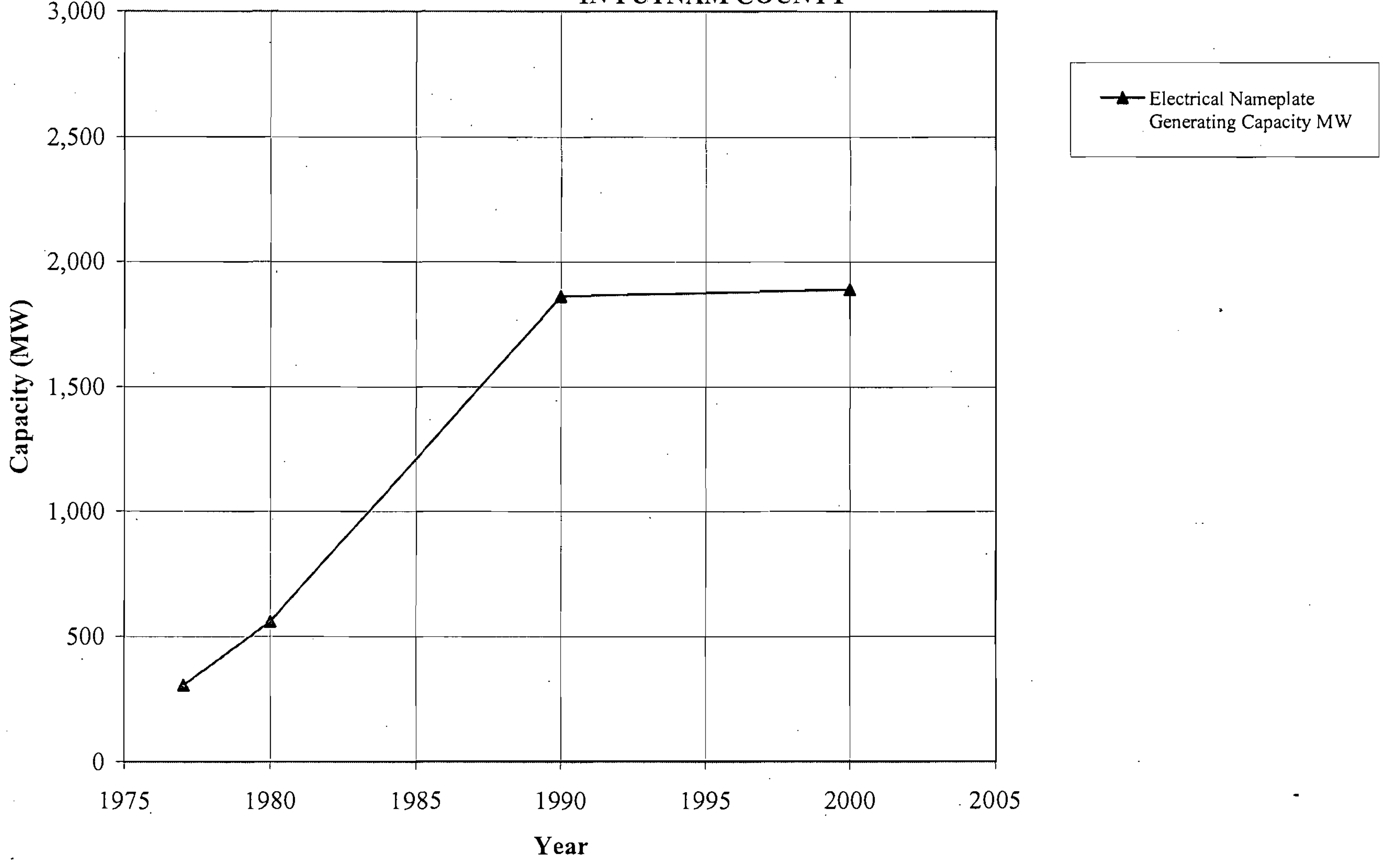


FIGURE C-15
MOBILE SOURCE EMISSIONS (TONS PER DAY) OF CO,NOC AND NOx IN PUTNAM COUNTY

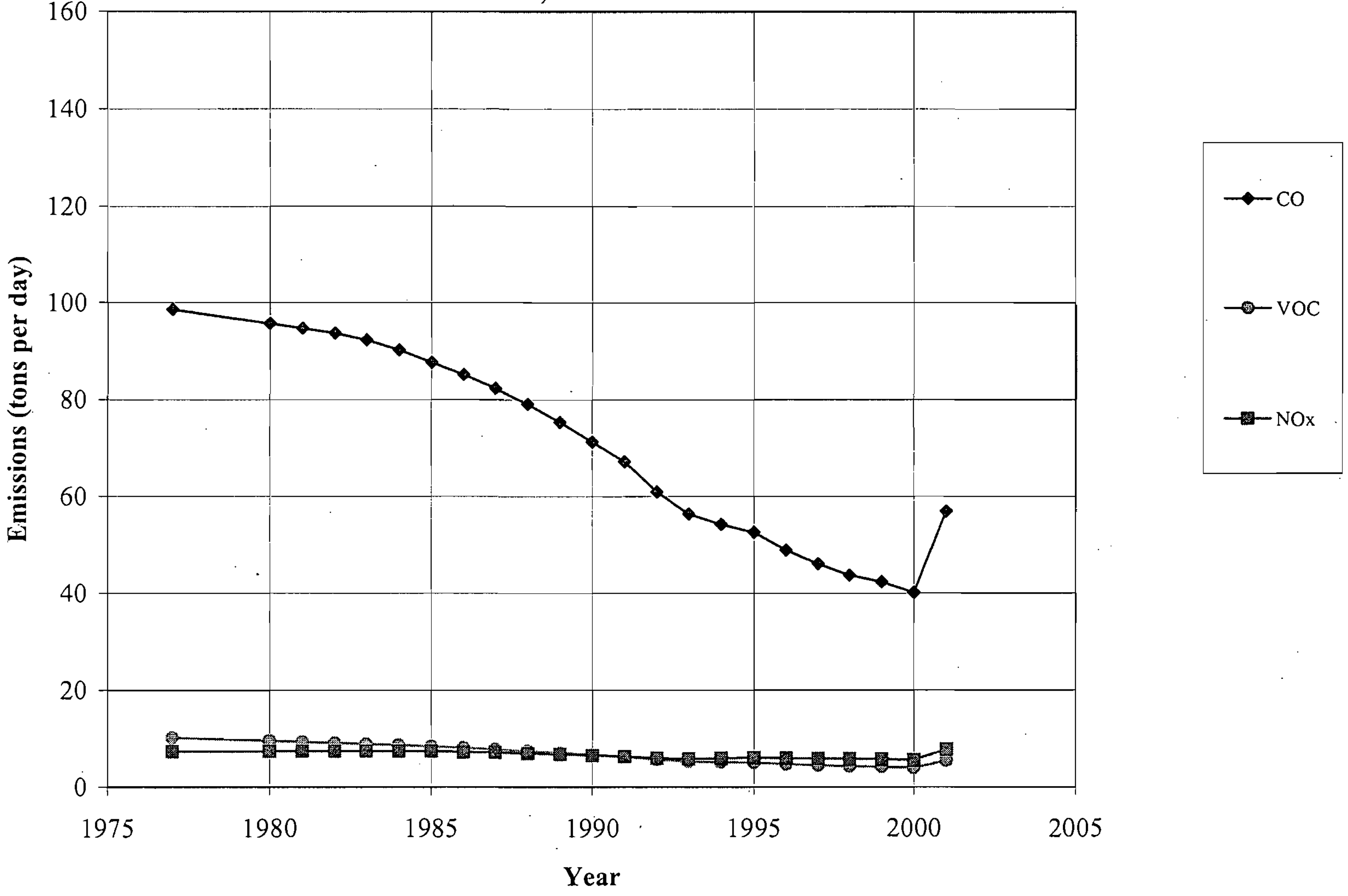


FIGURE C-16
MEASURED 3-HOUR AVERAGE SULFUR DIOXIDE CONCENTRATIONS
(2nd Highest Values) from 1984 to 2002- Putnam County

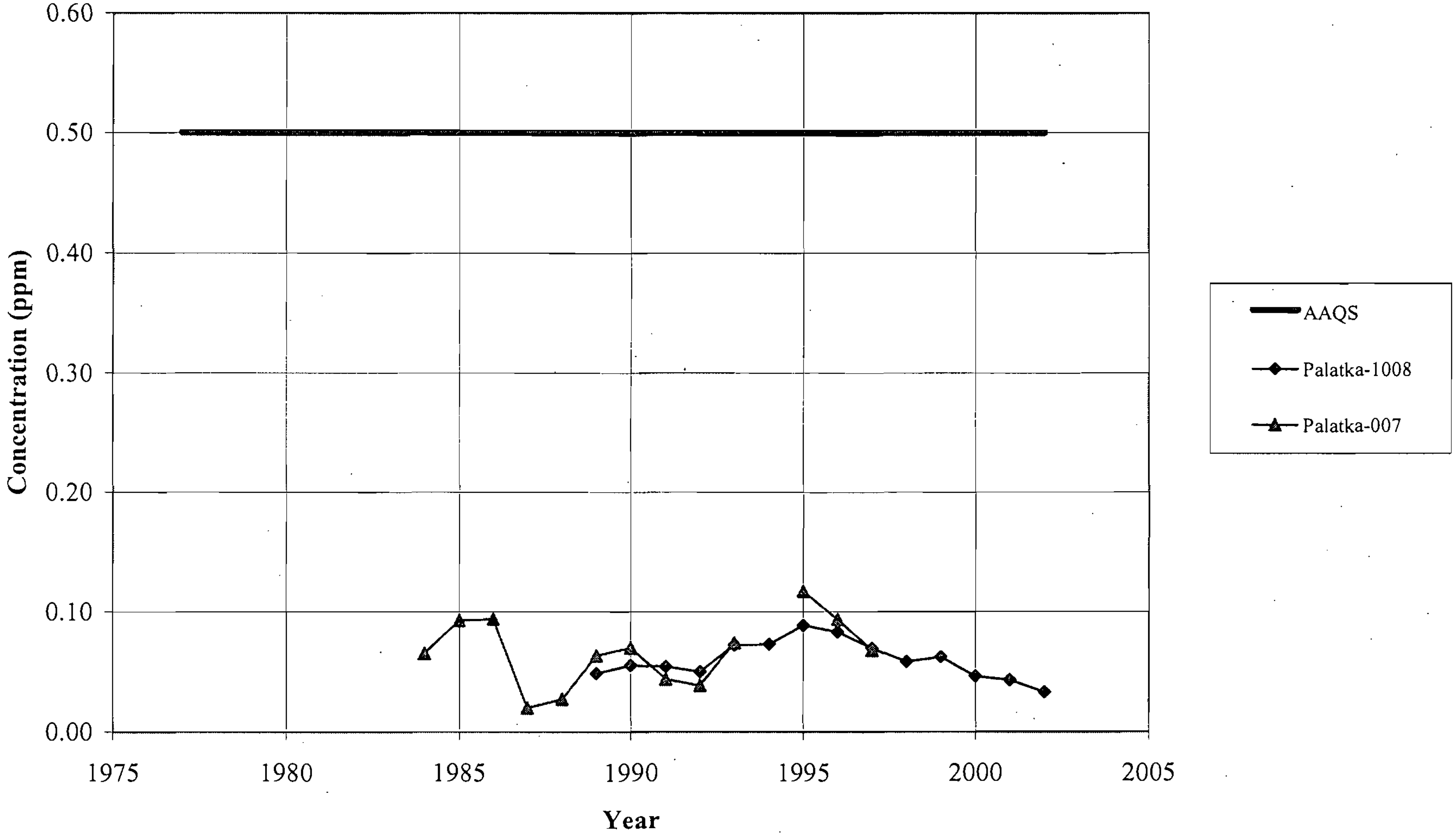


FIGURE C-17
MEASURED 24-HOUR AVERAGE SULFUR DIOXIDE CONCENTRATIONS
(2nd Highest Values) from 1984 to 2002- PutnamCounty

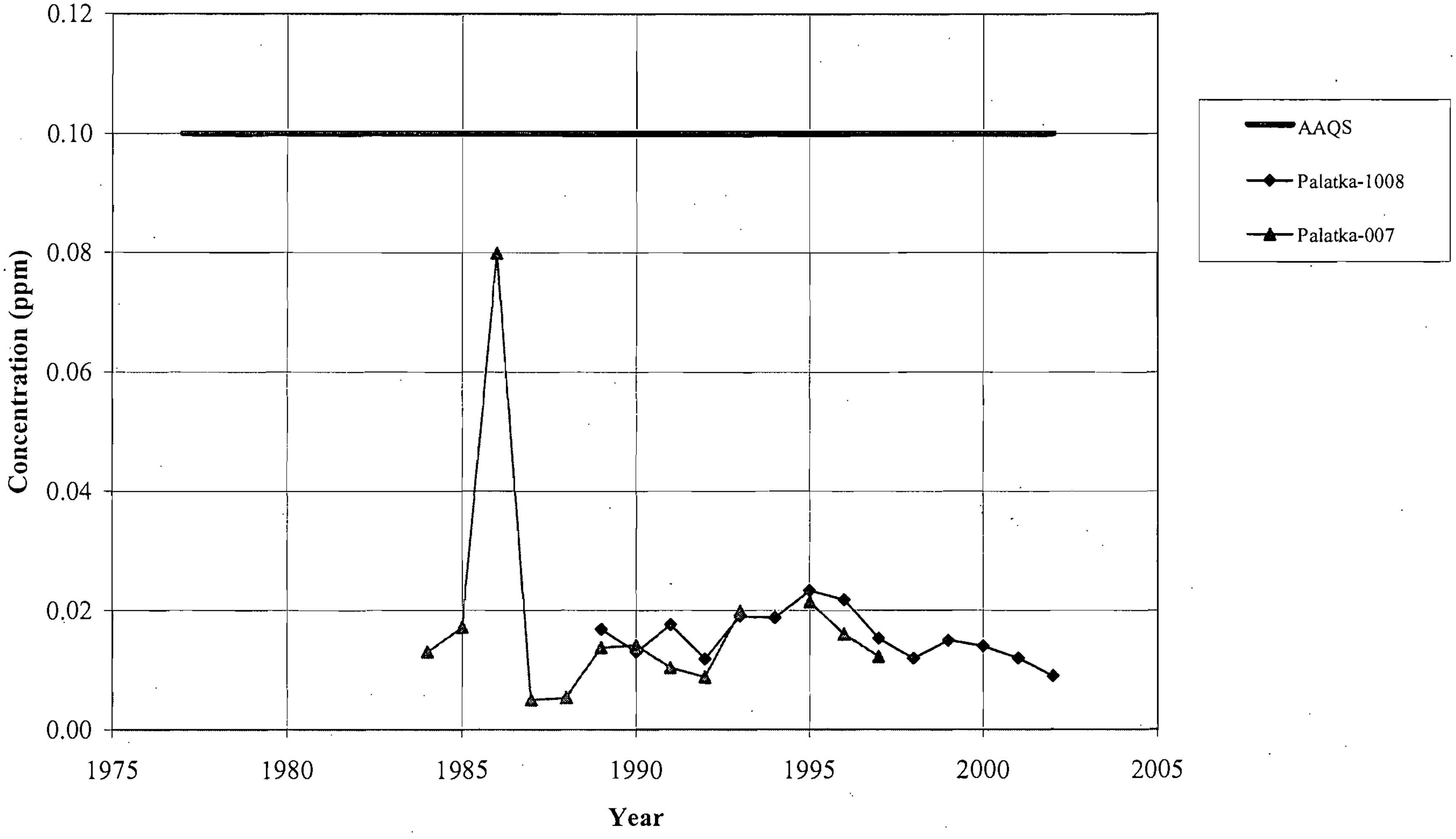


FIGURE C-18
MEASURED ANNUAL AVERAGE SULFUR DIOXIDE CONCENTRATIONS
(from 1984 to 2002- Putnam County)

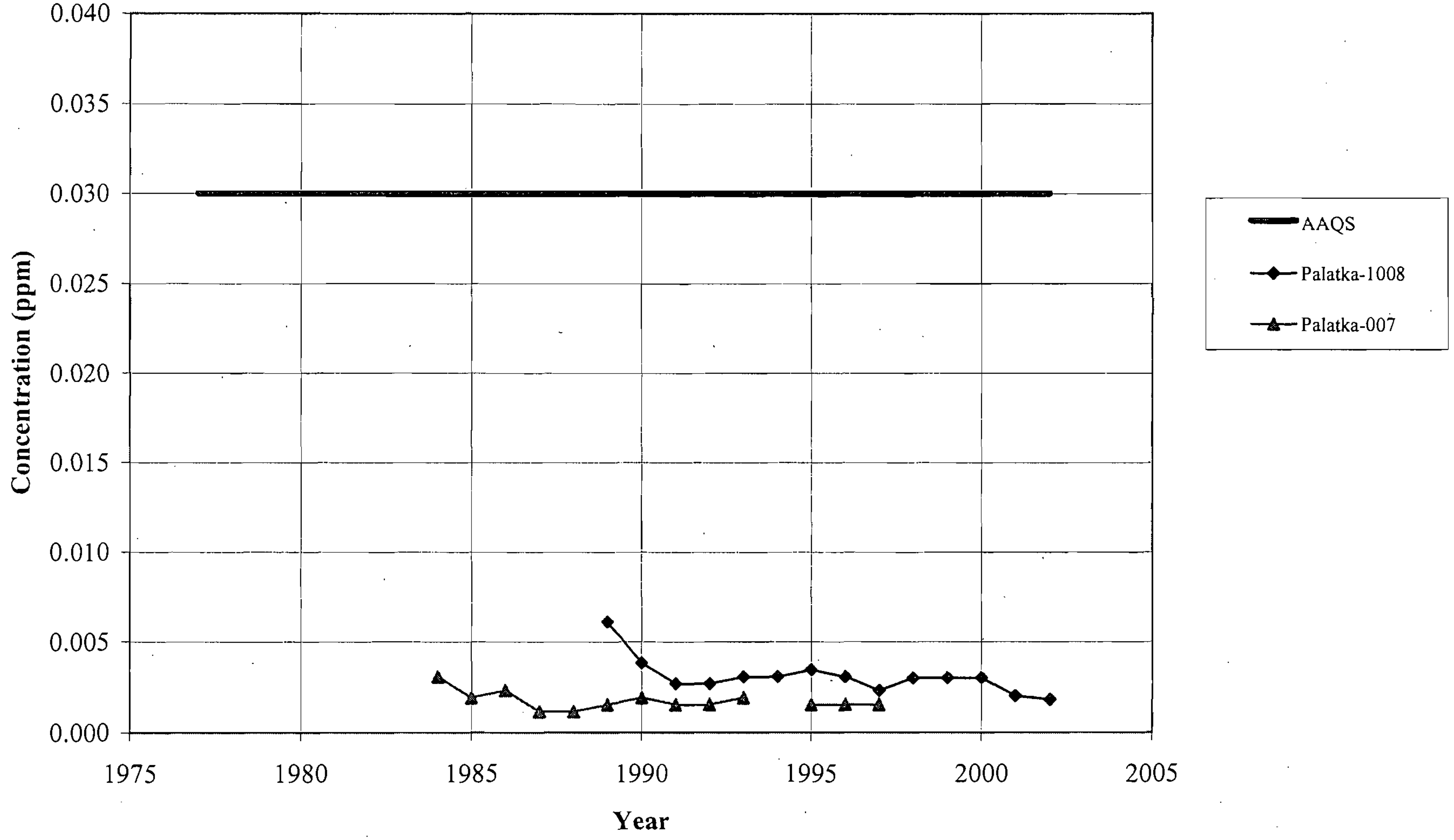


FIGURE C-19
MEASURED 24-HOUR AVERAGE PM_{10} CONCENTRATIONS
(1988 to 2002)
AND TOTAL SUSPENDED PARTICULATE CONCENTRATIONS
(1981 to 1987)
(2nd Highest Values) - Putnam County

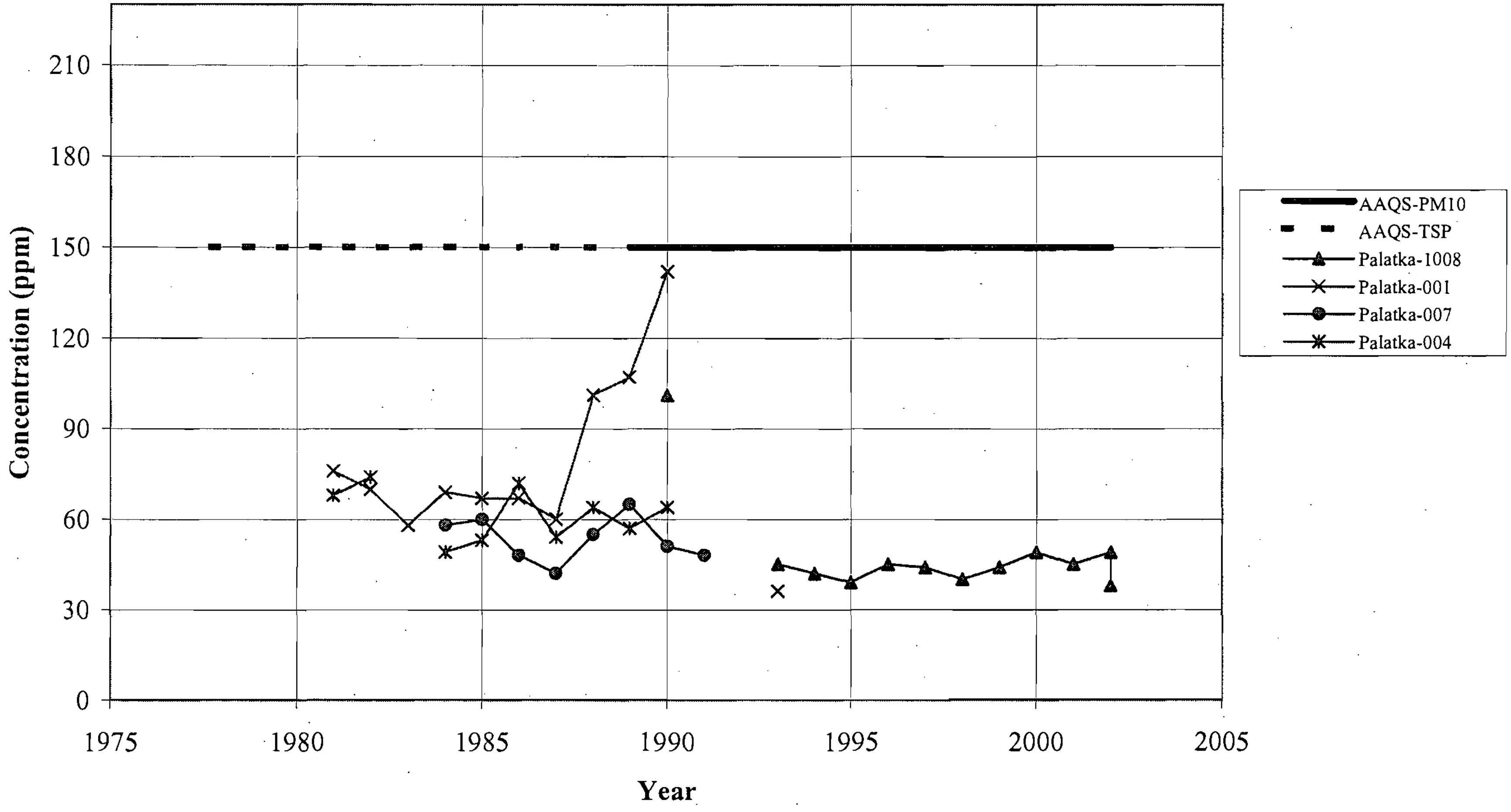


FIGURE C-20
MEASURED ANNUAL AVERAGE PM_{10} CONCENTRATIONS (1988 to 2002) AND TOTAL SUSPENDED PARTICULATE CONCENTRATIONS (1981 to 1987)
Putnam County

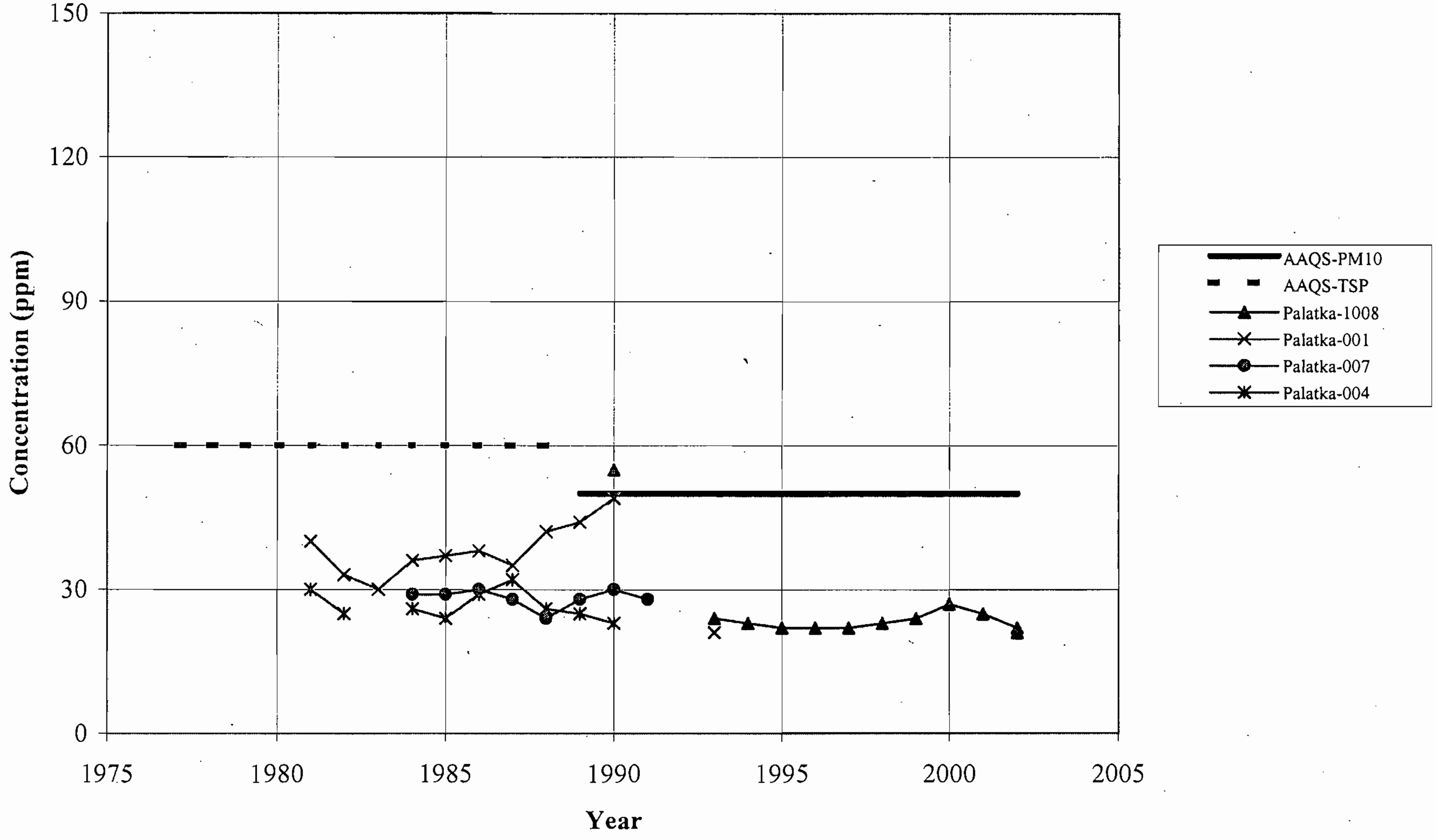


FIGURE C-21
MEASURED ANNUAL AVERAGE NITROGEN DIOXIDE CONCENTRATIONS FROM 1981 to 2002
Putnam County

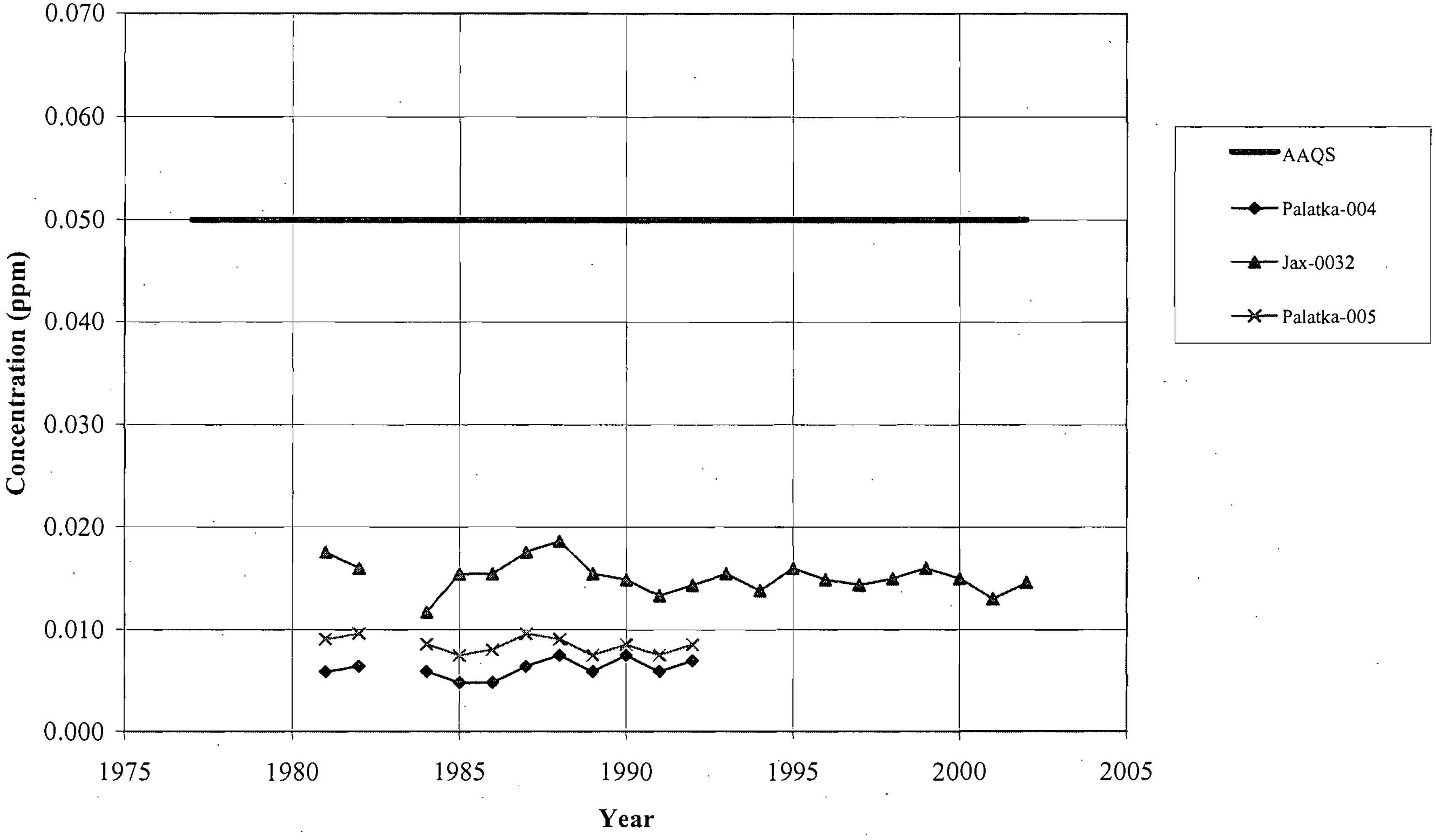


FIGURE C-22
MEASURED 1-HOUR AVERAGE CARBON MONOXIDE CONCENTRATIONS
(2nd Highest Values) from 1981 to 2002 - Putnam County

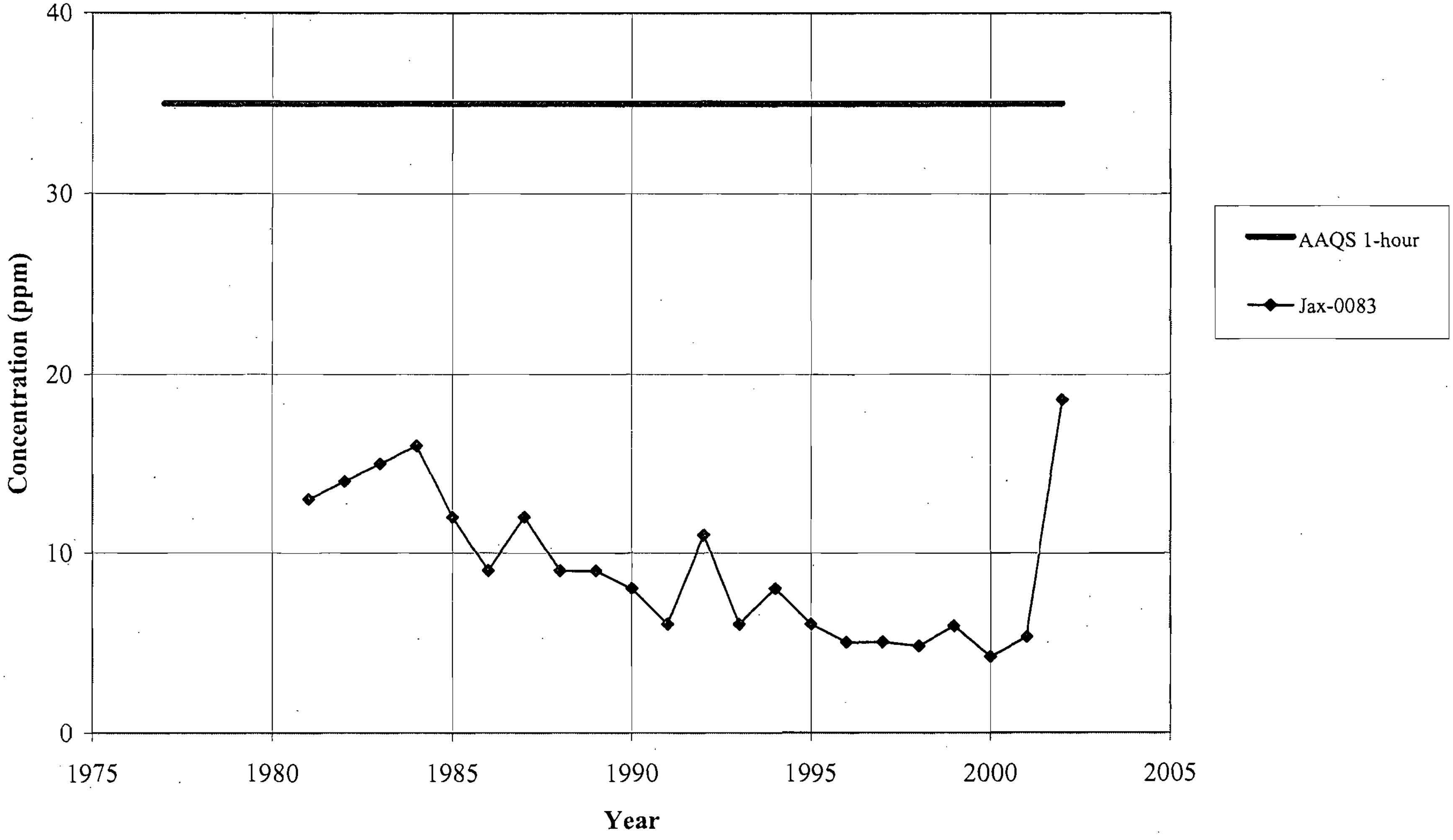


FIGURE C-23
MEASURED 8-HOUR AVERAGE CARBON MONOXIDE CONCENTRATIONS
(2nd Highest Values) from 1981 to 2002 - Putnam County

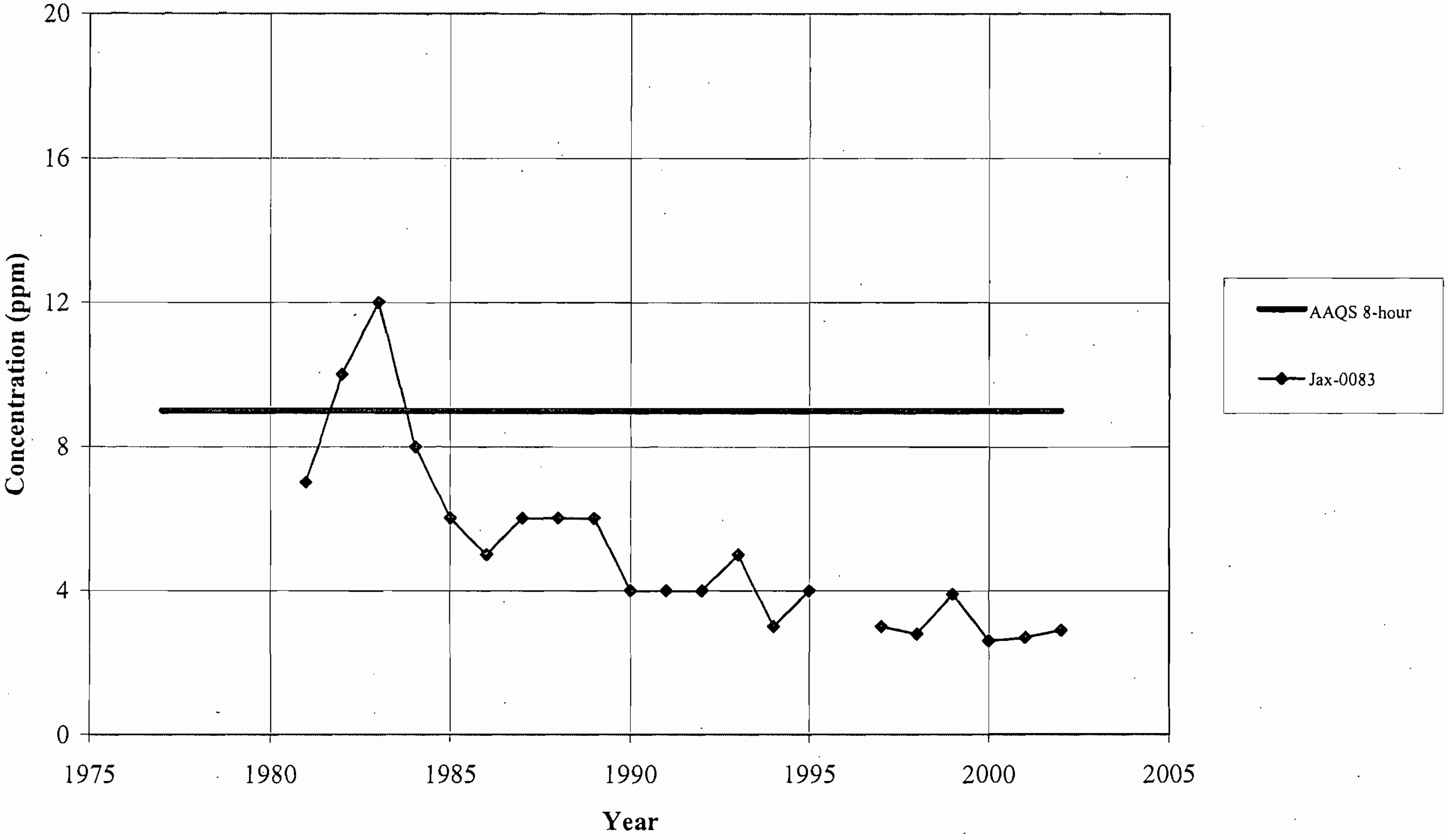


FIGURE C-24

MEASURED 1-HOUR AVERAGE OZONE CONCENTRATIONS

(2nd Highest Values) from 1981 to 2002

Putnam County

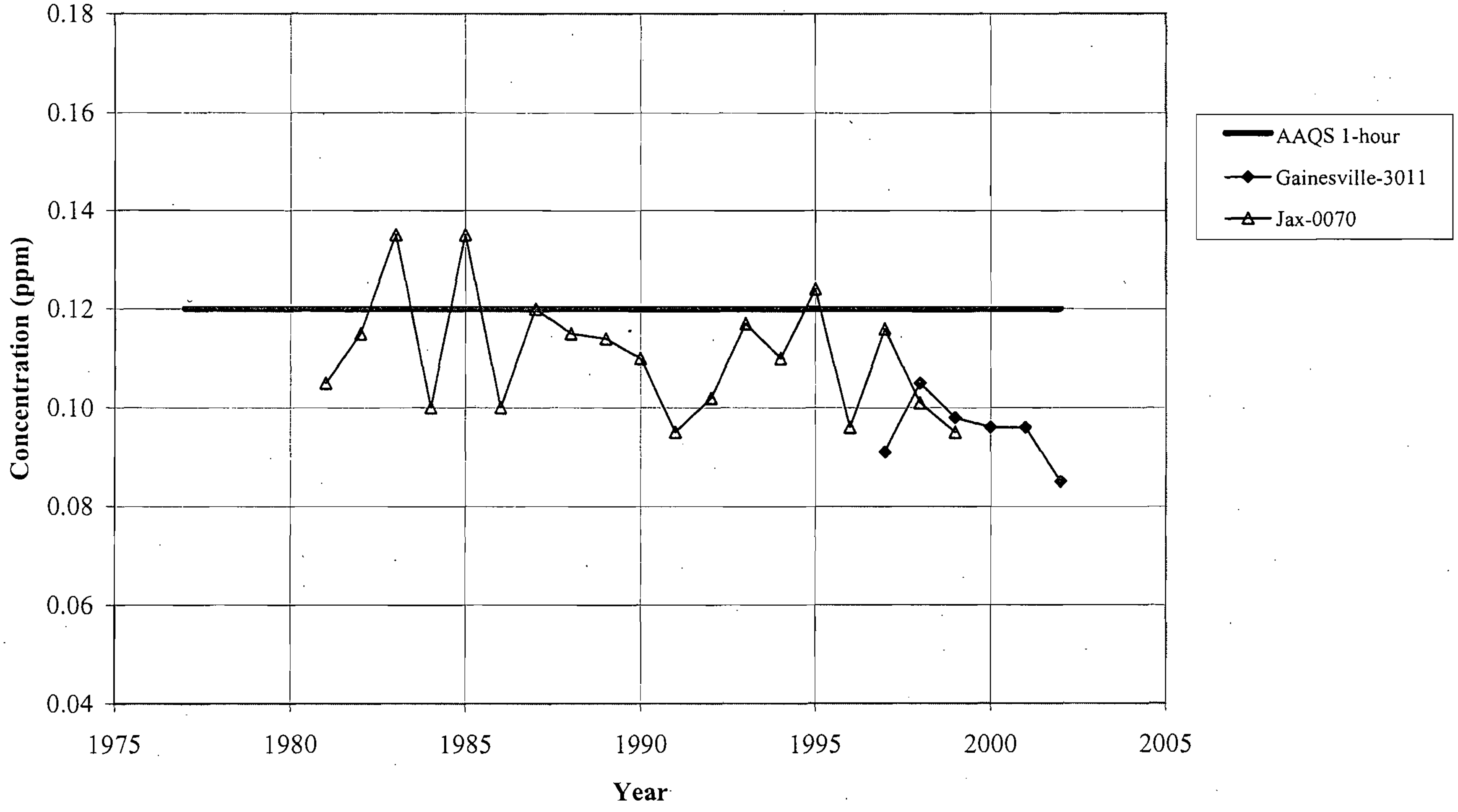
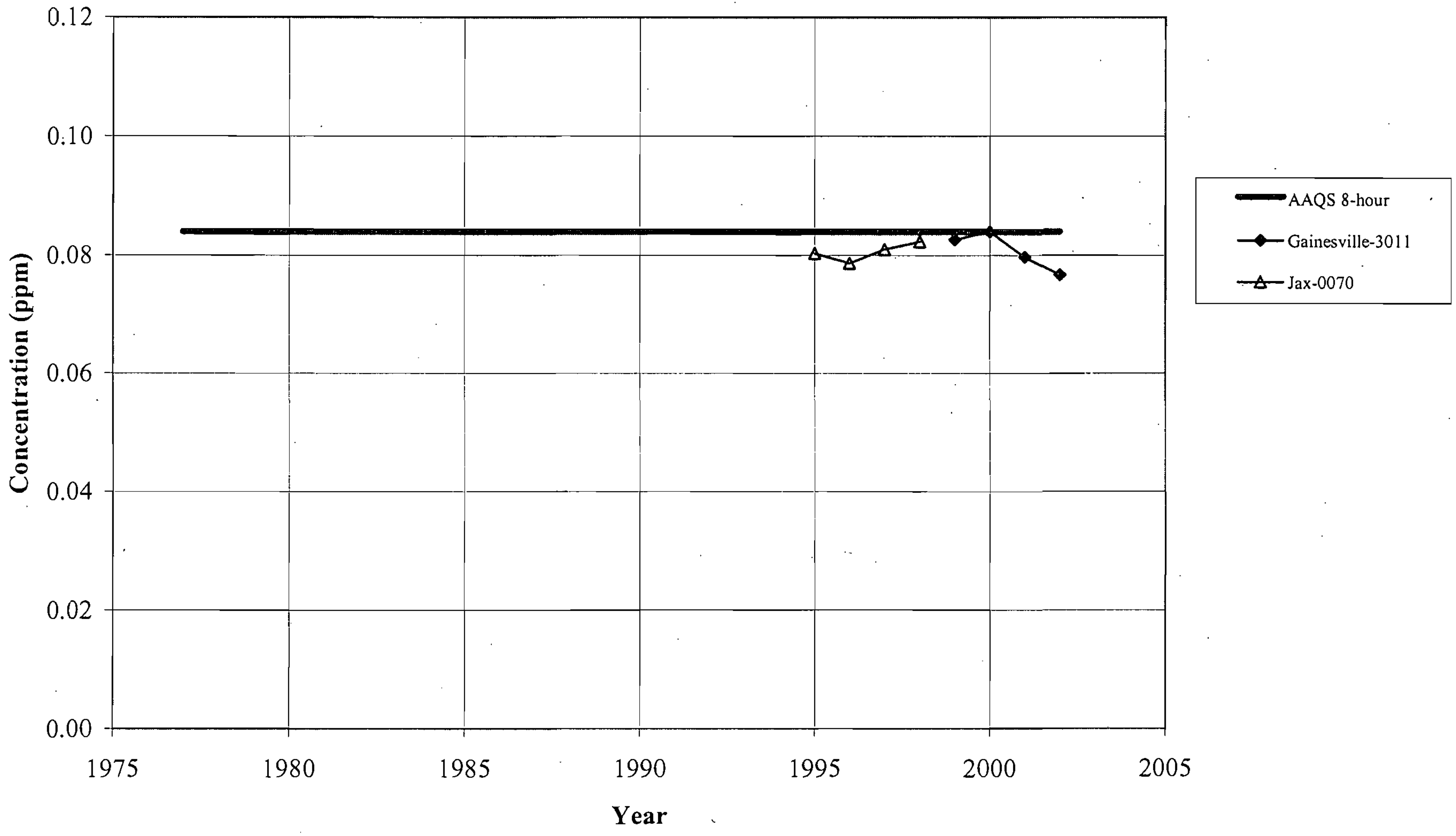


FIGURE C-25
MEASURED 8-HOUR AVERAGE OZONE CONCENTRATIONS
(3-Year Average of the 4th Highest Values) from 1995 to 2002
Putnam County



APPENDIX C-1

STRUCTURE DIMENSIONS FOR THE CHIP-N-SAW MILL USED IN THE MODELING ANALYSIS

Structure	**Height**		**Length**		**Width**	
	(ft)	**(m)**	**(ft)**	**(m)**	**(ft)**	**(m)**
Chip-N-Saw Building	25	7.6	116	35.4	112	34.1
Dry Finish Lumber Shed	20	6.1	200	61.0	50	15.2
Dry Rough Lumber Shed 1	20	6.1	200	61.0	50	15.2
Dry Rough Lumber Shed 2	20	6.1	200	61.0	80	24.4
Kiln 1	30	9.1	68	20.7	33	10.1
Kiln 2	30	9.1	68	20.7	33	10.1
Kiln Fuel Silo	72	21.9	28	8.5	28	8.5
Sorter	21.5	6.6	140	42.7	29	8.8
Stacker	21	6.4	84	25.6	37	11.3
Planer Mill	22	6.7	195	59.4	120	36.6

ATTACHMENT D

BEST AVAILABLE CONTROL TECHNOLOGY (BACT) ANALYSIS FOR NO. 4 RECOVERY BOILER

ATTACHMENT D
BEST AVAILABLE CONTROL TECHNOLOGY (BACT) REVIEW FOR NO. 4 RECOVERY BOILER

PROJECT DESCRIPTION

The Recovery Boiler is at the heart of the Kraft chemical recovery process. It fulfills the following essential functions:

(1) Evaporates residual moisture from the black liquor solids.
(2) Burns the organic constituents.
(3) Supplies heat for steam generation.
(4) Reduces oxidized sulfur compounds to sulfide.
(5) Recovers inorganic chemicals in molten form.
(6) Conditions the products of combustion to minimize chemical carryover.

Heavy black liquor from the pulping process is sprayed directly into the Boiler. The liquor droplets dry and partially paralyze before falling onto the char bed. Incomplete combustion in the porous char bed causes carbon and carbon monoxide to act as reducing agents, thus converting sulfate and thiosulfate to sulfide. The heat is sufficient to melt the sodium salts, which filter through the char bed to the floor of the Boiler. The "smelt" then flows by gravity through water-cooled spouts to the No. 4 Smelt Dissolving Tanks.

The No. 4 Recovery Boiler (Emission Unit 018) was originally constructed in the mid-1970s. The current, permitted capacity of the Boiler is 210,000 pounds per hour (lbs/hour) of black liquor solids (BLS) and 5.04 million pounds (MM lbs) of BLS per day. The Boiler is also permitted to combust natural gas, No. 6 fuel oil with a sulfur content not to exceed 2.35% by weight and on-spec used oil as start-up fuels. The Recovery Boiler is equipped with an electrostatic precipitator (ESP) for particulate matter control.

This PSD application is being submitted to implement several projects for the No. 4 Recovery Boiler and associated evaporators. First, the Mill plans to replace a large percentage of the tubes in the Recovery Boiler. This includes tubes in the superheater, economizer, and generating banks of the Boiler. This major tube work is estimated to commence in May 2007 and conclude in 2008. The total cost of this work is estimated to be in the range of $24 million.

Although still in the preliminary engineering phase, the Mill is also considering replacement of, or changes to, the combustion air system for the Boiler. The objective of this part of the project is to lower peak furnace exit gas temperature and velocity into the superheater in an effort to reduce the potential for corrosion and pluggage of the superheater in the future. The new air system is also expected to reduce carry over and fouling in the Boiler convection banks. Through the staging of air, it is anticipated that emissions of some pollutants (*e.g.,* total reduced sulfur (TRS) compounds and carbon monoxide (CO)) will be more consistently controlled and/or reduced. At the same time, by reducing TRS and CO and increasing boiler efficiency, nitrogen oxide (NO_x) emissions are expected to increase slightly. The Mill is in the process of receiving vendor quotations for this work, including suggested scope. As such, the exact scope of this work is not available at this time.

A third project involves a modification to the black liquor evaporation system (No. 4 Evaporator Set). This change would increase the solids concentration of the black liquor to the Recovery Boiler from 65 percent solids to approximately 75 percent solids. When the new system is operational, the liquor from the concentrator will pass through a Crystallizer vessel to raise the temperature of the liquor. The liquor will then enter a storage/flash tank at lower pressure where the moisture will "flash off". The "flash" vapors will then be routed to the existing evaporator system and collected as part of the existing non-condensable gas (NCG) collection system. The purpose of the project is to increase Boiler efficiency by reducing the amount of water entering the Boiler with the liquor solids. By reducing the amount of water vaporization being performed by the Boiler, less supplemental fuel will be required to process the same amount of BLS. Furthermore, the increase in solids will improve the efficiency of the Boiler for steam production per pound of BLS, thus reducing the amount of steam produced from oil in the other boilers.

Finally, the Mill is considering the removal of some internal baffles and resizing some downcomer piping in the existing concentrators. The unit currently has scaling problems, leading to frequent "boil outs". The proposed changes will improve liquor circulation and increase velocity through the tubes, which should reduce scaling and fouling. This will increase the time between "boil outs". In addition, an external heat exchanger will be added to the existing concentrators to preheat the liquor with steam prior to entry into the concentrators. This will allow for increased evaporation surface, providing for a capability that more closely matches the capacity of the Recovery Boiler.

APPLICABILITY

The following pollutants are subject to PSD review as shown in Table 5-1 of the main text of this application package and are therefore subject to the BACT review for this project:

- Particulate matter (PM), including particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10})
- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Sulfuric acid mist (SAM)
- Ozone (based on a significant increase in volatile organic compounds (VOCs))

Each of these pollutants is addressed in turn in the following section.

BACT ANALYSIS FOR THE NO. 4 RECOVERY BOILER

Particulate Matter (PM/PM_{10})

Step 1a-Identification of Control Technologies-Typical Technologies in Use in the United States

Emission control equipment that may be selected to control particulate matter emissions from recovery boilers includes ESPs, baghouses, and high efficiency wet scrubbers. Each of these types of control equipment, described more fully below, is capable of significantly reducing particulate matter emissions.

Electrostatic Precipitators(ESPs)

ESPs use electrical energy to charge and collect particles with very high removal efficiencies. The classification of ESPs may be as wet or dry systems and/or single-stage or two-stage systems. Dry systems are the predominant type used in industrial applications. Wet systems are gaining in use today since they eliminate the possibility of fires, which can sometimes occur in dry systems.

The principal components of an ESP include the housing, discharge and collection electrodes, power source, cleaning mechanism, and solids handling systems. The housing is gas-tight, weatherproof, and grounded for safety. Dust particles entering the housing are charged by ions from the discharge electrodes. Dust is collected on the collection electrodes. The collection electrodes are also referred to as plates. The system voltage and the distance between the discharge and collection electrodes govern the electric field strength and the amount of charge on the particles. ESPs are most effective at collecting coarse, larger particles above the 1 micron (μm) size. Particles smaller than this are difficult to remove because they can inhibit the generation of the charging corona in the inlet field, thereby reducing collection efficiency. Rappers and liquid washdown serve as the cleaning mechanisms for dry and wet ESPs, respectively. Dust hoppers collect the precipitated particles from a dry ESP. Wet sluicing is used to remove wet particles. Dry dust is removed continuously or periodically from the hopper and stored in a container until final disposition. Wet solids must be continuously removed and sent to a holding pond or to a wastewater treatment system.

ESPs are the predominant type of particulate matter control device used on recovery boilers in the U.S. today. ESPs can achieve particulate matter removal efficiencies as high as 99.9%. Some of their advantages over other types of particulate matter control devices are listed below:

- Low power requirements and associated electrical energy costs
- Capable of removing very small particles, even those not removable by other treatment technologies
- Dry dust collection often used, which may be useful for byproduct recovery
- Temperature changes very small with dry systems
- Small pressure drops (in the range of 1-2 inches water column (w.c.) pressure)
- Low maintenance due to few moving parts
- System tolerant of high temperatures
- System capacity can easily be expanded with the addition of partitions

Some of the disadvantages of using an ESP over other particulate matter control devices are listed below:

- High capital cost
- Space requirements large
- Gaseous wastes are not controlled
- Safety is a concern due to high voltage
- Wet systems produce sludges that may require dewatering before disposal

Baghouses

A baghouse, or fabric filter, is one of the most efficient devices for removing particulate matter. Baghouses have the capability of maintaining collection efficiencies above 99% for particles down to 0.3 μm in size. The basic components of a fabric filter unit consist of woven or felted fabric, usually in the form of bags that are suspended in a housing structure (baghouse), an induced draft or forced draft fan, a blow-back or reverse air fan for cleaning the bags, or a pulse-jet fan or a mechanical shaking mechanism for cleaning the bags. The emission stream is distributed by means of specially designed entry and exit plenum chambers, providing equal gas flow through the filtration medium. The particle collection mechanism for fabric filters includes inertial impaction, Brownian diffusion, gravity settling, and electrostatic attraction. The particles are collected in dry form on a cake of dust supported by the fabric or on the fabric itself. The process occurs with a relatively low-pressure drop requirement (usually within the range of 2-6 inches w.c.). Periodically, most of the cake dust is removed for disposal. Cake dust is removed by the use of a mechanical shaking or "rapping" system, with the use of reverse air, or with the use of a pulse-jet of air. Dust is collected in a hopper at the bottom of the baghouse and is removed through a valve and dumped into a storage container. Usually, the dust is disposed of at an industrial landfill.

Some of the advantages of using baghouses over other types of particulate matter control devices are listed below:

- High collection efficiency down to small particle sizes (99% control down to 0.3 μm)
- Relatively low capital cost
- Dry dust collection may be useful for byproduct recovery
- Low pressure drop

Some of the disadvantages of using baghouses compared to other types of particulate matter control devices are listed below:

- High maintenance costs due to the presence of many moving parts
- Maximum operating temperatures of about 550 degrees Fahrenheit (°F)
- Gaseous wastes are not controlled
- Space requirements large
- Cannot operate with saturated (wet) gas streams

Wet Scrubbers

Wet scrubbers are collection devices that trap wet particles in order to remove them from a gas stream. They utilize inertial impaction and/or Brownian diffusion as the particle collection mechanism. Wet scrubbers generally use water as the cleaning liquid. Water usage and wastewater disposal requirements are important factors in the evaluation of a scrubber alternative. Types of scrubbers include spray scrubbers, cyclone scrubbers, packed-bed scrubbers, plate scrubbers, and venturi scrubbers. The most common particulate matter removal scrubber is the venturi scrubber because of its simplicity (*e.g.*, no moving parts) and high collection efficiency. In this type of scrubber, a gas stream is passed through a venturi section, before which, a low-pressure liquid (usually water) is added to the throat. The liquid is atomized by the turbulence in the throat and begins to collect particles impacting the liquid as a result of differing velocities for the gas stream and atomized droplets. A separator is used to remove the particles or liquid from the gas stream. The most important design consideration is the pressure drop across the venturi. Generally, the higher the pressure drop, the higher the removal efficiency.

Advantages of using a wet scrubber compared to other particulate matter control devices are listed below:

- Adsorbs gas phase emissions, as well as particulate matter as long as proper scrubbing media is used
- Compact size
- Efficient through wide loading range
- Insensitive to moisture content
- Venturi – no moving parts

Disadvantages of using a wet scrubber compared to other particulate matter control devices are listed below:

- Inefficient with high-temperature gases
- Requires high power input to create large pressure drop and high collection efficiency
- Waste scrubber liquid handling required

Step 1b-Identification of Control Technologies-Review of RACT/BACT/LAER Clearinghouse (RBLC)

Searches of the RBLC were conducted to identify control technologies for the control of PM/PM_{10} emissions from recovery boilers.

The specific categories searched are listed below:

- External Combustion-Other-11.999
- Kraft Pulp Mills-30.002
- Pulp & Paper Production Other than Kraft-30.004

- Other Wood Products Industry Sources-30.999

The results of the search are listed in Table D-1a. As can be seen in Table D-1a, all of the entries, with just a few exceptions, indicate the use of ESPs to control PM/PM_{10} emissions from recovery boilers.

Step 1c-Identification of Control Technologies-Review of Technologies in Use at Georgia-Pacific Corporation Facilities

Georgia-Pacific operates numerous pulp and paper mills in the United States, with many of these employing Kraft recovery boilers. All of the recovery boilers at these facilities use ESPs to control PM/PM_{10} emissions. One facility, located in Camas, Washington (listed in the RBLC as James River Corporation, but now owned by GP), has two recovery boilers equipped with both ESPs and wet scrubbers. The wet scrubbers were installed to recover heat and make hot process water for use in the Mill. The wet scrubbers were not installed to control particulate matter emissions, which is accomplished by the ESPs.

Step 2-Technical Feasibility Analysis-Eliminate Technically Infeasible Options

While baghouses can achieve high levels of particulate matter control, the exhaust gas streams from the recovery boilers have relatively high moisture contents (25 to 30%) that cause the particulate matter to be hydroscopic in nature. These characteristics will cause the bag filters in the baghouse to "blind-up" and plug. These problems indicate that a baghouse is not an appropriate technology for recovery boilers. Therefore, baghouses are not considered further as part of this BACT analysis.

ESPs and wet scrubbers are feasible technologies for reducing particulate matter emissions from recovery boilers.

Step 3-Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy

ESPs are most effective in controlling fine particulate matter emissions from recovery boilers. As discussed above, ESPs are the predominant particulate matter control device listed in EPA's RBLC for Kraft recovery boilers. ESPs control particulate matter from recovery boilers at levels that exceed 99+%.

Wet scrubbers will not have any problem with the high moisture content in recovery boiler exhaust gas streams. However, the particulate matter control efficiency for a scrubber will be approximately 98% versus a control efficiency of 99+% attained by an ESP.

Step 4-Control Effectiveness Evaluation

This step of the BACT analysis is only necessary when the top control technology from Step 3 is not selected as BACT. Since the Mill already uses an ESP to collect particulate matter emissions, which is the top control technology, a control effectiveness evaluation is not necessary.

Nearly all recovery boilers in the United States employ ESPs as the particulate matter control technology. This is validated by the RBLC listings in Table D-1a, which indicate the predominant use of ESPs as BACT.

Since an ESP is the most effective technology for removing particulate matter from the No. 4 Recovery Boiler, and since the unit already utilizes an ESP to control particulate matter emissions, no additional controls are proposed.

Step 5-Select BACT

The NSPS (40 CFR 60, Subpart BB) for particulate matter from Kraft recovery boilers is 0.044 grain per dry standard cubic foot (grain/dscf) at 8% oxygen (O_2). The Maximum Achievable Control Technology (MACT) rule, promulgated in January 2001, also specifies a particulate matter emission limit of 0.044 grain/dscf at 8% oxygen. However, the No. 4 Recovery Boiler already has a Title V Permit limit of 0.03 grain/dscf at 8% O_2, which is more stringent than either the NSPS or MACT standards.

The limits listed for other recovery boilers in Table D-1a range from 0.021 grain/dscf to 0.15 grain/dscf. Therefore, BACT for the No. 4 Recovery Boiler should be the use of an ESP with a limit set equal to the current Prevention of Significant Deterioration (PSD) and Title V Permit limit of 0.03 grain/dscf at 8% O_2 (75.6 lbs/hr and 331.1 tons/yr). This is at the low end of the limits contained in Table D-1a.

Nitrogen Oxides (NO_x)

Step 1a-Identification of Control Technologies-Typical Technologies in Use in the United States

NO_x is formed during combustion processes by the thermal oxidation of nitrogen in the combustion air (*i.e.,* thermal NO_x) and the oxidation of nitrogen in the fuel (*i.e.,* fuel-bound NO_x). In a recovery boiler, black liquor nitrogen content, or fuel NO_x, is the most important factor affecting NO_x formation. Fuel properties, temperature, and the stoichiometric conditions present during combustion are additional variables that affect NO_x formation. Excess oxygen in the zone where the bulk of black liquor combustion takes place is also an important factor for NO_x formation.

There are two main approaches that can be used to reduce nitrogen oxides emissions from boilers. The first is combustion modification and the second is post-combustion controls.

Combustion Modification Techniques

There are a number of combustion modification techniques available for reducing NO_x emissions. These include:

- Staged combustion using overfire air in burners (20-50% reduction)
- Addition of levels of staged air combustion (percent reduction dependent upon the number of existing levels and number of levels added)
- Low-NO_x burners (20-50% reduction)
- Flue gas recirculation (15-20% reduction)
- Low excess air (0-30% reduction)

The combustion modification techniques listed above all reduce NO_x by minimizing its formation in the combustion chamber of the Boiler by using less oxygen than is stoichiometrically required for complete combustion of the fuel. This lowers the temperature in the combustion chamber, thus reducing the amount of thermal NO_x that is formed. To complete the combustion process, excess air is added later in the combustion process. Each of these modifications requires additional equipment, such as new fans or burners, as well as controls, to operate properly.

Post-Combustion Controls

The technologies for post-combustion control include:

- Selective non-catalytic reduction (SNCR) (25-70% reduction)
- Selective catalytic reduction (SCR) (up to 90% reduction)

Post-combustion technologies work by several different methods as explained in the following sections.

SNCR systems work by injecting ammonia or urea into the combustion chamber of the boiler, thereby converting NO_x to elemental nitrogen, carbon dioxide, and water vapor. The reaction must take place between specific temperature ranges or more NO_x will be formed instead of less NO_x. The optimum temperature range for a system that uses ammonia is 1,600 to 2,000 °F and for a system that uses urea, the optimum temperature range is 1,650 to 2,100 °F. Increasing the residence time available for mass transfer and chemical reactions generally increases NO_x removal. Variations in boiler steam load or flue gas temperature make the design and operation of an SNCR system more difficult.

SCR systems work by passing the contaminated exhaust gas stream through a catalyst bed and injecting aqueous or anhydrous ammonia just in front of the catalyst bed. This system also converts NO_x to elemental nitrogen, carbon dioxide, and water vapor, similar to an SNCR system. This reaction also has an optimum temperature range to work efficiently. The optimum temperature range for the catalyst to work efficiently is 550 to 1,000 °F (best temperature window is between 700 and 750 °F). Since the optimum temperature window for the SCR process is less than that for the SNCR process, reaction of NO_x is designed to take place downstream of the combustion chamber, as opposed to inside the combustion chamber as is the case for an SNCR system. Most designs install the reaction chamber downstream of the economizer, but upstream of the air pre-heater, where the metal oxide-based catalyst works best. Reheating of the flue gas is required for reaction chambers located downstream of the air pre-heater.

Most of the operating parameters discussed above for an SNCR system are valid for an SCR system as well, except for catalyst management. Catalysts can lose their activity over time for a number of reasons as discussed below:

> *Poisoning*-certain fuel constituents released during the combustion process can act as catalyst poisons. Catalyst poisons include calcium and magnesium oxides, potassium, sodium, arsenic, chlorine, fluorine, and lead. These constituents deactivate the catalyst by diffusing into active pore sites and occupying them irreversibly.
>
> *Thermal Sintering*-high flue gas temperatures cause sintering (*i.e.,* a permanent loss of catalyst activity due to a change in pore structure of the catalyst). Thermal sintering can occur at temperatures as low as 450 °F. The amount of sintering that occurs is dependent upon the composition and structure of the catalyst.
>
> *Binding/Plugging/Fouling*-ammonia salts, fly ash, and other particulate matter in the flue gas can cause binding, plugging, and/or fouling of the catalyst. The particulate matter deposits in the active pore sites of the catalyst, which results in a decrease in the number of sites available for NO_x reduction and an increase in flue gas pressure loss across the catalyst bed.
>
> *Erosion and Aging*-catalysts with hardened leading edges or increased structural strength are less susceptible to erosion. Increasing catalyst strength by hardening reduces the number of active pore sites. Catalyst aging occurs over a period of time, which changes the physical and chemical properties of the catalyst.

There are methods available to minimize the possibility of the catalyst from deactivating over time (because of the reasons listed above). These include the use of soot blowers to dislodge deposits of particulate matter on the catalyst, turning vanes and rectifier grids to remove some of the particulate matter from the flue gas before it reaches the catalyst, and replacing the catalyst on a routine basis before it becomes poisoned or deactivated. Catalyst replacement can be a significant part of the operating costs for an SCR system

Similar to an SNCR system, an SCR system requires an aqueous or anhydrous ammonia or urea storage, feed, and control system, to operate properly.

Step 1b-Identification of Control Technologies-Review of RACT/BACT/LAER Clearinghouse

Searches of the RBLC were conducted to identify control technologies for the control of NO_x emissions from recovery boilers.

The specific categories searched are listed below:

- External Combustion-Other-11.999
- Kraft Pulp Mills-30.002
- Pulp & Paper Production Other than Kraft-30.004
- Other Wood Products Industry Sources-30.999

The results of the searches are listed in Table D-1b and are summarized below:

- No controls feasible
- Boiler design and good combustion practices
- Low-NO_x burner for natural gas combustion
- Proper combustion techniques and operating practices
- Staged combustion
- Boiler design and operation
- Combustion control
- Addition of 4th level of air

Step 1c-Identification of Control Technologies-Review of Technologies in Use at Georgia-Pacific Corporation Facilities

Some of the recovery boilers located at GP mills utilize four levels of staged combustion control, some of the boilers utilize three levels of staged combustion control, and some of the boilers utilize only two levels of staged combustion control. None of the boilers use any type of add-on control, such as SCR, to control NO_x emissions. Average NO_x emission rates during normal operations from GP's recovery boilers range from 70-150 parts per million by volume (ppmv).

Step 2-Technical Feasibility Analysis-Eliminate Technically Infeasible Options

Combustion modification techniques as a control option are technically feasible for recovery boilers and most recovery boilers employ one type of combustion technique or another. Probably the most widely used combustion technique is staged combustion where there are two to four different stages of combustion air supplied to the boiler at successively higher points in the body of the boiler.

Relative to flue gas treatment as a control option, SNCR is not considered technically feasible for Kraft recovery boilers based on the fact that a recovery boiler is a complete, chemical reaction system and any disruption of the delicate chemistry could potentially damage the boiler, impact the quality of the product, or otherwise unacceptably affect the system. The injection of a urea solution or ammonia gas would have a detrimental effect upon the chemistry inside of a recovery boiler. For these reasons, SNCR is considered technically infeasible for a recovery boiler and it is not considered further in this BACT analysis.

It is questionable if an SCR system is technically feasible for the treatment of flue gases generated by a recovery boiler. The toxic metals present in the flue gas exhaust, even after passing through the ESP, are of sufficient quantity to build-up on the surface of the catalyst bed and poison the catalyst within relatively short periods of time. Additionally, the flue gas exhaust would need to be heated from a temperature of about 425 °F to at least 700 °F in order for the catalyst to work efficiently. This will add significant cost for a duct burner combusting natural gas, as well as add NO_x emissions back into the environment.

To verify that an SCR system is not economically feasible for a recovery boiler, a cost estimate for the installation and operation of an SCR system is presented under Step 4 of this section (see below), even though an SCR system is probably not suitable because of the likelihood of catalyst poisoning.

Low-NO_x burners represent a method for lowering NO_x emissions for the combustion of fossil fuels in a recovery boiler, however, the Mill only burns No. 6 fuel oil in the No. 4 Recovery Boiler for periods of start-up and shut-down, and not during normal operations. Natural gas is only burned to fuel a pilot light which in turn is used to light the No. 6 fuel oil. It would not be practical to use low-NO_x burners for short periods of time that are not representative of normal operation for the boiler.

Step 3-Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy

SNCR was eliminated due to technical infeasibility. SCR and combustion modification techniques are the only remaining control technologies to be evaluated. As stated earlier, SCR control systems can reduce NO_x emissions by as much as 90%. Combustion modification techniques can reduce NO_x emissions by varying amounts, depending upon the technology selected and the baseline emission rate. Each of these technologies is discussed under Step 4 below.

Step 4-Control Effectiveness Evaluation

A cost effectiveness evaluation for installation of an SCR system for the No. 4 Recovery Boiler is presented in Table D-2. The cost data presented in Table D-2 were used with EPA's cost factors contained in EPA's Cost Control Manual to develop the cost effectiveness for an SCR system. Based on the data contained in Table D-2, the overall costs for an SCR system are estimated to be equal to $17,620 per ton of NO_x reduced. This is based on the average 2004-2005 NO_x emission rate of 472.6 tons per year from the Recovery Boiler and an assumed 90% reduction of NO_x emissions with the SCR system. This cost effectiveness value is economically infeasible and cannot be justified for a recovery boiler.

While very little, if anything, can be done to affect black liquor nitrogen content, staged air combustion, which is integral to the operation of most recovery boilers, is the most effective strategy for minimizing NO_x formation in a recovery boiler. The No. 4 Recovery Boiler at the Palatka Mill currently employs staged combustion with primary, secondary, and tertiary combustion air. As part of the project to increase boiler efficiency, the Mill is planning to install a fourth level of combustion air. Since the Mill is installing this technology, a cost effectiveness analysis is not necessary.

Step 5-Select BACT

There is no NSPS limit for NO_x emissions from recovery boilers. As stated earlier, typical NO_x emissions from recovery boilers range from 75 to 150 ppmv, depending upon how many levels of combustion air (and the configuration of the air system in general) are used to control NO_x emissions. Table D-1b provides a listing of the NO_x BACT determinations for recovery boilers, which indicate NO_x permit limits that range from 70 to 210 ppmv. The BACT control technologies listed in Table D-1b include combustion control, staged combustion, boiler design and operation, and process controls. One entry lists low-NO_x burners, but this technology applies to a supplemental burner that fires natural gas. One entry lists the addition of a fourth level of combustion air with a NO_x emission limit of 100 ppmv.

The current Title V and PSD NO_x permit limit for the No. 4 Recovery Boiler is 80 ppmvd @ 8% O_2 and 168.5 pounds per hour.

To determine what the NO_x emission rate would be by installing a fourth level of staged air combustion, the Mill obtained proposals from a number of vendors. The guaranteed NO_x emission estimates from the vendors for the addition of a fourth level of air in the No. 4 Recovery Boiler ranged from 78 to 90 ppmv, corrected to 8% oxygen. These emission estimates are based on a black liquor solids content of 75%, which is the expected level after the crystallizer project is implemented. As the result of the project to increase boiler efficiency, TRS and CO emission rates will be reduced. However, this will result in a slight increase in NO_x emissions. To keep the NO_x emission rate from increasing beyond its current level (with only three levels of combustion air), a fourth level of combustion air is necessary.

Based on the emission guarantees from the vendors, the Mill believes that BACT should be equal to a fourth level of combustion air with the same NO_x emission rate 168.5 lbs/hr and 738.1 tons/yr (equivalent to 80 ppmvd, corrected to 8% oxygen) as contained in the current Title V Permit. The 80 ppmvd value is at the low end of the emission estimates obtained from the vendors.

Carbon Monoxide (CO)

Step 1a-Identification of Control Technologies-Typical Technologies in Use in the United States

CO is generated in a recovery boiler when there is insufficient oxygen present to achieve complete combustion of the black liquor solids in the combustion chamber of the boiler. CO generation is inversely proportional to the generation of NO_x emissions. In other words, if NO_x emissions are minimized through the use of internal combustion modification techniques, it is likely that CO emissions will be increased and vice-versa. Therefore, efforts to minimize CO emissions in a recovery boiler must be balanced so that NO_x emissions are not significantly increased.

There are two approaches that can be used to reduce CO emissions from recovery boilers. The first is combustion modification and the second is post-combustion controls (*e.g.,* oxidation catalysts).

Combustion Control

Minimizing the formation of CO emissions is usually performed by ensuring efficient combustion in the combustion chamber of a boiler. This is achieved by providing sufficient air to the material being combusted, in this case carbon, and providing the air in a manner where it mixes effectively with this material. Providing sufficient air is accomplished by providing excess air in the unit to ensure there is adequate air to complete combustion. The additional air for complete combustion is measured by the oxygen analyzers on the boiler outlet and on the stack. Proper mixing is accomplished by manually adjusting the air to the air zone which is deficient in oxygen. Depending on other operating parameters (TRS, NO_x, Bed Height, Liquor Temperature, etc.) the air can be adjusted in either one or multiple zones (primary, secondary, tertiary, or quaternary) to reduce CO without adversely affecting other operating parameters.

Oxidation Catalysts

Oxidation catalysts can be used as a post-combustion technique to reduce CO emissions by as much as 90% from the uncontrolled emission rate. The catalysts work best when the temperature of the gas stream being oxidized is between 600 and 1,100 °F, with an optimum temperature of 800 °F. If the exhaust gas stream temperature of the boiler in question is lower than the optimum temperature range, then additional heat must be used in order to raise the temperature to the desired level (the Palatka Mill's No. 4 Recovery Boiler exhaust temperature is approximately 425 °F). This may add significant operating costs to the control system since fuel must be combusted in a duct burner in order to supply the additional heat.

Oxidation catalysts are typically only used in combustion applications that use natural gas or light grade fuel oils (*i.e.,* No. 1 and No. 2 fuel oils). This is because oxidation catalysts are sensitive to heavy metals that are contained in higher-grade fuel oils (such as No. 6 fuel oil) or black liquor. Heavy metals, such as zinc, lead, mercury, copper, potassium, magnesium, arsenic and vanadium, will poison the catalyst once a build up of 0.2% (by weight) accumulates on the surface of the catalyst. Most of the referenced heavy metal contaminants are present in black liquor and No. 6 Fuel Oil. When the No. 4 Recovery Boiler is burning black liquor and/or No. 6 fuel oil, these contaminants will build-up on the surface of the catalyst, thereby poisoning the catalyst and rendering it useless for reducing CO emissions.

Even after consideration of pollution control equipment to remove particulate matter emissions from the flue gas exhaust from the No. 4 Recovery Boiler, a sufficient quantity of heavy metals will still be present to degrade or even poison the catalyst. For these reasons, it is not technically feasible to use an oxidation catalyst for reducing CO emissions from the No. 4 Recovery Boiler.

Step 1b-Identification of Control Technologies-Review of RACT/BACT/LAER Clearinghouse

Searches of the RBLC were conducted to identify control technologies for the control of CO emissions from recovery boilers.

The specific categories searched are listed below:

- External Combustion-Other-11.999
- Kraft Pulp Mills-30.002
- Pulp & Paper Production Other than Kraft-30.004
- Other Wood Products Industry Sources-30.999

The results of the searches are listed in Table D-1c and are summarized below:

- No controls feasible
- Boiler design and good combustion practices
- Proper combustion techniques and operating practices
- Boiler design and good combustion practices
- Combustion control
- Good combustion control of flame temperature and excess air
- Boiler design and operation
- Efficient operation

Step 1c-Identification of Control Technologies-Review of Technologies in Use at Georgia-Pacific Corporation Facilities

All of the recovery boilers at GP's mills utilize varying degrees of staged combustion controls to balance CO and NO_x emissions. The recovery boilers at GP's mills emit varying quantities of CO emissions during normal operations that range from 60 to 450 ppmv, with the higher values coming from older boilers and/or boilers with fewer than three levels of combustion air, and the lower values coming from newer boilers and/or boilers with three or more levels of combustion air.

Step 2-Technical Feasibility Analysis-Eliminate Technically Infeasible Options

As stated earlier, it is not technically feasible to use an oxidation catalyst to reduce CO emissions due to catalyst poisoning from heavy metal contamination. Combustion control is technically feasible for minimizing CO emissions and is inherent in the design of recovery boilers due to the use of staged combustion techniques.

Step 3-Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy

The only remaining control technology is combustion control.

Step 4-Control Effectiveness Evaluation

The most effective control technology for minimizing carbon monoxide emissions from recovery boilers is combustion control through the use of staged combustion. As discussed previously, the Palatka No. 4 Recovery Boiler employs staged combustion with primary, secondary, and tertiary combustion air.

Step 5-Select BACT

There is no NSPS limit for CO emissions from recovery boilers. The existing Title V and PSD permits limit CO emissions to 800 ppmv @ 8% O_2 on a 3-hour average basis (1,025.4 lbs/hr) and 400 ppmv @ 8% O_2 on a 24-hour and annual average basis (512.7 lbs/hr).

Based on the entries shown in Table D-1c from the RBLC, CO emission limits for recovery boilers range anywhere from 200 to 3,000 ppmv, depending upon the age of the boiler and the averaging time. As stated earlier, the CO emission rate from a recovery boiler is dependent upon the age of the boiler and its inherent design. The BACT control technologies listed in Table D-1c include combustion control, boiler design and operation, and process controls.

GP is not proposing any changes to the CO emission limits for the No. 4 Recovery Boiler as part of this BACT analysis. GP further proposes that BACT for the No. 4 Recovery Boiler be defined as “Boiler Design and Combustion Control”.

Sulfuric Acid Mist (SAM)

Step 1a-Identification of Control Technologies-Typical Technologies in Use in the United States

SAM forms as a byproduct of SO_2 emissions when condensation occurs in the gas stream. The quantity of SAM generated is small compared to the amount of SO_2 generated, usually no more than 2-4% of the SO_2 emissions.

There are three approaches that can be used to reduce SAM emissions from recovery boilers. These include mist eliminators, wet ESPs, and combustion control.

Mist Eliminators

The predominant method for controlling SAM emissions from industrial processes and sources of combustion, other than internal design, is mist eliminators. SAM particles are very small, usually in the submicron range. Mist eliminators are designed to remove fine particles, down to 0.5 micron in size. For example, one type of mesh pad manufactured by Enviro-Chem is advertised to remove 99.9% of all particles greater than 2 microns in size and 70% of particles less than 2 microns in size. This efficiency is achieved with a pressure drop of less than 3 inches w.c. pressure.

Wet ESPs

Wet ESPs may also be used to control SAM emissions from recovery boilers. Wet ESPs work similar to dry ESPs, except that the particles are washed off of the electrodes with water sprays, instead of the use of a rapping system for dry ESPs. Also, wet ESPs must be constructed of materials that are resistant to acids, otherwise, the structure of the ESP would corrode very quickly due to the acidic environment. Wet ESPs will remove 90 to 95% of the inlet SAM emissions.

Combustion Control

Combustion control to reduce SO_2 emissions is inherent in the design of a recovery boiler due to the chemical reactions that take place inside of the combustion chamber when black liquor is combusted.

Since SAM emissions make up 2 to 4% of SO_2 emissions, minimizing the generation of SO_2 emissions means that SAM emissions will be minimized as well.

Step 1b-Identification of Control Technologies-Review of RACT/BACT/LAER Clearinghouse

Searches of the RBLC were conducted to identify control technologies for the control of SAM emissions from recovery boilers.

The specific categories searched are listed below:

- External Combustion-Other-11.999
- Kraft Pulp Mills-30.002
- Pulp & Paper Production Other than Kraft-30.004
- Other Wood Products Industry Sources-30.999

The results of the searches are listed in Table D-1d and are summarized below:

- No controls
- Boiler design
- Firing rate and pulp production limits

Step 1c-Identification of Control Technologies-Review of Technologies in Use at Georgia-Pacific Corporation Facilities

All of the recovery boilers in use at GP's mills utilize combustion control to minimize the formation of SO_2 and SAM emissions.

Step 2-Technical Feasibility Analysis-Eliminate Technically Infeasible Options

As stated earlier in this analysis, the average exhaust temperature for the No. 4 Recovery Boiler is about 425 °F. At this temperature, SAM emissions would be in a gaseous state. Mist eliminators are not designed to remove gases, rather, they are designed to remove very small liquid droplets. Therefore, the use of mist eliminators for a recovery boiler is not technically feasible unless the unit already had in place a wet scrubber or other means to condense the sulfuric acid gases into a liquid mist. The No. 4 Recovery Boiler at the Palatka Mill does not have a wet scrubber or other device installed to condense the gases into a liquid mist.

The use of a wet ESP and combustion control are technically feasible options for the control of SAM emissions.

Step 3-Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy

Combustion control can reduce SO_2 emissions by 99% or more, which means that SAM emissions can be reduced by a similar amount. Wet ESPs will remove 90-95% of SAM emissions.

Step 4-Control Effectiveness Evaluation

The most effective control technology for reducing SAM emissions from recovery boilers is combustion control. Based on stack test data collected over the 5-year period, 1999 through 2003, SAM emissions are generally less than 1.5 lbs/hour and 0.5 ppmv.

GP is unaware of any recovery boilers in the United States that employ mist eliminators to control SAM emissions.

GP selects the only remaining control technology, combustion control, as BACT.

Step 5-Select BACT

There is no NSPS limit for SAM emissions from recovery boilers. Table D-1d provides a listing of the SAM BACT determinations for recovery boilers. These limits range from 2.2 to 20 pounds per hour. The BACT control technologies listed in Table D-1d include "boiler design" and "no controls".

The current Title V Permit limit for SAM emissions is 0.81 ppmv. Based on recent stack test results (2004-2005), SAM emissions are less than the permit limit. GP proposes that BACT for the No. 4 Recovery Boiler be defined as "Boiler Design and Combustion Control" with an emissions limit of 3.6 lbs/hr, which is equivalent to the current Title V Permit limit of 0.81 ppmv.

Volatile Organic Compounds (VOCs)

Step 1a-Identification of Control Technologies-Typical Technologies In Use in the United States

The VOC emission rate is an inverse function of combustion efficiency. In other words, maintaining high combustion efficiencies will lower the VOC emission rate. This holds true in most combustion-related processes, including recovery boilers.

The same two approaches that can be used to reduce CO emissions from recovery boilers can also be used for reducing VOC emissions. The first approach is combustion control and the second approach is post-combustion controls (*e.g.,* oxidation catalysts):

Combustion Control

Just as efficient combustion will minimize the formation of CO emissions, VOC emissions will also be minimized by ensuring efficient combustion in the combustion chamber of a recovery boiler. This is achieved by having the correct controls in place to assure the proper black liquor solids to combustion air ratio in the combustion chamber of the boiler.

Oxidation Catalysts

Oxidation catalysts that are used as a post-combustion technique to reduce CO emissions will also reduce VOC emissions by as much as 90 to 95% from the uncontrolled emission rate. The catalysts work best when the temperature of the gas stream being oxidized is between 600 and 1,100 °F, with the optimum temperature of 800 °F. If the exhaust gas stream temperature of the boiler in question is lower than the optimum temperature range, then additional heat must be added in order to raise the temperature to the desired level. This may add significant operating costs to the control system since fuel must be combusted in a duct burner in order to supply the additional heat.

Oxidation catalysts are typically only used in combustion applications that use natural gas or light grade fuel oils (*i.e.,* No. 1 and No. 2 fuel oils). This is because oxidation catalysts are sensitive to heavy metals that are contained in higher-grade fuel oils or black liquor. Heavy metals, such as zinc, lead, mercury, copper, potassium, magnesium, arsenic and vanadium, will poison the catalyst once a build up of 0.2% (by weight) accumulates on the surface of the catalyst. Most of the referenced heavy metal contaminants are present in black liquor. When the No. 4 Recovery Boiler is burning black liquor, these contaminants will build-up on the surface of the catalyst, thereby poisoning the catalyst and rendering it useless for reducing VOC emissions.

Even after consideration of pollution control equipment to remove particulate matter emissions from the flue gas exhaust from the No. 4 Recovery Boiler, a sufficient quantity of heavy metals will still be present to degrade or even poison the catalyst. For these reasons, it is not technically feasible to use an oxidation catalyst for reducing VOC emissions from the No. 4 Recovery Boiler.

Step 1b-Identification of Control Technologies-Review of RACT/BACT/LAER Clearinghouse

Searches of the RBLC were conducted to identify control technologies for the control of VOC emissions from recovery boilers.

The specific categories searched are listed below:

- External Combustion-Other-11.999
- Kraft Pulp Mills-30.002
- Pulp & Paper Production Other than Kraft-30.004
- Other Wood Products Industry Sources-30.999

The results of the searches are listed in Table D-1e and are summarized below:

- No controls
- Combustion control
- Boiler design and good combustion practices
- Low odor design

Step 1c-Identification of Control Technologies-Review of Technologies in Use at Georgia-Pacific Corporation Facilities

As described above for CO, the recovery boilers in use at GP facilities utilize varying degrees, or stages, of combustion air to maintain adequate combustion efficiency and low CO emission rates. The same control technique also minimizes VOC emissions.

Step 2-Technical Feasibility Analysis-Eliminate Technically Infeasible Options

As stated earlier in this report, it is not technically feasible to use an oxidation catalyst to reduce VOC emissions due to catalyst poisoning from heavy metal contamination. Combustion control is technically feasible for minimizing VOC emissions and is inherent in the design of recovery boilers due to the use of staged combustion techniques.

Step 3-Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy

The only remaining control technology is combustion control.

Step 4-Control Effectiveness Evaluation

The most cost effective control technology for minimizing VOCs from recovery boilers is combustion control through the use of staged combustion. As discussed previously, the No. 4 Recovery Boiler employs staged combustion with primary, secondary and tertiary combustion air.

Step 5-Select BACT

There is no NSPS limit for VOC emissions from recovery boilers. Table D-1e provides a listing of the VOC BACT determinations for recovery boilers. These limits range from 2.8 to 50 ppmv and 3.7 to 233 pounds per hour. The current Title V Permit limit for VOC emissions from the No. 4 Recovery Boiler is 31.5 lbs/hr, which is based on an emission factor of 0.3 lb/ton of black liquor solids. Based on recent discussions with the

FL DEP, GP has agreed to lower the VOC emission factor for the No. 4 Recovery Boiler to 0.2 lb/ton of black liquor solids.

GP proposes that BACT for the No. 4 Recovery Boiler be defined as Boiler Design and Combustion Control with potential emission rates of 21.0 lbs/hr and 92.0 tons/yr.

TABLE M/PM$_{10}$

FACILITY NAME	STATE	PERMIT DATE	THRUPUT	THRUPUT UNITS	EMISSIONS	EMISSION UNITS	CONTROL TECHNOLOGY DESCRIPTION
SIMPSON LEE PAPER CO.	CA	1/14/1975	6000	GAL/H B.L.	0.15	GR/DSCF	ESP
ALABAMA RIVER PULP CO., INC	AL	11/6/1975	1086	T ADP/D	0.044	GR/DSCF AT 8% O2	ESP
UNION CAMP CORP.	AL	11/15/1977	1340	T ADP/D	0.044	GR/DSCF AT 8% O2	ESP
LEAP RIVER FOREST	MS	3/14/1980	999999	MMBTU/HR	0.044	GR/DSCF	DRY COLLECTION & SCRUBBER
HAMMERMILL PAPER	AL	3/26/1980	382	MMBTU/H	4	LB/ADTP	ESP
HAMMERMILL PAPER	AL	3/26/1980	737	MMBTU/H	66.2	LB/HR	ESP
WEYERHAEUSER CO.	MS	5/22/1980	155	T/H BLS	0.044	GR/DSCF	ESP
KIRBY FOREST INDUSTRIES	TX	8/14/1980	935	MMBTU/H	83.4	LB/HR	WET BOTTOM ESP
WILLAMETTE INDUSTRIES, INC.	KY	12/3/1980	540	T/H	0.04	GR/DSCF	ESP
SCOTT PAPER	AL	1/15/1981	1100	T/D ADP	0.044	GR/DSCF	ESP
WESTVACO CORP.	SC	2/24/1981	187500	LB/H BLS	0.027	GR/DSCF	ESP
CHAMPION INTERNATIONAL CORP.	MI	3/17/1981	380000	LB/H	0.044	GR/DSCF	ESP
UNION CAMP CORP.	SC	2/25/1982	2.3	MM LB/D BLS	0.044	GR/DSCF	ESP AT 8% O2
BOWATER CAROLINA CO.	SC	5/3/1982	900	T/D ADP	0.044	GR/DSCF	ESP
INDEPENDENT KRAFT CORP.	AL	2/23/1983	763	T ADP/D	0.044	GR/DSCF AT 8% O2	ESP
POTLATCH	ID	4/25/1983	90	T/H BLS	58	LB/HR SEE NOTE 2	ESP
WEYERHAEUSER CO.	WA	1/17/1984	4.5	MMLB/D BLS	0.06	GR/DSCF CORRECTED TO	ESP
WILLAMETTE INDUSTRIES, INC.	KY	8/6/1984	600	T/D ADP	0.04	GR/DSCF AT 8% O2	ESP
NEKOOSA PAPER CO.	AR	10/1/1985	4.4	MMLB/D BLS	0.044	GR/DSCF	ESP
GEORGIA-PACIFIC CORP.	FL	11/15/1985	607500	LB/H STEAM AT 900F	0.044	GR/DSCF CORR TO 8% O	ESP
S.D. WARREN CO.	ME	6/23/1988	375	MMBTU/H	0.021	GR/DSCF	ESP
WILLAMETTE INDUSTRIES	SC	9/29/1988	840	T/D ADP	0.03	GR/DSCF AT 8% O2	ESP
MEAD COATED BOARD	AL	10/1/1988	1500	T ADP/D	0.044	GR/DSCF AT 8% O2	ESP & INCINERATION
LOUISIANA PACIFIC CORP.	CA	2/22/1989	830	T/D ADP	0.025	GR/DSCF	ESP
GEORGIA-PACIFIC CORP.	ME	4/12/1989	1450	T/D ADP	0.021	GR/DSCF	ESP
UNION CAMP PULP AND PAPER MILL	SC	5/1/1989	1463	T/D ADP	0.03	DR/DSCF AT 8% O2	ESP
UNION CAMP PULP AND PAPER MILL	SC	5/1/1989	822	T/D ADP	0.036	GR/DSCF AT 8% O2	ESP
CHAMPION INTERNATIONAL	AL	7/18/1989	4.18	MMLBS/D BLS	0.027	GR/SDCF AT 8% O2	ESP
BOISE CASCADE CORP.	ME	7/18/1989	4	MMLB/D BLS	0.044	GR/DSCF	ESP
WEYERHAEUSER CO.	MS	10/24/1989	5	MMLB/D BLS	0.03	GR/DSCF AT 8% O2	ESP
GREAT SOUTHERN PAPER	GA	12/8/1989	63.56	T/H BLS	46	LB/HR	ESP
ALABAMA RIVER PULP CO.	AL	1/22/1990	5.5	MMLB/DAY BLS	0.025	GR/DSCF AT 8% O2	ESP
LONGVIEW FIBRE CO	WA	7/27/1990	1100	T ADP/D	0.027	GR/DSCF AT 8% O2	ESP
RIVERWOOD INTERNATIONAL	GA	12/21/1990	3.5	MMLB/D BLS	0.027	GR/DSCF	ESP
CHESAPEAKE CORP.	VA	3/1/1991	62.5	T BLS/H	0.03	GR/DSCF AT 8% O2	ESP
GULF STATES PAPER	AL	3/12/1991	3.3	MMLB/D BLS	0.025	GR/DSCF AT 8% O2	ESP
GEORGIA-PACIFIC CORPORATION	FL	6/12/1991	--	MMBTU/HR	0.033	GR/DSCF AT 8% O2	ESP
JAMES RIVER CORP.	WA	9/26/1991	523	MMBTU/H	0.033	GR/DSCF AT 8% O2	ESP W/HEAT RECOVERY SCRUBBER
JAMES RIVER CORP.	WA	9/26/1991	770	MMBTU/H	0.033	GR/DSCF AT 8% O2	ESP W/HEAT RECOVERY SCRUBBER
BOISE CASCADE CORPORATION	AL	4/1/1992	32600	LB BLS/DAY	0.021	GR/DSCF AT 8% O2	ESP
LEAF RIVER FOREST PRODUCTS	MS	7/14/1992	6.4	MM LB/DAY BLS	0.04	GR/DSCF @ 8% O2	ESP, COMBUSTION CONTROL
PENNTECH PAPERS INC. SUBSIDIARY WILLAMETTE IND.	PA	12/9/1992	630	ADT/DAY	0.027	GR/DSCF AT 8% O2	ESP
PENNTECH PAPERS INC. SUBSIDIARY WILLAMETTE IND.	PA	12/9/1992	630	ADT/DAY	0.027	GR/DSCF AT 8% O2	ESP
WILLAMETTE INDUSTRIES	KY	9/14/1993	87500	LB/HR	0.025	GR/DSCF AT 8% O2	ESP
GEORGIA-PACIFIC CORPORATION	FL	9/21/1995	118	TPH ADUP	0.03	GR/DSCF AT 8% O2	ESP REBUILT IN 1991
WILLAMETTE INDUSTRIES - MARLBORO MILL	SC	4/17/1996	4	MM LB BLS/DAY	0.021	GR/DSCF	ESP
WEYERHAEUSER COMPANY	MS	9/10/1996	7	MM LBS/DAY	0.023	GR/DSCF @ 8% O2	ESP MOD. # M.O.420296 ENVIR. ELEM. CORP.
MEAD COATED BOARD, INC.	AL	10/9/1996	2.7	MM LBS BLS PER DAY	0.038	GR/DSCF @ 8% O2	ESP
TENNECO PACKAGING COMPANY	TN	6/17/1997	180180	LB/HR	0.027	GR/DSCF, 8% OXYGEN	ESP
GULF STATES PAPER CORPORATION	AL	12/10/1997	3.94	MM LBS BLS/DAY	0.021	GR/DSCF @ 8% O2	ESP
ROANOKE RAPIDS MILL	NC	7/31/1998	2.77	MM LBS BLS/DAY	0.021	GR/DSCF @ 8% O2	MULTIFIELD ESP
GAYLORD CONTAINER CORPORATION	LA	3/18/1999	908	MM BTU/HR	0.044	GR/DSCF	EXISTING ESP
DONAHUE INDUSTRIES	TX	10/17/2000			50.5	LB/HR	NONE INDICATED
MOSINEE PAPER CORPORATION	WI	12/18/2000	250	MM BTU/HR	79.78	T/YR	ESP
POPE & TALBOT	OR	3/2/2001	1350	TBLS/DAY	1.1	LB/TON BLS	NOT IN PERMIT
CROWN PAPER	LA	4/29/2001	68.75	TBLS/DAY	34.38	LB/TON BLS	ELECTROSTATIC PRECIPITATOR
INTERNATIONAL PAPER-MANSFIELD MILL	LA	8/14/2001	71	TBLS/HR	96.5	LB/HR	ESP
BOWATER COATED PAPER DIVISION	SC	10/31/2001			0.036	GR/DSCF @ 8% O2	ESP
LONGVIEW FIBRE COMPANY-RF # 18	WA	12/10/2001	1200	TBLS/DAY	219	TON/YR	FACILITY WILL HAVE A FEDERAL LIMIT OF PM$_{10}$ REPRESENTING A 20% REDUCTION FROM THE CURRENTLY ALLOWED EMISSION LEVELS. WITH THIS NEW BASELINE FOR POTENTIAL PM$_{10}$. BACT IS NO FURTHER CONTROL APPLICATION.
LONGVIEW FIBRE COMPANY-RF # 19	WA	12/10/2001	2000	TBLS/DAY	292	TON/YR	FACILITY WILL HAVE A FEDERAL LIMIT OF PM$_{10}$ REPRESENTING A 20% REDUCTION FROM THE CURRENTLY ALLOWED EMISSION LEVELS. WITH THIS NEW BASELINE FOR POTENTIAL PM$_{10}$, BACT IS NO FURTHER CONTROL APPLICATION.
GEORGIA-PACIFIC CORP.-PORT HUDSON MILL RF # 1	LA	1/25/2002	2.81	MM LBS BLS/DAY	37.3	LB/HR	ELECTROSTATIC PRECIPITATOR
GEORGIA-PACIFIC CORP.-PORT HUDSON MILL RF # 2	LA	1/25/2002	3.98	MM LBS BLS/DAY	56.0	LB/HR	ELECTROSTATIC PRECIPITATOR
GEORGIA-PACIFIC CORP.-CEDAR SPRINGS MILL	GA	7/25/2002			49.7	LB/HR	ESP
GEORGIA-PACIFIC CORP.-PORT HUDSON MILL RF # 1	LA	10/4/2002	2.81	MM LBS BLS/DAY	37.3	LB/HR	ELECTROSTATIC PRECIPITATOR
GEORGIA-PACIFIC CORP.-PORT HUDSON MILL RF # 2	LA	10/4/2002	3.96	MM LBS BLS/DAY	56.0	LB/HR	ELECTROSTATIC PRECIPITATOR
WEYERHEAUSER COMPANY-MARLBORO PAPER MILL	SC	12/10/2002	4.4	MM LBS BLS/DAY	0.021	GR/DSCF @ 8% O2	ELECTROSTATIC PRECIPITATOR
GEORGIA-PACIFIC CORP.-Monticello Mill RB # 1	MS	5/14/2004	861.4	MM Btu/hr	0.044	GR/DSCF @ 8% O2	ELECTROSTATIC PRECIPITATOR
GEORGIA-PACIFIC CORP.-Monticello Mill RB # 2	MS	5/14/2004	861.4	MM Btu/hr	0.044	GR/DSCF @ 8% O2	ELECTROSTATIC PRECIPITATOR

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FACILITY NAME	STATE	PERMIT DATE	THRUPUT	THRUPUT UNITS	EMISSIONS	EMISSION UNITS	CONTROL TECHNOLOGY DESCRIPTION
HAMMERMILL PAPER	AL	3/26/1980	737	MMBTU/H	114.2	LB/HR	BOILER DESIGN & GOOD COMBUSTION PRACTICES
WEYERHAEUSER CO.	MS	5/22/1980	155	TON/HR BLS	70	PPM	EQUIPMENT OPERATION
KIRBY FOREST INDUSTRIES	TX	8/14/1980	935	MM BTU/HR	67.8	LB/HR	LOW NOX BURNER, CONTINUOUS O2 MON
SCOTT PAPER	AL	1/15/1981	1100	TON/DAY ADP	242	LB/HR	EQUIPMENT OPERATION
WESTVACO CORP.	SC	2/24/1981	187500	LB/HR BLS	0.25	LB/MMBTU	BOILER DESIGN
UNION CAMP CORP.	SC	2/25/1982	2.3	MM LB/DAY BLS	210	PPMV DRY T	NO CONTROLS
INDEPENDENT KRAFT CORP.	AL	2/23/1983	763	TON ADP/DAY	31.8	LB/HR	NO CONTROLS
POTLATCH	ID	4/25/1983	90	TON/HR BLS	321	LB/H SEE NOTE 3	NO CONTROLS
POTLATCH CORPORATION	ID	12/3/1984	--	--	160	LB/HR	NO CONTROLS
GEORGIA-PACIFIC CORP.	FL	11/15/1985	607500	LB/H STEAM AT 900F	--	--	PROPER EQUIPMENT OPERATION
CONSOLIDATED PAPERS, INC.-KRAFT DIV.	WI	1/1/1987	1400000	LB BLS/DAY	80	PPMDV	PROPER COMB. TECH. & OPER. PRACTICES
S.D. WARREN CO.	ME	6/23/1988	375	MM BTU/HR	97	PPMDV	COMBUSTION CONTROL
WILLAMETTE INDUSTRIES	SC	9/29/1988	840	TON/DAY ADP	150	PPM, DRY BASIS	BOILER DESIGN & GOOD COMBUSTION PRACTICES
MEAD COATED BOARD	AL	10/1/1988	1500	TON ADP/DAY	112	PPMV AT 8% O2	NO CONTROLS
LOUISIANA PACIFIC CORP.	CA	2/22/1989	830	TON/DAY ADP	0.1	LB/MMBTU	BOILER DESIGN
GEORGIA-PACIFIC CORP.	ME	4/12/1989	1450	TON/DAY ADP	80	PPMDV	COMBUSTION CONTROL
UNION CAMP PULP AND PAPER MILL	SC	5/1/1989	1463	TON/DAY ADP	150	PPM, DRY BASIS AT 8%	BOILER DESIGN & GOOD COMBUSTION PRACTICES
UNION CAMP PULP AND PAPER MILL	SC	5/1/1989	822	TON/DAY ADP	200	PPM AT 8% O2	BOILER DESIGN & GOOD COMBUSTION PRACTICES
BOISE CASCADE	MN	5/12/1989	571	MM BTU/HR	80	PPMDV AT 8% O2	COMBUSTION CONTROL
BOISE CASCADE CORP.	ME	7/18/1989	4	MM LB/DAY BLS	134	LB/HR	COMBUSTION CONTROL
CHAMPION INTERNATIONAL	AL	7/18/1989	4.18	MM LBS/DAY BLS	75	PPMV AT 8% O2	NO CONTROLS FEASIBLE
WEYERHAEUSER CO.	MS	10/24/1989	5	MM LB/DAY BLS	70	PPMVD AT 4% O2	PROCESS CONTROLS
GREAT SOUTHERN PAPER	GA	12/8/1989	63.56	TON/HR BLS	154	LB/HR	NO CONTROLS FEASIBLE
STONE CONTAINER CORP.	LA	1/9/1990	800	TON ADP/DAY	198	LB/HR	COMBUSTION CONTROL
ALABAMA RIVER PULP CO.	AL	1/22/1990	5.5	MM LB/DAY BLS	75	PPMV AT 8% O2	NO CONTROLS FEASIBLE
LONGVIEW FIBRE CO	WA	7/27/1990	1100	TON ADP/DAY	95	PPM AT 8% O2	BOILER DESIGN & GOOD COMBUSTION PRACTICES
JAMES RIVER PENNINGTON	AL	8/16/1990	5.4	MM LB/DAY BLS	115	PPMV AT 8% O2	COMBUSTION CONTROLS
RIVERWOOD INTERNATIONAL	GA	12/21/1990	3.5	MM LB/DAYBLS	120	PPM	STAGED COMBUSTION
WILLAMETTE INDUSTRIES INC	LA	2/4/1991	1400	TON ADP/DAY	206.1	LB/HR	DESIGN & OPERATION
INTERNATIONAL PAPER COMPANY	LA	2/24/1991	1117	TON ADP	137.9	LB/H, NOTE 4	COMBUSTION CONTROL/DESIGN
CHESAPEAKE CORP.	VA	3/1/1991	62.5	TON BLS/HR	112	PPMDV AT 8% O2	FURNACE DESIGN & OPERATION
GULF STATES PAPER	AL	3/12/1991	3.3	MM LB/DAY BLS	90	PPMV AT 8% OXYGEN	BOILER DESIGN
LEAF RIVER FOREST PRODUCTS	MS	4/9/1991	6	MM LB/DAY BLS	80	PPM AT 8% O2	COMPUTER OPERATED COMBUSTION CONTROL
GEORGIA-PACIFIC CORPORATION	FL	6/12/1991	--	MM BTU/HR	100	PPMVD AT 8% O2	COMBUSTION CONTROL
JAMES RIVER CORP.	WA	9/26/1991	523	MM BTU/HR	2.13	LB/ADUT	DESIGN & OPERATION
JAMES RIVER CORP.	WA	9/26/1991	770	MM BTU/HR	2.44	LB/ADUT	DESIGN & OPERATION
BOISE CASCADE CORPORATION	AL	4/1/1992	32600	LB BLS/DAY	0.0115	PPMV @ 8% OXYGEN AND	NOT DESIGNED
LEAF RIVER FOREST PRODUCTS	MS	7/14/1992	6.4	MM LB/DAY BLS	110	PPM @ 8% O2	COMPUTER OPERATED COMBUSTION CONTROL
PENNTECH PAPERS INC. SUBSIDIARY WILLAMETTE IND.	PA	12/9/1992	630	ADT/DAY	110	PPM AT 8% O2	GOOD BOILER DESIGN AND OPERATIONAL PRACTICES.
WILLAMETTE INDUSTRIES	KY	9/14/1993	87500	LB/HR	150	PPM AT 8% O2	NO CONTROLS LISTED
INTERNATIONAL PAPER COMPANY	PA	12/21/1994	375000	CF/HR	0.2	LB/MMBTU	NO CONTROLS FEASIBLE
GEORGIA-PACIFIC CORPORATION	FL	9/21/1995	118	TPH ADUP	80	PPMVD AT 8% O2	COMBUSTION MODIFICATION COMBUSTION CONTROL TECHNOLOGY
WILLAMETTE INDUSTRIES - MARLBORO MILL	SC	4/17/1996	4	MM LB BLS/DAY	100	PPM	GOOD COMBUSTION CONTROL
WEYERHAEUSER COMPANY	MS	9/10/1996	7	MM LBS/DAY	80	PPMVD @ 8% O2	STAGED COMBUSTION
MEAD COATED BOARD, INC.	AL	10/9/1996	2.7	MM LBS BLS PER DAY	112	PPMDV @ 8% O2	COMBUSTION CONTROL
TENNECO PACKAGING COMPANY	TN	6/17/1997	180180	LB/HR	110	PPM @ 8% O2	COMBUSTION CONTROL AND GOOD OPERATING/ENGINEERING PRACTICES
GULF STATES PAPER CORPORATION	AL	12/10/1997	3.94	MM LBS BLS/DAY	90	PPMDV @ 8% O2	PROPER DESIGN AND OPERATION
ROANOKE RAPIDS MILL	NC	7/31/1998	2.77	MM LBS BLS/DAY	110	PPM @ 8% O2	FURNACE DESIGN AND COMBUSTION OPTIMIZATION
LOUISIANA-PACIFIC SAMOA, INC.	CA	4/12/1999	3	MMLB/D	78	PPM @8% O2 (12 H)	LOW NOX BURNER FOR NATURAL GAS COMBUSTION.
POTLATCH CORPORATION - CYPRESS BEND MILL	AR	3/3/2000	2.57	MMLB BLS/D	110	PPMDV	PROPER DESIGN AND OPERATION
MOSINEE PAPER CORPORATION	WI	12/18/2000	250	MM BTU/HR	95	PPM @ 8% O2	GOOD COMBUSTION OPERATIONS BY MONITORING TEMPERATURE OF THE GAS STREAM AND THE IN-SITU OXYGEN CONTENT OF THE FLUE GAS
POPE & TALBOT	OR	3/2/2001	1350	TBLS/DAY	1.25	LB/TON BLS	NONE INDICATED
RIEGELWOOD MILL	NC	5/10/2001	557	MM BTU/HR	586.5	LB/HR	GOOD COMBUSTION PRACTICE
INTERNATIONAL PAPER-MANSFIELD MILL	LA	8/14/2001	71	TBLS/HR	147.8	LB/HR	GOOD PROCESS CONTROLS
BOWATER COATED PAPER DIVISION	SC	10/31/2001			80	PPMDV @ 8% O2	GOOD COMBUSTION CONTROL
LONGVIEW FIBRE COMPANY-RF # 18	WA	12/10/2001	1200	TBLS/DAY	95	PPMDV @ 8% O2	GOOD COMBUSTION PRACTICE
LONGVIEW FIBRE COMPANY-RF # 19	WA	12/10/2001	2000	TBLS/DAY	95	PPMDV @ 8% O2	GOOD COMBUSTION PRACTICE
GEORGIA-PACIFIC CORP.-PORT HUDSON MILL RF # 1	LA	10/4/2002	2.81	MM LBS BLS/DAY	142	LB/HR	STAGED COMBUSTION, GOOD EQUIPMENT DESIGN AND PROPER COMBUSTION TECHNIQUES.
GEORGIA-PACIFIC CORP.-PORT HUDSON MILL RF # 2	LA	10/4/2002	3.96	MM LBS BLS/DAY	192.1	LB/HR	STAGED COMBUSTION, GOOD EQUIPMENT DESIGN AND PROPER COMBUSTION TECHNIQUES.
WEYERHEAUSER COMPANY-MARLBORO PAPER MILL	SC	12/10/2002	4.4	MM LBS BLS/DAY	100	PPM @ 8% O2	ADDITION OF 4TH LEVEL OF AIR TO RECOVERY FURNACE/GOOD COMBUSTION PRACTICE
GEORGIA-PACIFIC CORP.-Monticello Mill RB # 1	MS	5/14/2004	861.4	MM Btu/hr	200.2	LB/HR	STAGED AIR COMBUSTION
GEORGIA-PACIFIC CORP.-Monticello Mill RB # 2	MS	5/14/2004	861.4	MM Btu/hr	200.2	LB/HR	STAGED AIR COMBUSTION

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FACILITY NAME	STATE	PERMIT DATE	THRUPUT	THRUPUT UNITS	EMISSIONS	EMISSION UNITS	CONTROL TECHNOLOGY DESCRIPTION
HAMMERMILL PAPER	AL	3/26/1980	737	MM BTU/HR	456.6	LB/HR	BOILER DESIGN & GOOD COMBUSTION PRACTICES
KIRBY FOREST INDUSTRIES	TX	8/14/1980	935	MM BTU/HR	82.5999	LB/HR	CONTINUOUS O2 MONITORING
SCOTT PAPER	AL	1/15/1981	1100	TON/DAY ADP	770	LB/HR	EQUIPMENT OPERATION
UNION CAMP CORP.	SC	2/25/1982	2.9	MM LB/D BLS	2	LB/T ADP	NO CONTROLS
INDEPENDENT KRAFT CORP.	AL	2/23/1983	763	TON ADP/DAY	63.6	LB/HR	NO CONTROLS
POTLATCH	ID	4/25/1983	90	TON/HR BLS	1223	LB/HR	NO CONTROLS
GEORGIA-PACIFIC CORP.	FL	11/15/1985	607500	LB/HR STEAM AT 900F	–	–	PROPER EQUIPMENT OPERATION
S.D. WARREN CO.	ME	6/23/1988	375	MM BTU/HR	169	PPMDV	COMBUSTION CONTROL
WILLAMETTE INDUSTRIES	SC	9/29/1988	840	TON/DAY ADP	2	LB/T ADP	BOILER DESIGN & GOOD COMBUSTION PRACTICES
MEAD COATED BOARD	AL	10/1/1988	1500	TON ADP/DAY	879	PPMV AT 8% O2	NO CONTROLS
LOUISIANA PACIFIC CORP.	CA	2/22/1989	830	TON/DAY ADP	250	PPM	BOILER DESIGN
GEORGIA-PACIFIC CORP.	ME	4/12/1989	1450	TON/DAY ADP	215	PPMDV	COMBUSTION CONTROL
UNION CAMP PULP AND PAPER MILL	SC	5/1/1989	1463	TON/DAY ADP	8	LB/T ADP	BOILER DESIGN & GOOD COMBUSTION PRACTICES
UNION CAMP PULP AND PAPER MILL	SC	5/1/1989	822	TON/DAY ADP	8	LB/T ADP	BOILER DESIGN & GOOD COMBUSTION PRACTICES
BOISE CASCADE	MN	5/12/1989	571	MM BTU/HR	600	PPMDV AT 8% O2	COMBUSTION CONTROL
BOISE CASCADE CORP.	ME	7/18/1989	4	MM LB/DAY BLS	222	LB/HR	COMBUSTION CONTROL
CHAMPION INTERNATIONAL	AL	7/18/1989	4.18	MM LB/DAY BLS	200	PPMV AT 8% O2	NO CONTROLS
WEYERHAEUSER CO.	MS	10/24/1989	5	MM LB/DAY BLS	2.2	LB/METRIC TON OF BLS	PROCESS CONTROLS
GREAT SOUTHERN PAPER	GA	12/8/1989	63.56	TON/HR BLS	480	LB/HR	SEE NOTE#3
STONE CONTAINER CORP.	LA	1/9/1990	800	TON ADP/DAY	434.6	LB/HR	COMBUSTION CONTROL
ALABAMA RIVER PULP CO.	AL	1/22/1990	5.5	MM LB/DAY BLS	200	PPMV AT 8% O2	NO CONTROLS
LONGVIEW FIBRE CO	WA	7/27/1990	1100	TON ADP/DAY	300	PPM AT 8% O2	BOILER DESIGN & GOOD COMBUSTION PRACTICES
RIVERWOOD INTERNATIONAL	GA	12/21/1990	3.5	MM LB/DAY BLS	146.5	LB/HR	NO CONTROLS
WILLAMETTE INDUSTRIES INC	LA	2/4/1991	1400	TON ADP/DAY	350	LB/HR	DESIGN & OPERATION
INTERNATIONAL PAPER COMPANY	LA	2/24/1991	1117	TON ADP	209.9	LB/HR, NOTE 5	COMBUSTION CONTROL/DESIGN
CHESAPEAKE CORP.	VA	3/1/1991	62.5	TON BLS/HR	250	PPMDV AT 8% O2	FURNACE DESIGN & OPERATION
GULF STATES PAPER	AL	3/12/1991	3.3	MM LB/DAY BLS	300	PPMV AT 8% OXYGEN	BOILER DESIGN
LEAF RIVER FOREST PRODUCTS	MS	4/9/1991	6	MM LB/DAY BLS	300	PPM AT 8% O2	COMPUTER OPERATED COMBUSTION CONTROL
GEORGIA-PACIFIC CORPORATION	FL	6/12/1991	–	MM BTU/HR	400	PPMVD AT 8% O2	COMBUSTION CONTROL
JAMES RIVER CORP.	WA	9/26/1991	523	MM BTU/H	2755	TON/YR	DESIGN & OPERATION
JAMES RIVER CORP.	WA	9/26/1991	770	MM BTU/H	2755	TON/YR	DESIGN & OPERATION
PENNTECH PAPERS INC. SUBSIDIARY WILLAMETTE IND.	PA	12/9/1992	630	ADT/DAY	300	PPM AT 8% O2	GOOD COMBUSTION
GEORGIA-PACIFIC CORPORATION	FL	9/21/1995	118	TPH ADUP	800 400	PPM AT 8% O2 (3-hr avg.) PPM AT 8% O2 (24-hr avg.)	GOOD COMBUSTION COMBUSTION CONTROLS
WILLAMETTE INDUSTRIES - MARLBORO MILL	SC	4/17/1996	4	MM LB BLS/DAY	200	PPM	GOOD COMBUSTION CONTROL
WEYERHAEUSER COMPANY	MS	9/10/1996	7	MM LBS/DAY	300	PPMVD @ 8% O2	EFFICIENT OPERATION
MEAD COATED BOARD, INC.	AL	10/9/1996	2.7	MM LBS BLS PER DAY	300	PPMDV @ 8% O2	BOILER DESIGN AND COMBUSTION CONTROL
TENNECO PACKAGING COMPANY	TN	6/17/1997	180180	LB/HR	300	PPMDV @ 8% O2	COMBUSTION CONTROL AND GOOD OPERATING/ENGINEERING PRACTICES
GULF STATES PAPER CORPORATION	AL	12/10/1997	3.94	MM LBS BLS/DAY	250	PPMDV @ 8% O2	PROPER DESIGN AND OPERATION
ROANOKE RAPIDS MILL	NC	7/31/1998	2.77	MM LBS BLS/DAY	300	PPMDV @ 8% O2	FURNACE DESIGN & COMBUSTION OPTIMIZATION
U S ALLIANCE	AL	9/25/1998		UNKNOWN	200	PPM	NO CONTROLS LISTED
POTLATCH CORPORATION - CYPRESS BEND MILL	AR	3/3/2000	2.57	MM LB BLS/DAY	300	PPMDV	PROPER DESIGN AND COMBUSTION CONTROLS
DONAHUE INDUSTRIES, INC	TX	10/17/2000			112.5	LB/HR	NONE INDICATED
MOSINEE PAPER CORPORATION	WI	12/18/2000	250	MM BTU/HR	3000 1000	PPM @ 8% O2 (1-hr. max.) PPM @ 8% O2 (3-hr. vg.)	GOOD COMBUSTION OPERATIONS BY MONITORING TEMPERATURE OF THE GAS STREAM AND THE IN-SITU OXYGEN CONTENT OF THE FLUE GAS
POPE & TALBOT	OR	3/2/2001	1350	TON BLS/DAY	3.7	LB/TON BLS	NONE INDICATED
CROWN PAPER	LA	4/29/2001	68.75	TON BLS/DAY	354.06	LB/HR	GOOD OPERATING PRACTICES
RIEGELWOOD MILL	NC	5/10/2001	557	MM BTU/HR	357.1	LB/HR	GOOD COMBUSTION PRACTICES
INTERNATIONAL PAPER-MANSFIELD MILL	LA	8/14/2001	71	TON BLS/DAY	754	LB/HR	GOOD PROCESS CONTROLS
LONGVIEW FIBRE COMPANY-RF # 18	WA	12/10/2001	1200	TON BLS/DAY	360	LB/HR	GOOD COMBUSTION CONTROL OF FLAME TEMPERATURE AND EXCESS AIR
LONGVIEW FIBRE COMPANY-RF # 19	WA	12/10/2001	2000	TON BLS/DAY	600	LB/HR	GOOD COMBUSTION CONTROL OF FLAME TEMPERATURE AND EXCESS AIR
GEORGIA-PACIFIC CORPORATION-PORT HUDSON	LA	1/25/2002	2.8	MM LB/DAY	30B.9	LB/HR	GOOD EQUIPMENT DESIGN AND PROPER COMBUSTION TECHNIQUES
GEORGIA-PACIFIC CORPORATION-PORT HUDSON	LA	1/25/2002	3.96	MM LB/DAY	417.76	LB/HR	GOOD EQUIPMENT DESIGN AND PROPER COMBUSTION TECHNIQUES
GEORGIA-PACIFIC CORP.-PORT HUDSON MILL RF # 1	LA	10/4/2002	2.81	MM LBS BLS/DAY	308.9	LB/HR	GOOD EQUIPMENT DESIGNS AND PROPER COMBUSTION TECHNIQUES
GEORGIA-PACIFIC CORP.-PORT HUDSON MILL RF # 2	LA	10/4/2002	3.96	MM LBS BLS/DAY	417.8	LB/HR	GOOD EQUIPMENT DESIGNS AND PROPER COMBUSTION TECHNIQUES
WEYERHEAUSER COMPANY-MARLBORO PAPER MILL	SC	12/10/2002	4.4	MM LBS BLS/DAY	200	PPM	GOOD COMBUSTION PRACTICE
GEORGIA-PACIFIC CORP.-Monticello Mill RB # 1	MS	5/14/2004	861.4	MM Btu/hr	735.6	LB/HR	COMBUSTION CONTROL
GEORGIA-PACIFIC CORP.-Monticello Mill RB # 2	MS	5/14/2004	861.4	MM Btu/hr	735.6	LB/HR	COMBUSTION CONTROL

TABLE [illegible] SAM

FACILITY NAME	STATE	PERMIT DATE	THRUPUT	THRUPUT UNITS	EMISSIONS	EMISSION UNITS	CONTROL TECHNOLOGY DESCRIPTION
MEAD COATED BOARD	AL	10/1/1988	1500	TON ADP/DAY	20	LB/HR	NO CONTROLS
ALABAMA RIVER PULP CO.	AL	1/22/1990	5.5	MM LB/DAY BLS	15.7	LB/HR	NO CONTROLS
GULF STATES PAPER	AL	3/12/1991	3.3	MM LB/DAY BLS	12.6	LB/HR	BOILER DESIGN
MEAD COATED BOARD, INC.	AL	10/9/1996	2.7	MM LBS BLS/DAY	12.2	LB/HR	BOILER DESIGN
GULF STATES PAPER CORPORATION	AL	12/10/1997	3.94	MM LBS BLS/DAY	12.6	LB/HR	NO CONTROLS
WEYERHEAUSER COMPANY-MARLBORO PAPER	SC	12/10/2002	4.4	MM LBS BLS/DAY	2.2	LB/HR	RECOVERY FURNACE FIRING RATE AND PULP PRODUCTION LIMITS
WEYERHEAUSER COMPANY-VALLIANT MILL	OK	10/13/2004			0.5	PPM@8% O2	GOOD COMBUSTION PRACTICES
GEORGIA-PACIFIC CORP.-Monticello Mill RB # 2	MS	5/14/2004	861.4	MM Btu/hr	NONE		COMBUSTION CONTROL

TABL[illegible]VOC

FACILITY NAME	STATE	PERMIT DATE	THRUPUT	THRUPUT UNITS	EMISSIONS	EMISSION UNITS	CONTROL TECHNOLOGY DESCRIPTION
LOUISIANA PACIFIC CORP.	CA	3/17/1989	830	TON/DAY ADP	40	PPM	BOILER DESIGN
MEAD COATED BOARD	AL	6/1/1989	1500	TON ADP/DAY	0.03	LB/MMBTU	NONE INDICATED
BOISE CASCADE	MN	7/1/1989	571	MM BTU/HR	2.8	PPMDV AT 8% O2	COMBUSTION CONTROL
BOISE CASCADE CORP.	ME	9/29/1989	4	MM LB/DAY BLS	3.7	LB/HR	COMBUSTION CONTROL
CHAMPION INTERNATIONAL	AL	9/29/1989	4.18	MM LBS/DAY BLS	0.048	LB/MMBTU	NO CONTROLS
GEORGIA-PACIFIC CORP.	ME	9/29/1989	1450	TON/DAY ADP	0.7	LB/TON ADP	COMBUSTION CONTROL
STONE CONTAINER CORP.	LA	2/28/1990	800	TON ADP/DAY	34.4	LB/HR	COMBUSTION CONTROL
ALABAMA RIVER PULP CO.	AL	1/22/1990	5.5	MM LB/DAY BLS	0.048	LB/MMBTU	NO CONTROLS
WEYERHAEUSER CO.	MS	3/31/1991	5	MM LB/DAY BLS	0.6	LB/SHORT T OF BLS	GOOD COMBUSTION PRACTICES
INTERNATIONAL PAPER COMPANY	LA	5/21/1991	1117	TON ADP	24	LB/HR, NOTE 6	COMBUSTION CONTROL/DESIGN
LONGVIEW FIBRE CO	WA	8/1/1991	1100	TON ADP/DAY	1	TON/DAY	BOILER DESIGN & GOOD COMBUSTION PRACTICES
JAMES RIVER CORP.	WA	1/31/1992	523	MM BTU/HR	219	TON/YR	DESIGN & OPERATION
WILLAMETTE INDUSTRIES	SC	7/7/1993	840	TON/DAY ADP	2	LB/TON ADP	BOILER DESIGN & GOOD COMBUSTION PRACTICES
GEORGIA-PACIFIC CORPORATION	FL	7/19/1994	--	MM BTU/HR	0.52	LB/TON BLS	COMBUSTION CONTROL
GULF STATES PAPER	AL	3/24/1995	3.3	MM LB/DAY BLS	0.048	LB/MM BTU AND	BOILER DESIGN
CHESAPEAKE CORP.	VA	3/24/1995	62.5	TON BLS/HR	0.048	LB/MM BTU	FURNACE DESIGN & OPERATION
WILLAMETTE INDUSTRIES INC	LA	3/24/1995	1400	TON ADP/DAY	116.6	LB/HR	DESIGN & OPERATION
GEORGIA-PACIFIC CORPORATION	FL	1/31/1996	118	TON/HR ADUP	0.3	LB/TON BLS	GOOD COMBUSTION COMBUSTION CONTROL
BOISE CASCADE CORP.	MN	5/31/1996	571	MM BTU/HR	0.6	LB/BDT OF BLS	COMBUSTION CONTROL
MEAD COATED BOARD, INC.	AL	5/31/1997	2.7	MM LBS BLS PER DAY	0.048	LBS/MMBTU	BOILER DESIGN AND COMBUSTION CONTROL
TENNECO PACKAGING COMPANY	TN	6/17/1997	180180	LB/HR	110	PPM @ 8% O2	COMBUSTION CONTROL AND GOOD OPERATING/ENGINEERING PRACTICES
WILLAMETTE INDUSTRIES - MARLBORO MILL	SC	3/26/1998	4	MM LB BLS/DAY	40	PPM	GOOD COMBUSTION CONTROL
GULF STATES PAPER CORPORATION	AL	4/24/1998	3.94	MM LBS BLS/DAY	0.03	LB/MM BTU	PROPER DESIGN AND OPERATION
ROANOKE RAPIDS MILL	NC	7/31/1998	2.77	MM LBS BLS/DAY	50	PPM @ 8% O2	FURNACE DESIGN AND COMBUSTION OPTIMIZATION
DONAHUE INDUSTRIES	TX	10/17/2000			20.27	LB/HR	NONE INDICATED
POPE & TALBOT	OR	3/2/2001	1350	TON BLS/DAY	0.024	LB/TON BLS	NONE INDICATED
RIEGELWOOD MILL	NC	5/10/2001	557	MM BTU/HR	37	LB/HR	GOOD COMBUSTION PRACTICES
LONGVIEW FIBRE COMPANY-RF # 18	WA	12/10/2001	1200	TON BLS/DAY	612	TON/YR	GOOD COMBUSTION CONTROL OF FLAME TEMPERATURE AND EXCESS AIR.
LONGVIEW FIBRE COMPANY-RF # 19	WA	12/10/2001	2000	TON BLS/DAY	1020	TON/YR	GOOD COMBUSTION CONTROL OF FLAME TEMPERATURE AND EXCESS AIR.
WEYERHEAUSER COMPANY-MARLBORO PAPER MILL	SC	12/10/2002	4.4	MM LBS BLS/DAY	40	PPMDV @ 8% O2	LOW ODOR RECOVERY FURNACE
GEORGIA-PACIFIC CORP.-Monticello Mill RB # 1	MS	5/14/2004	861.4	MM Btu/hr	14	LB/HR	COMBUSTION CONTROL
GEORGIA-PACIFIC CORP.-Monticello Mill RB # 2	MS	5/14/2004	861.4	MM Btu/hr	14	LB/HR	COMBUSTION CONTROL
WEYERHEAUSER COMPANY-VALLIANT MILL	OK	10/13/2004			40	PPMDV @ 8% O2	STAGED COMBUSTION AND NON-DIRECT CONTACT EVAPORATORS

TABLE D-2
USE OF SCR TO REDUCE NO_x EMISSIONS FROM RECOVERY FURNACE NO. 4

Cost Items	Cost Factors	2006 dollars
DIRECT CAPITAL COSTS (DCC):		
(1) Purchased Equipment Cost		
(a) Basic Equipment/Services	Based on Engineering Calculations (See Appendix D-1)	$13,460,000
(2) Direct Installation		included
Total DCC:	(1a) + (2)	$13,460,000
INDIRECT CAPITAL COSTS (ICC):		
(3) Indirect Installation Costs		
(a) Technology License Fee	included with 1a	$0
(b) Engineering & Supervision	included with 1a	$0
(c) Construction & Field Expenses	included with 1a	$0
(d) Construction Contractor Fee	included with 1a	$0
(e) Contingencies	(0.15) x (DCC)	$2,019,000
(4) Other Indirect Costs		
(a) Startup & Testing	Estimated	$10,000
(b) Working Capital	30-day DOC	$444,024
Total ICC:	(3) + (4)	$2,473,024
TOTAL CAPITAL INVESTMENT (TCI):	DCC + ICC	$15,933,024
DIRECT OPERATING COSTS (DOC):		
(5) Operating Labor	assume 1 hr/day x 365 day/yr	
Operator	$22.37/man-hr	$8,165
Supervisor	assume 15% of operating labor cost	$1,225
(6) Maintenance		
Labor	assume 1.5% of TCI	$238,995
(7) Utilities		
(a) Ammonia Injection System Electricity	assume 600 Kw/hr & 0.061/Kw-hr	$183,960
(8) Chemical Costs-ammonia reagent	assume 600 lb/hr @ $0.10/lb	$525,600
(9) Natural gas cost to heat flue gas with a duct burner to 700 °F	$7.27/MM Btu x 82.745 MM Btu/hr x 8,760 hr/yr = $/yr	$5,269,632
Total DOC:	(5) + (6) + (7) + (8) + (9)	$5,328,291
INDIRECT OPERATING COSTS (IOC):		
(10) Overhead	10% of oper. labor & maintenance	$24,839
(11) Property Taxes	1% of total capital investment	$159,330
(12) Insurance	1% of total capital investment	$159,330
(13) Administration	2% of total capital investment	$318,660
Total IOC:	(7) + (8) + (9) + (10)	$662,159
CAPITAL RECOVERY FACTOR	n=yrs; i = %	0.0944
CAPITAL RECOVERY COSTS (CRC):	CRF of 0.0944 times TCI (20 yrs @ 7%)	$1,503,965
ANNUALIZED COSTS (AC):	DOC + IOC + CRC	$7,494,415
UNCONTROLLED NO_x EMISSIONS (TPY):	Average Emissions-2004-2005	472.6
TOTAL NO_x REMOVED TPY:	tons NO_x removed (472.6 -47.3 = 425.3)	425.3
COST EFFECTIVENESS:	$ per ton of NO_x Removed	$17,620

Notes:

Cost factors based on data contained in Chapter 2 of US EPA's Cost Control Manual to reflect better estimates of what true costs would be.

*The CRF is computed according to the standard formula:

CRF = i(1+i)n/[(1+i)n-1]

where: i = annual interest rate (decimal)
n = control system life (years)

APPENDIX D-1 SELECTIVE CATALYTIC REDUCTION (SCR) COSTS FOR NO. 4 RECOVERY BOILER

The following calculations have been used to estimate the costs to install and operate an SCR system for the Palatka Mill's No. 4 Recovery Boiler. The average flue gas temperature exiting the No. 4 Recovery Furnace is about 425 °F. Since an SCR system has an optimum temperature window of 700 °F, the temperature of the furnace exhaust must be raised from 425 °F to 700 °F in order for the SCR catalyst to work effectively. The actual average volumetric flow rate from the furnace is about 447,000 acfm. The energy required to heat the flue gas from 425 °F to 700 °F can be calculated as shown below:

$H = m C_p (t_2 - t_1)$

Where: H = heat input, Btu/hr
m = mass flow rate of flue gas, lbs/hr
C_p = specific heat of flue gas, Btu/lb-°F
$t_2 - t_1 = 700 - 425 = 275$ °F

Assume: From Figure 3-12 of Perry's Chemical Engineers Handbook, 5th Edition, $C_p = 0.25$ Btu/lb-°F

Mass flow rate of flue gas can be calculated using the Ideal Gas Law equation:

$PV = nRT$

where P = pressure, atm = 1.0 (assumed)
V = volumetric flue gas flow rate, ft^3/min = 447,000
Assume that mol. wt. of flue gas ~ 29.0 lb/lb-n for any combustion device
n = moles of flue gas = mass flue gas/molecular weight flue gas = mass of flue gas (lb/hr) / 29.0 lb/lb-mole = mass/29.0
R = ideal gas law constant, atm-ft^3/lb-°R = 0.7302
T = temperature, °F + 460 = °R = 425 + 460 = 885 °R

Solving for mass rate lbs/hr: lbs/hr = 1 atm x 447,000 ft^3/min x 60 min/hr x 29 lbs/lb-m / (0.7302 atm-ft^3/lb-°R) x 885 = 1,203,570 lbs/hr

H = 1,203,570 lb/hr x 0.25 Btu/lb-°F x 275 °F = 82,745,438 Btu/hr

Assuming a cost for natural gas (average for 2004-2005) of \$7.27/MM Btu, the annual cost for heating the flue gas to 700 °F = \$7.27/MM Btu x 82.745 MM Btu/hr = \$601.56/hr x 8,760 hr/yr = \$5,269,632/yr.

APPENDIX D-1 SELECTIVE CATALYTIC REDUCTION (SCR) COSTS (CONTINUED)

The capital, operating, and maintenance (O & M) costs of adding an SCR system to the Recovery Furnace is estimated based on the costs in EPA's Cost Control Manual, January 2002. The capital costs for retrofitting a SCR system are given as $10,000/MM Btu/hr or higher for a large coal-fired boiler. Assuming that the cost estimates for a coal-fired boiler can be applied for a recovery furnace, the following calculations can be made to conservatively estimate the SCR costs:

Capital Costs:

1,346 MM Btu/hr heat input for No. 1 Recovery Furnace x $10,000/MM Btu = $13,460,000

The rated heat input capacity for the No. 4 Recovery Boiler is 1,346 MM Btu/hr. Therefore, using the estimated costs from above, the capital cost estimate is equal to $13,460,000. The annual cost for heating the flue gas from 425 °F to 700 °F equals $5,269,632. The annualized cost estimate at 7% interest over 20 years is $7,494,415 per year as shown in Table D-2.

The average (based on 2004-2005 calendar years) NO_x emission rate for the No. 4 Recovery Boiler was 472.6 tons/yr (see Attachment B). Assuming a 90% reduction in emissions, the controlled option emissions rate will be 10% of 472.6 ton/yr or 47.3 ton/yr.

The average cost effectiveness in dollars per ton of NO_x removed is equal to:

$$\frac{\text{Control option annualized cost}}{\text{Average emissions rate} - \text{Control option emissions rate}}$$

$$\frac{\$7{,}494{,}415}{472.6 - 47.3 = 425.3 \text{ tons/yr}} = \$7{,}494{,}415/425.3 = \$17{,}620/\text{ton}$$

ATTACHMENT E

BACT ANALYSIS
FOR NO. 4 LIME KILN

ATTACHMENT E
BACT Analysis
Georgia-Pacific, Palatka Mill, Lime Kiln Shell Replacement

INTRODUCTION TO BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

Both the U. S. Environmental Protection Agency (EPA) and the Florida Department of Environmental Protection (FDEP) require that Best Available Control Technology (BACT) be applied to control emissions from a proposed new or modified source that triggers review under the federal Prevention of Significant Deterioration (PSD) regulations. Since the proposed project will install new equipment and modify an existing emissions unit, the BACT analysis must address all of this equipment. The project triggers PSD review and the requirement for a BACT analysis for emissions of particulate matter (both total suspended particulate matter (PM) and particulate matter less than 10 microns in aerodynamic diameter (PM_{10})), nitrogen oxides (NO_x), carbon monoxide (CO), sulfuric acid mist (SAM), and ozone (based on a significant increase in volatile organic compounds (VOCs)).

With regard to the federal PSD rules, BACT is defined in 40 CFR 52.21as follows:

> *"Best Available Control Technology means an emission limitation (including a visible emission standard)based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results."*

The requirements for BACT were promulgated within the framework of the PSD regulations in the 1977 Amendments to the Clean Air Act (CAA) [Public Law 95-95; Part C, Section 165(a)(4)]. The primary purpose of BACT is to optimize consumption of PSD air quality increments and thereby enlarge the potential for future economic growth without significantly degrading air quality (EPA, 1978; 1980). Guidelines for the evaluation of BACT can be found in the EPA's Guidelines for Determining Best Available Control Technology (BACT) (EPA, 1978) and in the PSD Workshop Manual (EPA, 1980 and 1990 draft). EPA promulgated these guidelines to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to BACT in another area.

According to EPA (1980), BACT analyses for the same types of emissions unit and the same pollutants in different locations or situations may determine that different control strategies should be applied to the different sites, depending on site-specific factors. Therefore, BACT analyses must be conducted on a case-by-case basis.

The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed or modified facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the facility. BACT must, as a minimum, demonstrate compliance with the New Source Performance Standards (NSPS) for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on sound judgment, balancing environmental benefits with energy, economic, and other impacts (EPA, 1978).

FACILITY DESCRIPTION

Georgia-Pacific Corporation (GP) operates an unbleached and bleached Kraft pulp and paper Mill in Palatka, Florida (Putnam County). Processes and systems at the Mill include a batch digester system, multiple effect evaporator (MEE) system, condensate stripper system, recovery boiler and smelt dissolving tanks, lime kiln, tall oil plant, utilities, bleach plant, chlorine dioxide plant, and other equipment to produce finished paper products from virgin wood.

Putnam County has been designated by EPA as in attainment or unclassified for all criteria pollutants. The existing Mill is classified as a major stationary source under PSD and Clean Air Act Title V definitions since it has the potential-to-emit more than 100 tons per year (tpy) of at least one regulated air pollutant.

PROCESS AND PROJECT DESCRIPTION

As explained more fully in the main text of this document, the Palatka Mill is proposing to complete a maintenance project on the existing Lime Kiln (Emission Unit 017). In late 2003, the Mill experienced a failure of the Lime Kiln shell. The Kiln had cracks all the way through the shell in several different areas of the “hot end”. This outage alone resulted in unbudgeted expenditures of $1.5 million for maintenance repairs and purchased chemicals. An equipment vendor has recommended that the Mill replace 62 feet of the hot end Kiln shell and all ten (10) coolers. The existing coolers are causing excessive stress on the Kiln shell. The new coolers will have an improved mounting bracket design that will eliminate future stress cracking underneath the coolers.

Presently, the Lime Kiln dries and processes lime mud from the causticizing system by burning fuel oil with a sulfur content no greater than 2.35%. The main function of the recausticizing area is to causticize green liquor with reburned lime or fresh lime to form white liquor for use in the digesters. In the recausticizing area, sodium carbonate (Na_2CO_3) is converted into active sodium hydroxide (NaOH) and various impurities introduced from the furnace and Lime Kiln are removed. Green liquor (formed by dissolving smelt from the recovery furnace) is first stabilized then clarified to remove dregs. Clarified green liquor and reburned lime from the lime storage silo are continuously mixed in a lime slaker to convert quick lime (CaO) into milk-of-lime (slaked lime). The liquor from the slaker continuously flows to the causticizers. In the causticizers, lime and Na_2CO_3 are converted into white liquor (sodium hydroxide and $CaCO_3$) by the following reaction steps.

1. $CaO + H_2O \rightarrow Ca(OH)_2 + \text{Heat}$
2. $Ca(OH)_2 + Na_2CO_3 \rightarrow 2NaOH + CaCO_3$

The white liquor from the causticizers flows through a clarifier where precipitated lime mud ($CaCO_3$) settles, and is then ready to recycle and re-use in the digesters. The $CaCO_3$ is then washed and calcined in a lime kiln to produce CaO for re-use in the causticizing process. The following reaction takes place in the Lime Kiln:

$$CaCO_3 \text{ (lime mud)} + \text{Heat} \rightarrow CaO + CO_2$$

Lime dust is captured by a dust collector (cyclone) and recycled back to the process. The exhaust gases from the Lime Kiln are then treated by a venturi scrubber.

SCOPE OF BACT ANALYSIS

For this permit application, a BACT analysis is required for particulate matter (both PM and PM_{10}), NO_x, CO, SAM, and VOCs. Attachment B of this permit application presents the emission inventory for the project. The following sections present the BACT analysis for the Lime Kiln.

TECHNICAL APPROACH

Historically, a bottom-up approach, consistent with the BACT Guidelines and PSD Workshop Manual, has been used. With this approach, an initial control level, which is usually NSPS, is evaluated against successively more stringent controls until a BACT level is selected. However, EPA developed a concern that the bottom-up approach was not providing the level of BACT decisions originally intended. As a result, in December 1987, the EPA Assistant Administrator for Air and Radiation mandated changes in the implementation of the PSD program, including the adoption of a new "top-down" approach to BACT decision-making.

The EPA issued a draft guidance document on the top-down approach entitled Top-Down Best Available Control Technology Guidance Document (EPA, 1990). However, to date, EPA has not promulgated the top-down approach for determining BACT. According to the guidance, the BACT analysis shall include the following steps:

(1) Identify all potential control strategies.

(2) Eliminate technically infeasible options. The demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that the technical difficulties would preclude the successful use of the control option on the emission unit under review.

(3) Rank remaining control technologies by control effectiveness. The ranking should include relevant information such as:

(a) control effectiveness
(b) expected emission rate
(c) expected emission reduction
(d) energy impacts
(e) environmental impacts
(f) economic impacts

(4) Evaluate most effective controls and document results. The evaluation should include case-by-case consideration of energy, environmental and economic impacts. If the top option is not selected as BACT, the evaluation should consider the next most effective control option.

(5) Select BACT. BACT is the most effective option not rejected in Step 4.

BACT ANALYSIS FOR LIME KILN

Step 1 – Identification of Control Technologies

GP conducted a comprehensive review of potential control technologies, utilizing the following:

- The BLIS database (the RACT/BACT/LAER Clearinghouse) (RBLC),
- Pollution control technology vendors;
- US EPA control technology documents;
- GP experience with similar pollution control technologies in pulp and paper manufacturing

To identify the current technologies in use today, GP considered RBLC entries dated January 1990 or later for pulp and paper lime kilns. The following table summarizes the findings.

Table Nos. E-1a through E-1e presents the individual query results for each pollutant (E-1a-NO_x, E-1b-PM/PM_{10}, E-1c-VOC, E-1d-CO, E-1e-VOCs)

Table E-2. Summary of BACT Determinations for Pulp Mill Lime Kilns Listed by EPA

Pollutant	Control Technology
NO_x	No Controls
NO_x	Low-NO_x Burners
NO_x	Efficient Operation
NO_x	Good Combustion Control
NO_x	Preventative Maintenance
PM/PM_{10}	Electrostatic Precipitator (ESP)
PM/PM_{10}	Wet Scrubber (venturi and other)
PM/PM_{10}	Venturi Scrubber
PM/PM_{10}	Fabric Filter[1]
VOC	Venturi Scrubber Using Fresh Water
VOC	Good Combustion Control
VOC	Kiln Design and Operation
CO	Good Equipment Design and Proper Combustion Techniques
SAM	Inherent scrubbing

[1] According to the West Virginia Department of Environmental Protection (DEP), the equipment was never constructed and the permit has expired.

As the listed technologies are all conventional and demonstrated (with the exception of the fabric filter for PM control) on pulp and paper mill lime kilns, this BACT analysis presents a detailed description of the individual technologies in Step 2.

In addition to the listed technologies, several additional technologies for NO_x control are available for external combustion sources, although these have never been "demonstrated" on a lime kiln. These technologies include Flue Gas Recirculation (FGR), Oxidation/Reduction Scrubbing (O/R), Selective Catalytic Reduction (SCR), Selective Non-Catalytic Reduction (SNCR) and Non-Selective Catalytic Reduction (NSCR).

Step 2 – Technical Feasibility Analysis

This step of the BACT review process discusses the technical feasibility or infeasibility of each of the technologies identified in prior steps. Table E-3 below addresses the technical feasibility of the various technologies specifically applied to the Lime Kiln at the Palatka Mill.

Table E-3. Technical Feasibility of the Control Technologies for a Lime Kiln

Pollutant	Control Technology	Typical Control Efficiency Range (% reduction)	Technically Feasible for Palatka Lime Kiln?
NO_x	Oxidation/Reduction Scrubbing	90%	No
NO_x	Selective Catalytic Reduction	60-90%	No
NO_x	Selective Non-Catalytic Reduction	30-50%	No
NO_x	Low-NO_x Burners	20-30%	No
NO_x	Flue Gas Recirculation	Varies (15%-25%)	No
NO_x	Non-Selective Catalytic Reduction	Varies	No
NO_x	Good Combustion Control/ Preventative Maintenance/Efficient Operation	Varies	Yes
PM/PM_{10}	Venturi Scrubber and ESP[1]	99%+	Yes
PM/PM_{10}	Fabric Filter[2]	99%+	No
PM/PM_{10}	ESP	95-99%	Yes
PM/PM_{10}	Venturi Scrubber	95-99%	Yes
PM/PM_{10}	Wet Scrubber (other)	95+%	Yes
PM/PM_{10}	Cyclonic Separators	25-95%	Yes
VOC	Venturi Scrubber Using Fresh Water	Varies	Yes
VOC	Good Combustion Control	Varies	Yes
VOC	Kiln Design and Operation	Varies	Yes
CO	Good Combustion Practices & Kiln Design	Varies	Yes
CO	Proper Combustion Techniques	Varies	Yes
CO	No Controls	N/A	Yes
SAM	Inherent Scrubbing	Varies	Yes
SAM	No Controls	N/A	Yes

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[1] Control technology currently in place at Mills at GP's Leaf River, MS and Brunswick, GA; also in place on one of two lime kilns at a GP Mill in Port Hudson, LA and on a lime kiln at a GP Mill in Naheola, AL.

[2] According to the West Virginia Department of Environmental Protection (DEP), the equipment was never constructed and the permit has expired.

Nitrogen Oxides

Table E-3 identifies seven (7) possible technologies for the control of NO_x emissions from a lime kiln. GP believes that only one of these is technically feasible. The following paragraphs discuss the technical feasibility or infeasibility of each technology. A significant portion of the following information, including feasibility for a lime kiln, was obtained from the BACT Determination for Weyerhaeuser – Flint River Operations, Georgia SIP Permit Application No. 14050, March 2003. A copy of the determination is included in Attachment F.

Oxidation/Reduction Scrubbing (O/R)

Several proprietary NO_x removal processes are commercially available, such as Tri-Mer Corporation's TRI-NO_X and BOC's $LoTO_X$ System. It has been reported that O/R scrubbing has a theoretical NO_x removal efficiency of 90 percent. The basic elements of the system are:

1) Cooling of the gas stream to its dew point temperature (150 degrees Fahrenheit (°F) to 250 °F) which condenses a portion of the water vapor in the gas and generates condensate that requires disposal,
2) Low temperature oxidation of the NO_x, CO and SO_2 to higher oxides through controlled injection of ozone or sodium chlorite in a static mixer or reaction duct (the ozone/NO_x ratios required to produce the desired NO_x oxidation are reported to be less than stoichiometric amounts),
3) Absorption of higher vapor forms of nitrogen and sulfur oxides in a wet scrubber that produces nitric, sulfuric, and carbonic acid solution. These acids must be recovered and neutralized by the use of sodium hydroxide in the scrubber water (caustic scrubbing) as follows:

$$2\ NaOH + 2\ NO_2 + 1/2\ O_2 \rightarrow 2\ NaNO_3 + H_2O$$

$$N_2O_5 + H_2O \rightarrow 2\ HNO_3$$

4) Once neutralized, the resultant scrubber water, containing nitrate solution, can be discharged to a sanitary sewer system.

Saturated flue gas from the scrubber requires heating before exiting through the flue stack to prevent in-stack condensation of acid gases and other adverse ambient impacts. Further, bleed air or a water spray cooling tower could be required to cool the gases, thus increasing the size of the ID fan and its power consumption. When using bleed air, cooling the gases to the dew point temperature will condense a portion of the water vapor and acid vapor. This condensate must be properly disposed of since it cannot be used in other portions of the lime kiln process. Also, oxygen must be supplied to cells that generate the ozone. This requires installation of very large liquid oxygen tanks. The liquid oxygen is withdrawn from the tank, sent through a vaporizer, and then to the generating cells. Considerable safety practices must be exercised when dealing with handling and vaporizing liquid oxygen. Finally, the ability of the O/R Scrubbing System to perform on a lime kiln or a similar source has never been demonstrated, particularly in the presence of carbon dioxide (CO_2) from both calcination and combustion. Furthermore, the technology is not listed for lime kilns in the RBLC. For all of the reasons listed above, O/R Scrubbing is considered technically infeasible for the Lime Kiln.

Selective Catalytic Reduction (SCR)

SCR is an exhaust gas treatment process in which ammonia (NH_3) or urea is injected into the exhaust gas upstream of a catalyst bed. The NH_3 reacts to form nitrogen (N_2) and water on the surface of the catalyst. The overall chemical reaction is represented by the following equation:

$$NH_3 + NO + 1/4\ O_2 \rightarrow N_2 + 3/2\ H_2O$$

In the SCR process, urea or NH_3 from a liquid storage tank is vaporized and injected into the exhaust prior to the catalyst. The exhaust gas/ammonia mixture passes over the catalyst. The function of the catalyst is to lower the activation energy of the NO decomposition reaction, therefore, lowering the temperature necessary to carry out the reaction. Several technical and operational difficulties exist with SCR technology. The SCR process is temperature sensitive. Efficient operation requires constant exhaust temperatures within a defined range; usually ± 50°F. Any load fluctuation resulting in exhaust gas temperature fluctuations reduces removal efficiency and upsets the NH_3/NO_x molar ratio. A low temperature results in slow reaction rates, which leads to low nitrogen oxides conversion, and unreacted NH_3 passing through the reactor bed (ammonia slip). A high temperature results in shortened catalyst life and can lead to the oxidation of NH_3 and the formation of additional NO_x. Under ideal conditions the catalytic reaction can result in NO_x removal efficiencies between 60 and 90 percent. SCR technology has not been applied to lime kilns due to the variable exhaust temperatures associated with the process. Further, the optimum temperature range for the catalytic reaction is 575 °F to 750 °F. A lime kiln typically operates in the 1,600 – 2,700 °F range.

Additional concerns with using a SCR system include the hazards involved with storing large quantities of NH_3 and with disposal of spent catalyst that has been contaminated by SO_2 and chlorine (Cl_2). Most of the time, the spent catalyst is returned to the supplier who regenerates the catalyst and sends it back to the user. The NH_3 also causes potential corrosion problems. Another operating condition that has a major impact on SCR performance is the NH_3/NO_x molar ratio. Ammonia is typically injected to produce an NH_3/NO_x molar ratio of 1.05-1.1/1 to achieve NO_x conversions of 80 to 90 percent with an ammonia slip of about 10 parts per million (ppm). Increasing this ratio would significantly increase the ammonia slip, with little change in conversion, and decreasing the ratio would result in lower conversion. The ammonia may also react with sulfur to form ammonium bisulfate, which has the potential to create a visible and/or detached plume. The lime may also react with the sulfur to form calcium sulfate. Ammonium bisulfate and calcium sulfate coatings, along with other dusts, will block the catalyst pores, thereby reducing the catalyst effectiveness.

The SCR unit could be placed downstream of the wet scrubber to alleviate the catalyst blockage problem; however, the flue gas is approximately 170 °F and would require a heat exchanger (*i.e.,* an additional gas-fired duct burner) system to achieve the desired reaction temperature of greater than 575 °F. The necessary equipment includes a catalytic reactor, heat exchanger, and blower. This technology is not listed for lime kilns in the RBLC. For all of the reasons listed above, SCR is not considered to be technically feasible for controlling NO_x emissions from lime kilns.

Selective Non-Catalytic Reduction (SNCR)

SNCR is an exhaust gas treatment process in which urea or ammonia is injected into the exhaust gas. High temperatures, normally between 1,600 °F and 2,100 °F, promote the reaction between NH_3 and NO_x to form N_2 and water. The overall chemical reaction is represented by the following equation.

$$NH_3 + NO + 1/4\ O_2 \rightarrow N_2 + 3/2\ H_2O$$

In this process, NH_3 from a liquid storage tank is vaporized and injected into the exhaust. The system is temperature dependent.

Several difficulties preclude use of an SNCR system for control of NO_x emissions from a lime kiln. If burner temperatures exceed 2,100 °F, the NH_3 injected with the SNCR system will begin to oxidize, forming additional NO_x. Another difficulty involves maintaining the correct NH_3/NO_x ratio during any load fluctuations. Any excess NH_3 would be released into the atmosphere, creating ammonia slip. Not only does ammonia slip result in direct emissions to the atmosphere, it also leads to the formation of ammonium salts. These salts can result in a visible plume. In addition, the NH_3 injection, storage, and waste by-product collection system must be properly designed for spill containment and waste removal. Use of this control technology in a lime kiln would cause several concerns. Due to load and exhaust gas temperature fluctuations, optimum NH_3/NO_x molar ratio, as well as correct reaction temperatures, would be extremely difficult to monitor and maintain, and release of NH_3 into the atmosphere can occur. Further, it is likely that formation of NH_3 salts would occur, which could result in an increase in process downtime due to "ringing" effects on the kiln interior. In addition, the hazards involved with the storage of NH_3 and the increased emissions from ammonia slip cause environmental and safety concerns.

The correct temperature window of 1,600 °F to 2,100 °F occurs inside the rotating body of the kiln. Locating injection nozzles in such an area is not technically feasible at the present time and has not been attempted on any lime kiln. SNCR has never been demonstrated on a lime kiln and is not listed in the RBLC. For all of the above reasons, SNCR is considered a technically infeasible control technology for the Lime Kiln.

Low-NO_x Burners (LNB)

Traditional burner design introduces both the fuel and air into a single combustion zone. To obtain optimal flames, large amounts of excess air must be combined with the fuel. This relatively "uncontrolled" combustion creates high flame temperatures. To control the generation of thermal NO_x, LNB technology stages combustion in the high temperature zone of the flame. The first stage is a fuel-rich, oxygen-lean atmosphere where little oxygen is available for NO_x formation and which reduces peak flame temperatures by delaying the completion of the combustion process. Combustion is then completed downstream in the second stage where excess air is available, but temperatures are lower than at the hottest portion of the flame core. Although LNBs have been extensively tested and used in utility boilers and industrial furnaces, the transfer of this technology to lime processing has been met with difficulties. Burner flame properties are critical to the quality control and calcining process to convert a high percentage of mud to reburnt lime in the lime kiln. The burner flame shape and properties have a dramatic effect on calcining efficiency. Poor efficiency increases energy usage and decreases the calcining capacity of the kiln. Due to these technical complexities, the conversion of a standard lime kiln burner to low NO_x design is not yet technically feasible. Further, the State of Georgia BACT determination for the Weyerhaeuser Mill stated that there are no commercially available LNBs on the market for a lime kiln application. Due to such technical and operational difficulties, in addition to the unavailability, LNBs are not a technically feasible control option for NO_x emissions from the Palatka Lime Kiln.

Flue Gas Recirculation (FGR)

FGR redirects the post-combustion exhaust gas back to the primary combustion chamber to create a lower oxygen (O_2) content atmosphere. This oxygen-lean atmosphere provides less O_2 available for NO_x formation. Due to increased mass flow, peak flame temperature is lowered. Therefore, FGR reduces both fuel and thermal NO_x.

Major barriers to using FGR include the following: 1) it would reduce the peak flame temperature below the temperature necessary for proper lime formation, and 2) a long and lazy flame will be produced, which is not acceptable for ensuring fully calcined lime. FGR would also require an excessive amount of ducting from the stack to the Kiln inlet. Finally, FGR has never been demonstrated on a lime kiln and is considered a technically infeasible control technology for lime kilns.

Non-Selective Catalytic Reduction (NSCR)

NSCR is an exhaust gas treatment technique for NO_x reduction. It is the type of catalyst control used to treat automobile exhaust and typically uses a platinum/rhodium catalyst. Use of NSCR reduces emissions of NO_x, CO, and VOC simultaneously across the catalyst bed, but it is only effective in fuel rich combustion air. To achieve a fuel-rich environment, excess combustion air must be kept to a minimum, resulting in an exhaust gas with less than three percent O_2 by volume ideally (the O_2 content should be less than half a percent by volume for proper operation).

The Palatka Lime Kiln normally operates with stack exhaust gas O_2 concentrations in the 4 to 6 percent range (by volume). Decreasing the excess air, and thus the O_2 concentrations, would result in increased CO emissions – an unacceptable compromise. In addition to the operational incompatibility of the control strategy, various problems will arise from the fuel-borne contaminants causing catalyst fouling (dust, SO_2, and Cl_2 in the flue gas can poison the catalyst), excessive backpressure, plugging of the catalyst, and efficiency reduction. For all of the reasons mentioned above, NSCR is technically infeasible for lime kiln NO_x emissions control.

Good Combustion Practices

The formation of NO_x is minimized by proper kiln design and operation. Generally, emissions are minimized when the lime kiln temperature is kept at the lower end of the desired range and when the distribution of air at the air and fuel injection zones is controlled. Ideally, maintaining a low-oxygen condition near fuel injection points approaches an off-stoichiometric staged combustion process. A high thermal efficiency would lead to less consumption of heat and fuel and would produce less NO_x emissions. General improvement in thermal efficiency is one design method of reducing NO_x formation, since less fuel is used. This control option is technically feasible.

Particulate Matter

As indicated in Table E-3, GP has identified 5 technologies. GP believes each of these technologies is technically feasible. The following paragraphs discuss the technical feasibility of each technology.

Fabric Filters

A baghouse, or fabric filter, is one of the most efficient devices for removing particulate matter (including lead). Baghouses have the capability of maintaining collection efficiencies at or above 99 % for particles down to 0.3 micrometers (μm). The basic components of a fabric filter unit consist of woven or felted fabric, usually in the form of bags that are suspended in a housing structure (baghouse), an induced draft or forced draft fan; and a blow-back or reverse air fan, pulse-jet fan, or mechanical shaking mechanism. The emission stream is distributed by means of specially designed entry and exit plenum chambers, providing equal gas flow through the filtration medium. The particle collection mechanism for fabric filters includes inertial impaction, Brownian diffusion, gravity settling, and electrostatic attraction. The particles are collected in dry form on a cake of dust supported by the fabric or on the fabric itself. The process occurs with a relatively low pressure drop requirement (usually within the range of 2-6 inches water column pressure). Periodically, most of the cake dust is removed for disposal. Shaking or a "rapping" system removes cake dust, with the use of reverse air or with the use of a pulsejet of air. Dust is collected in a hopper at the bottom of the baghouse and is removed through a valve and dumped into a storage container. Usually, the dust is disposed of at an industrial landfill.

There is a single entry for a fabric filter in the RBLC, from eight (8) years ago, for a facility located in West Virginia (Apple Grove Pulp and Paper Company). GP spoke to the West Virginia Department of Environmental Protection on June 18, 2004 and obtained information that this equipment was never constructed and the permit has subsequently expired. GP made this call as a result of strong concerns regarding the use of this technology on a lime kiln. The moisture content of the gas stream is in the range of 35% leaving the Lime Kiln. The temperature of the stream is approximately 600 °F (range of 550 to 700 °F). In order for a fabric filter to operate properly, and within the range designed, condensation would have to be totally prevented. In order to prevent condensation, the temperature of the stream would have to maintained above the dew point temperature, which would be extremely difficult, if not impossible. A fabric filter would have to be fully insulated with no air leaks.

Furthermore, it would have to be assured that the insulation was put back on exactly as originally installed anytime that maintenance took place on the unit. If any condensation at all occurred within the fabric filter, the bags would plug and the collection efficiency would drop rapidly. A fabric filter is much more appropriate for "dry" air streams. For these reasons, this technology is rejected for the lime kiln application on the basis of technical infeasibility.

Electrostatic Precipitator (ESP)

ESPs use electrical energy to charge and collect particles with very high removal efficiency. The classification of ESPs may be as wet or dry systems and single-stage or two-stage systems. Dry systems are the predominant type used in industrial applications. Wet systems are gaining in popularity today since they eliminate the possibility of fires, which can sometimes occur in dry systems.

The principal components of a dry ESP (DESP) include the housing, discharge and collection electrodes, power source, cleaning mechanism, and solids handling systems. The housing is gas-tight, weatherproof, and grounded for safety. Dust particles entering the housing are charged by ions from the discharge electrodes. Dust is collected on the collection electrodes. The collection electrodes are also referred to as plates. The system voltage and the distance between the discharge and collection electrodes governs the electric field strength and the amount of charge on the particles. DESPs are most effective at collecting coarse, larger particles above the 1.0 μm size. Particles smaller than this are difficult to remove because they can inhibit the generation of the charging corona in the inlet field, thereby reducing collection efficiency. Rappers serve as the cleaning mechanisms for DESPs. Dust hoppers collect the precipitated particles from a DESP. Dust is removed continuously or periodically from the hopper and stored in a container until final disposition.

Wet ESPs operate a wet wall on the back of an ESP, with either continuous or intermittent water flow. The water flow is collected into a sump. The advantage to a wet ESP is that it has no back coronas and there is a reduced risk of fire. Collection efficiencies for both types of systems (dry or wet) are usually at or above 95-99%.

Both dry and wet ESPs are technically feasible for the Palatka Lime Kiln.

Wet Scrubbers

Wet scrubbers are collection devices that trap wet particles in order to remove them from a gas stream. They utilize inertial impaction and/or Brownian diffusion as the particle collection mechanism. Wet scrubbers generally use water as the cleaning liquid. Water usage and wastewater disposal requirements are important factors in the evaluation of a scrubber alternative. Types of scrubbers include spray scrubbers, cyclone scrubbers, packed-bed scrubbers, plate scrubbers, and venturi scrubbers. The most common particulate matter removal scrubber is the venturi scrubber because of its simplicity (no moving parts) and high collection efficiency. In this type of scrubber, a gas stream is passed through a venturi section, before which, a low-pressure liquid (usually water) is added to the throat. The liquid is atomized by the turbulence in the throat and begins to collect particles impacting the liquid as a result of differing velocities for the gas stream and atomized droplets. A separator is used to remove the particles or liquid from the gas stream. The most important design consideration is the pressure drop across the venturi. Generally, the higher the pressure drop, the higher the collection efficiency. Venturi scrubbers with a pressure drop greater than 15 inches of water usually have collection efficiencies near 85%. Venturi scrubbers with higher pressure drops can result in collection efficiencies up to 98%. Wet scrubbers are technically feasible for the Lime Kiln.

Cyclonic Separators

Cyclonic separators are devices that utilize centrifugal forces and low pressure caused by spinning motion to separate materials of different density, size and shape. Gas cyclones are used to separate particulate matter from dust-laden air streams. Cyclones are popular because they are simple to operate, inexpensive to manufacture, require little maintenance, have no moving parts, and operate at high temperatures and pressures. There are two types of separators available, tangential and axial. Both types operate on the same principle; however, in axial flow cyclones, the gas stream enters from the top of the unit and is forced to move tangentially by a grate in the top of the cyclone. In tangential cyclones, the gas stream enters from an inlet on the side that is positioned tangentially to the body of the unit. Multi-stage cyclones can increase the amount of particulate matter that is removed by connecting a number of single stage cyclones in series. The first stage of a multi-stage cyclone removes the larger particles while the remaining stages remove progressively smaller particles. The collection efficiency of cyclones varies anywhere from 25 to 95%, depending on whether the system is comprised of a single-stage cyclone or a multi-stage cyclone system. Cyclonic separators are technically feasible for the Lime Kiln.

Volatile Organic Compounds

As indicated in Table E-3, GP has identified one (1) add-on control technology and two pollution prevention techniques. The terms "good combustion practices" and "proper kiln design and operation" are really two labels for the same set of efficient combustion practices. As such, the same principles apply and there is no need to discuss these separately. The technical feasibility of each of these control approaches is discussed in the following paragraphs.

Venturi Scrubber Using Fresh Water

A single entry in the RBLC, for a facility in Louisiana, indicates the use of a "venturi scrubber using fresh water" as a control alternative for VOCs. Almost all of the water used in the Lime Kiln scrubber at the Palatka Mill is fresh water. If any condensates were used as scrubber "make-up", they would be "clean" condensates with extremely low quantities of methanol.

National Council for Air and Stream Improvement, Inc. (NCASI) Technical Bulletin No. 676 discusses the impact of a scrubber in controlling VOC emissions:

> *"At Mill M the lime kiln vent gases entering and exiting the wet scrubber were tested. The results...show a very small decrease in total...VOC emissions across the wet scrubber, primarily due to a slight decrease in methanol emissions from the scrubber. These differences do not appear to be significant."*

This same Technical Bulletin states the following:

> *"These observations...support the conclusion that methanol in the scrubber make-up water is the major source of...VOC emissions from lime kilns with wet scrubbers."*

The conclusion from these excerpts is that a scrubber using fresh water and "clean" condensates will have little to no impact on VOC emissions. Since these scrubbers are primarily in place for the control of particulate matter and sulfur compounds, the RBLC entry, when viewed in light of the excerpts from the NCASI document, indicates that, as long as the water being used in the scrubber is essentially "clean", no additional VOCs would be expected to be generated by the use of the scrubber. However, there is little control of the VOCs actually provided by the scrubber. This technology is in use at the Palatka Mill and is, therefore, technically feasible.

Good Combustion Practices/Proper Design and Operation

The formation of VOCs in a lime kiln is minimized by ensuring efficient combustion of the fuel in the burner. Efficient combustion is a function of several parameters, including the quantity of oxygen supplied in the burner to support combustion of the fuel and the temperature and residence time inside the kiln to which the products of fuel combustion are exposed.

Another factor that must be considered for efficient combustion of fuel oil is atomization in the burner. To burn fuel oil efficiently, the burner must be atomized correctly, with the oil sprayed into the kiln in a controlled manner. Droplet size is critical in determining the mixing rate of fuel oil and air. If the droplet size is too coarse, the larger drops take longer to burn, which affects combustion efficiency.

Since lime kilns operate at relatively high temperatures and have long residence times (due to their length), volatile organic matter, generated from the combustion of fuel, will be efficiently destroyed. Lime kilns typically operate at temperatures well above 1,400 °F and have residence times greater than 1 second. The values for these two parameters will ensure complete destruction of essentially all VOCs generated from the combustion of fuel oil. Recent stack testing conducted for the Palatka Lime Kiln in 2004 and 2005 (see Attachment B), indicated an average VOC emission rate of less than 1.0 pound per hour. This is an extremely low emission rate, which verifies that the Mill's Kiln is combusting fuel very efficiently. Therefore, this is a technically feasible manner in which to control emissions of VOCs.

Carbon Monoxide

As indicated in Table E-3, good combustion practices and proper design and operation of a lime kiln are the control technologies listed for minimizing CO emissions. Essentially, the control techniques discussed above for minimizing the formation of VOC emissions are the same for use in minimizing the formation of CO emissions. Summarizing the same information as above for VOC emissions can be done for CO emissions, in that the long residence times and high temperatures that lime kilns operate at assure the minimization of CO emissions. Recent stack testing conducted for the Palatka Lime Kiln in 2004 and 2005 (see Attachment B), indicated an average CO emission rate of less than 2.0 pound per hour. This is an extremely low emission rate, which verifies that the Mill's Kiln is combusting fuel very efficiently. Therefore, this is a technically feasible manner in which to control CO emissions.

The use of oxidation catalysts were discussed under the BACT analysis for the Recovery Boiler (Attachment D). In Step 1a of that analysis, it was pointed out that the use of No. 6 fuel oil, which contains several toxic metals, such as zinc, lead, mercury, copper, potassium, magnesium, arsenic and vanadium, will act as a poison after a sufficient amount of the metals builds-up on the catalyst bed. Even after consideration of pollution control equipment to remove particulate matter emissions from the flue gas exhaust from the No. 4 Lime Kiln, a sufficient quantity of heavy metals will still be present to degrade or even poison the catalyst. For these reasons, it is not technically feasible to use an oxidation catalyst for reducing CO emissions from the No. 4 Lime Kiln.

Sulfuric Acid Mist

As discussed above, the controls identified as part of the RBLC search for controlling emissions of SAM from lime kilns includes the inherent design of the lime kiln itself and the use of a high pH scrubbing solution in the venturi scrubber. However, GP is aware of the fact that wet ESPs can be very effective in the removal of SAM.

Wet ESP

Wet ESP operation is described in detail above for PM. Removal efficiencies for SAM would be in the same range as what is seen for PM or as high as 98-99%. This technology is technically feasible.

Wet Scrubber and Optimal Mud Washing

Beyond the use of a wet ESP, some removal would be expected from the use of a venturi scrubber with pH values above 7.0, along with optimal lime mud washing. Although the exact removal efficiency for SAM is not known, these technologies, both individually, and combined, are effective in the removal of sulfur compounds in general.

Step 3 – Ranking the Technically Feasible Alternatives to Establish a Control Hierarchy

The following sections discuss the control technology hierarchy for the technically feasible alternatives discussed in Step 2 above for each pollutant.

Nitrogen Oxides

Step 2 of the analysis determined that oxidation/reduction scrubbing, SCR, SNCR, LNB burners, flue gas recirculation, and NSCR are technically infeasible. Technically feasible control technologies for NO_x are limited to "efficient operation", "good combustion practices", and "preventative maintenance". It is difficult to assign specific control efficiencies for these practices. For this step of the BACT analysis, GP has assigned an equal ranking for these control techniques.

Particulate Matter

Step 2 of the analysis determined that all of the listed PM control technologies, with the exception of a fabric filter, are feasible. These technically feasible control technologies include cyclonic separators, venturi scrubbers, other wet scrubbers, ESPs, and a combination of a venturi scrubber and ESP. The following table ranks these technologies based on top control efficiency values and lists the associated emission rates reported in the RBLC:

Table E-4. Ranking of PM Control Technologies for Existing Lime Kilns

Control Technology	Removal Efficiency	Emission Rate (gr/dscf)
Venturi Scrubber and ESP	99.9%+	<0.064
Venturi Scrubber	98-99%	--
Dry/Wet ESP	98-99%	0.033-0.067[1]
Packed Bed Wet Scrubber	85+%	--
Cyclone Separators	25-95%	--

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[1] Emission rate ranges reflects natural gas-fired kilns at 0.033 gr/dscf and oil-fired kilns at 0.067 gr/dscf on existing lime kilns. In addition, the RBLC reports an emission standard of 0.01 gr/dscf for a completely new lime kiln under construction in Georgia. The limit of 0.01 gr/dscf is defined by National Emission Standards for Hazardous Air Pollutants (40 CFR 63, Subpart MM) for new kilns.

Volatile Organic Compounds

The technically feasible technologies for controlling VOC emissions include a venturi scrubber using fresh water and "good combustion practices"/"proper design and operation". While both of these techniques are in place on the Lime Kiln at the Palatka Mill, per the discussion above, it is likely that the scrubber is doing very little, if anything, to control VOC emissions. However, the use of "clean" make-up water ensures that additional VOCs are not generated through the use of that device in controlling other emissions (*i.e.*, PM and sulfur compound emissions).

Carbon Monoxide

The technically feasible approach for controlling CO emissions is "good combustion practices" and "proper design and operation" of the lime kiln. These practices are used as part of the normal operation of the lime kiln.

Sulfuric Acid Mist

As discussed above, the entries in the RBLC states that BACT for controlling sulfuric acid mist emissions from a lime kiln is the inherent design of the lime kiln itself and the use of a scrubbing solution with a pH value above 7.0. As discussed above, GP is aware of the fact that wet ESPs are very effective in the removal of SAM. Also, since the combination of a venturi scrubber and optimal lime mud washing is effective in reducing sulfur compounds in general, it is likely that these technologies are controlling sulfuric acid mist to some extent as well. However, the actual level of control for this technology combination is undocumented for sulfuric acid mist.

Step 4-Cost Effectiveness Evaluation

In addition to considering emission reduction efficiency, control effectiveness may consider economic, energy and environmental impacts. This step of the BACT process determines the cost effectiveness of the technically feasible control options listed in Step 3.

Nitrogen Oxides

As discussed in Step 3, the only technically feasible controls for NO_x from a lime kiln are "efficient operation", "good combustion practices", and "preventative maintenance". Since these are the only technically feasible control strategies for this pollutant, a cost effectiveness evaluation is not required.

Particulate Matter

The Lime Kiln at the Palatka Mill is currently equipped with a cyclonic dust collector followed by a venturi scrubber. The venturi scrubber primarily uses fresh water as the scrubbing media. In Step 3, there were two control configurations identified that would potentially have a higher control efficiency for particulate matter. These included, (1) the combination of a scrubber and an ESP, and (2) a fabric filter. Following those two options, a stand-alone scrubber and stand-alone ESP are essentially equivalent in terms of control efficiency for particulate matter. This equivalency is reflected in the RBLC entries – in some cases, scrubber installations are shown to have higher control efficiencies, while in others, ESPs are shown to be more effective in controlling particulate matter.

As stated in the EPA *New Source Review Workshop Manual* (draft, October 1990), "...for control alternatives that have been effectively employed in the same source category, the economic impact of such alternatives on the particular source under review should be not nearly as pertinent to the BACT decision making process as the average, and, where appropriate, incremental cost effectiveness of the control alternative". In order to understand the relevance of this language to the Lime Kiln at the Palatka Mill, it is important to document the facts surrounding the installations of an ESP/scrubber combination at GP's Mills in Leaf River, Mississippi and Brunswick, Georgia and the GP Mills in Port Hudson, Louisiana and Naheola, Alabama. When the Leaf River Mill was originally constructed in the mid-1980s, BACT was determined to be a stand-alone scrubber. It was only as a result of subsequent operational issues following initial start-up that seemed to necessitate the addition of the ESP. It is GP's understanding (the Mill was not owned by GP at the time of construction) that the Mill had an issue in meeting the original permitted particulate matter emission limit with the scrubber in place. As a result, the ESP was added for that purpose (*i.e.,* to meet the permitted emission limit), as opposed to being required as part of a BACT assessment. At any rate, the Mill subsequently determined that the issues that existed were a result of "engineering" problems, as opposed to having anything to do with the operation and/or performance of the control equipment. However, once that determination was made, the Mill had already committed to install the ESP. It is worth noting that, when the Leaf River Mill experienced a catastrophic fire in the ESP a few years ago, they were able to demonstrate compliance with their emissions limit(s) with the use of the scrubber. Given these facts, it is highly unlikely that a cost effectiveness calculation was ever performed for the ESP/scrubber combination in place at the Leaf River Mill.

In the case of the Brunswick and Port Hudson Mills, the scrubbers that were originally installed with the two kilns were of the low energy, low pressure drop variety, whereas the scrubbers in place at Palatka and other GP Mills are high energy with high pressure drops. For the Port Hudson Mill, the ESP was added as part of a retroactive PSD permitting exercise that took place approximately five years ago. As part of that exercise, it was determined that the No. 2 Lime Kiln should have been subjected to NSPS. With the low energy scrubber, GP had concerns that the Mill would be able to meet the NSPS limit for PM on a continual basis. As such, the decision was made to add the ESP. The No. 1 Lime Kiln at the Port Hudson Mill operates with two scrubbers, a conventional venturi unit (original) followed by a second, micro-mist type venturi scrubber. The second unit was added to ensure compliance when the No. 1 Lime Kiln began burning pet coke. Although the Brunswick Mill did not undergo a retroactive PSD analysis, it was determined, shortly after the kiln was installed in the mid-1980s, that there would be issues with that type of scrubber (*i.e.,* low energy, low pressure drop) maintaining compliance on a continual basis. As such, that ESP was added in the late-1980s, shortly after initial installation of the lime kiln. Similarly, for the Naheola Mill, although GP did not own the Mill at the time, it is reported that the ESP was added for compliance purposes and not as the result of a BACT assessment.

Again, the scrubbers in place at Palatka and other GP Mills are of the high energy, high pressure drop variety. As such, these scrubbers are already highly effective in the removal of PM, SAM, and to some degree, other sulfur compounds. Also, as discussed further above, in the context of a PSD application, one of the components of the BACT analysis is an economic evaluation. Since the ESPs that were added at the other mills were primarily for immediate compliance purposes, the economics were not necessarily given detailed consideration and they certainly were not evaluated in the context of a BACT-type economic analysis (*i.e.,* cost per ton of pollutant removed).

Since GP is aware that the ESP/scrubber combination exists at these mills and that this combination is technically feasible, a cost analysis is prepared for the Lime Kiln at the Palatka Mill as part of this BACT assessment. These costs, prepared utilizing spreadsheets from EPA's Cost Control Manual, are presented in Table E-5. Referring to the spreadsheet, the annualized cost is calculated as $1,403,393 for an ESP. As shown in Attachment B, baseline emissions are 58.2 and 57.2 tons per year (tpy) for PM and PM_{10}, respectively. Assuming a 99% control efficiency for the ESP, the pollutant tons removed are calculated as 57.6 and 56.6 tons for PM and PM_{10}, respectively. This yields a cost effectiveness of more than $24,364 per ton of pollutant removed ($1,403,393/57.6 tons removed based on total PM = $24,364). GP feels that it is appropriate, based on EPA guidance, to consider the scrubber as the "base case" in calculating the cost effectiveness. The scrubber is required by federally enforceable permit conditions in both the existing Title V and PSD permits. Furthermore, it is not feasible to simply replace the scrubber with an ESP since the scrubber is in place for the control of both particulate matter and sulfur compounds. Another way to conduct the cost effectiveness assessment is to perform the calculations in terms of incremental cost effectiveness. As stated in the New Source Review Workshop Manual, "The incremental cost effectiveness should be examined in combination with the average cost effectiveness in order to justify elimination of a control option. The annualized costs for a scrubber, based on EPA's Cost Control Manual, are calculated and presented in Table E-6. Referring to the spreadsheet, the annualized cost is calculated as $463,435. Adding this to the annualized cost of the ESP to get the total annualized cost for the control combination, yields a total annualized cost of $1,866,828. The formula to be utilized in calculating incremental cost effectiveness is as follows:

$$\frac{\text{Total Costs (annualized) of Control Option} - \text{Total Costs (annualized) of Next Control Option}}{\text{Next Control Option Emission Rate} - \text{Control Option Emission Rate}}$$

As presented in Table E-6, the estimated control efficiency for the ESP/scrubber combination is 99.9+ %. The estimated control efficiency for the scrubber alone is up to 99%. If it is assumed that the baseline emission rate of 58.2 tpy is a controlled emission rate based on 99% control, then the controlled emission rate at 99.9% efficiency would be (58.2 tpy/0.01 x 0.001 = 5.82 tpy).

$$\frac{\$1{,}866{,}828 - \$463{,}435}{58.2\text{ tpy} - 5.8\text{ tpy}} = \$17{,}675/\text{ton}$$

As shown, the cost effectiveness of adding the ESP is excessively high regardless of whether it is viewed in terms of average or incremental cost effectiveness. As such, this combination of controls (scrubber and ESP) is demonstrated to be economically infeasible for the Lime Kiln at the Palatka Mill.

Since a scrubber and a stand-alone ESP are the options with the second highest control effectiveness and the scrubber (and a cyclonic dust collector) is already in place on the Palatka Lime Kiln, no further cost analysis is required.

Volatile Organic Compounds

As discussed in Step 3, both technologies (*i.e.*, venturi scrubber with fresh water and good combustion practices/proper design and operation) are already being utilized at the Palatka Mill. However, based on the experiences of GP, NCASI and others, it is highly unlikely that the scrubber is leading to any significant decrease in VOC emissions. Since these systems are already in place, a cost effectiveness analysis is not required.

Carbon Monoxide

As discussed in Step 3, good combustion practices and proper design and operation of the lime kiln are already being utilized at the Palatka Mill. Since these systems are already in place, a cost effectiveness analysis is not required.

Sulfuric Acid Mist

As discussed in Step 3, a wet ESP is technically feasible for the removal of SAM from the exhaust of a lime kiln. Also, noted above, it is likely that some degree of removal of this compound is already occurring as a result of the venturi scrubber and optimal mud washing.

The Lime Kiln at the Palatka Mill is currently equipped with a cyclonic dust collector followed by a venturi scrubber. In Step 3, there was a single technology identified, a wet ESP, that would potentially have a higher control efficiency for SAM.

GP presented an annualized cost for an ESP under the discussion above for particulate matter. Referring to the spreadsheet in Table E-5, the annualized cost is calculated as $1,403,393 for an ESP. As shown in Attachment B, baseline emissions for SAM are only 0.01 tpy. Assuming a 99% control efficiency for the ESP, the pollutant tons removed are calculated as 0.0099 tons. This yields a cost effectiveness in excess of $141 MM per ton of pollutant removed ($1,403,393/0.0099 tons removed = $141,756,869). Even utilizing the proposed allowable emission rate of 1.8 tpy, which is much more stringent than what is required by EPA procedures, the cost effectiveness is estimated to be approximately $780,000 per ton of pollutant removed ($1,403,393/(1.8 tpy x 0.99) tons removed = $779,663). Since the control effectiveness being provided by the combination of the venturi scrubber and optimal mud washing is not known, it is not possible to calculate an incremental cost effectiveness value. However, given the relatively low SAM emissions, when compared to PM, the conclusion can be reached that a wet ESP would clearly not be cost effective in the removal of SAM from the Lime Kiln.

Since a scrubber and optimal mud washing are already in place on the Palatka Lime Kiln, no further cost analysis is required. Again, the SAM removal efficiency for these technologies is unknown.

Step 5-Selecting BACT

This step of the BACT process identifies the selection of BACT. Table E-7 summarizes the BACT selection for the Lime Kiln.

Table E-7. Summary of Proposed Selection of BACT for Lime Kiln

Pollutant	Control Technology	Ranking	Destruction Efficiency or Emission Rate
NO_x	Good Combustion	1	275 ppmvd at 10% O_2
PM/PM_{10}	Venturi Scrubber	3	0.081 gr/dscf at 10% O_2
VOC	Good Combustion/Proper Design and Operation	1	185 ppmvd at 10% O_2
CO	Good Combustion Practices	1	69 ppmvd at 10% O_2
SAM	No Controls	1	0.4 lbs/hr (1.8 tons/yr)

Table E-1a RBLC Search Results of Lime Kiln NOx Controls

RBLCID	FACILITY	STATE	PERMIT NUMBER	PERMIT DATE	CONTROLS	THRUPUT	THRUPUT UNIT	EMISSION LIMIT	EMISSION LIMIT UNIT	BASIS	NOTES
MS-0075	GEORGIA-PACIFIC MONTICELLO	MS	1500-00007	7/9/2003	GOOD COMBUSTION PRACTICES AND KILN DESIGN	200	MM BTU/HR	95.6	LB/HR	BACT-PSD	RETROACTIVE PSD PERMIT APPLICATION
GA-0095	WEYERHAEUSER - FLINT RIVER OPERATIONS	GA	2631-193-0013-V-01-1	5/28/2003	DRY PLATE ESP	370	T/D	175	PPM @ 10% O2	BACT-PSD	THE MODIFICATION IS FOR THE REPLACEMENT OF THE CALCINER WITH A LIME KILN, INSTALLATION OF WHITE LIQUOR SCRUBBER, AND REPLACEMENT OF THE SLAKER.
LA-0174	PORT HUDSON OPERATIONS	LA	PSD-LA-581 (M-2)	1/25/2002	GOOD EQUIPMENT DESIGN AND PROPER COMBUSTION TECHNIQUES	340	T/D	48.78	LB/H	BACT-OTHER	PERMIT IS FOR INSTALLATION OF THE NO. 6 THROUGH AIR DRIED (TAD) TOWEL MACHINE AND ASSOCIATED EQUIPMENT. PRODUCTION RATE IS 306 MACHINE DRY TONS PER DAY
LA-0174	PORT HUDSON OPERATIONS	LA	PSD-LA-581 (M-2)	1/25/2002	GOOD EQUIPMENT DESIGN AND PROPER COMBUSTION TECHNIQUES	270	T/D	38.75	LB/H	BACT-OTHER	PERMIT IS FOR INSTALLATION OF THE NO. 6 THROUGH AIR DRIED (TAD) TOWEL MACHINE AND ASSOCIATED EQUIPMENT. PRODUCTION RATE IS 306 MACHINE DRY TONS PER DAY (MDTPD) OF SHEETS OF TISSUE/TOWEL. THE PROJECT DOES NOT EXPECT TO ADVERSELY IMPACT SOILS, VEGETATION, O
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	LOW-VOC ADDITIVES, GOOD COMBUSTION PRACTICES	240	T CAO/D	340	PPMDV @ 10% O2	BACT-OTHER	IN LIEU OF SPECIFIC INFORMATION, THE PLANT ADDRESS IS PROVIDED IN THE PLANT CONTACT FIELD. PLANTWIDE EMISSION LIMITS PROVIDED (NOT SPECIFIED AS CHANGE IN PLANTWIDE EMISSION LIMITS): PM & PM10, 698.5 T/YR; SO2, 1885 T/YR; CO, 7056.5 T/YR; NOX, 3028.5 T/YR;
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	LOW-VOC ADDITIVES, GOOD COMBUSTION PRACTICES	250	T CAO/D	340	PPMDV @ 10% O2	BACT-OTHER	IN LIEU OF SPECIFIC INFORMATION, THE PLANT ADDRESS IS PROVIDED IN THE PLANT CONTACT FIELD. PLANTWIDE EMISSION LIMITS PROVIDED (NOT SPECIFIED AS CHANGE IN PLANTWIDE EMISSION LIMITS): PM & PM10, 698.5 T/YR; SO2, 1885 T/YR; CO, 7056.5 T/YR; NOX, 3028.5 T/YR;
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	LOW-VOC ADDITIVES, GOOD COMBUSTION PRACTICES	325	T CAO/D	275	PPMDV @ 10% O2	BACT-OTHER	IN LIEU OF SPECIFIC INFORMATION, THE PLANT ADDRESS IS PROVIDED IN THE PLANT CONTACT FIELD. PLANTWIDE EMISSION LIMITS PROVIDED (NOT SPECIFIED AS CHANGE IN PLANTWIDE EMISSION LIMITS): PM & PM10, 698.5 T/YR; SO2, 1885 T/YR; CO, 7056.5 T/YR; NOX, 3028.5 T/YR;
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	LOW-VOC ADDITIVES, GOOD COMBUSTION PRACTICES	140	T CAO/D EACH	340	PPMDV @ 10% O2	BACT-OTHER	IN LIEU OF SPECIFIC INFORMATION, THE PLANT ADDRESS IS PROVIDED IN THE PLANT CONTACT FIELD. PLANTWIDE EMISSION LIMITS

Table E-1a RBLC Search Results of Lime Kiln NOx Controls

SC-0084	BOWATER COATED PAPER DIVISION	SC	2400-0005-CO-CT	10/31/2001	ESP'S, SCRUBBER'S, BAG HOUSE'S, CENTRIFUGAL COLLECTOR, FILTERS, AND BOILER INCINERATION			152	PPMVD @ 10 % O2	BACT-PSD	The facility manufactures coated paper, newsprint, and market pulp. This PSD involves major modifications. The facility is constructing a new kraft mill fiber line (pulping and bleaching system). The facility will be converting paper machine no. 3 from ne
LA-0122	MANSFIELD MILL	LA	PSD-LA-93 (M-6)	8/14/2001	PREVENTATIVE MAINTENANCE, BAGHOUSES, SCRUBBERS, FUEL SULFUR LIMITS.	142	MMBTU/H	103.7	LB/H	BACT-PSD	ADDITIONAL SIC: 2621. PHYSICAL PLANT ADDRESS: HWY. 509 EAST; MANSFIELD, LA 71052.
LA-0122	MANSFIELD MILL	LA	PSD-LA-93 (M-6)	8/14/2001	PREVENTATIVE MAINTENANCE, BAGHOUSES, SCRUBBERS, FUEL SULFUR LIMITS.	370	HP	4.2	LB/H	BACT-PSD	ADDITIONAL SIC: 2621. PHYSICAL PLANT ADDRESS: HWY. 509 EAST; MANSFIELD, LA 71052.
OR-0031	HALSEY PULP MILL	OR	22-0027	3/2/2001	NONE INDICATED	156	T CAO/D	1.8	LB/T LIME PRODUCTION	BACT-PSD	COMPANY IS INCREASING ITS PULP PRODUCTION FROM 252,701 TO 276,612 AIR DRIED METRIC TONS (ADMT) PER YR (12-MO ROLLING BASIS)
TX-0263	DONAHUE INDUSTRIES, INC. PAPER MILL	TX	PSD-TX-437	10/17/2000	DIGESTERS ARE CONTROLLED BY VENTING THE OFF-GASES TO A COMBUSTION DEVICE (CURRENTLY LIME KILN, SOON TO BE INCINERATOR). THE GROUNDWOOD MILL IS UNCONTROLLED.			22.7	LB/H	BACT-OTHER	THIS IS A PAPER MILL THAT MANUFACTURES PULP FOR THE PRODUCTION OF NEWSPRINT AND SPECIALTY PAPER PRODUCTS. IT UTILIZES A GROUNDWOOD (MECHANICAL) PROCESS AND A KRAFT (CHEMICAL) PROCESS. THE DIGESTERS ARE PART OF THE EARLY KRAFT PROCESSING, WHERE CHIPS ARE P
MS-0029	WEYERHAEUSER COMPANY	MS	1680-00044	9/10/1996	EFFECTIVE OPERATION OF THE KILN	504	T/D CAO	300	PPMVD @3.6% O2	BACT-PSD	Weyerhaeuser Is Proposing to Expand its Production Capabilities for Both Market Pulp and Light Weight Coated (LWC) Paper.
FL-0111	BUCKEYE FLORIDA, L.P.	FL	1230001-004-AC / PSD-FL-232	8/13/1996	GOOD COMBUSTION/BURNER MODIFICATIONS	750	T/D LIME	68.44	LB/H	BACT-PSD	Increased Throughput of Existing No. 4 Lime Kiln from 650 To 750 Tpd
GA-0064	RIVERWOOD INTERNATIONAL CORPORATION	GA	2631-011-11958	7/11/1996	LOW NOX BURNERS	8.4	T/H CAO PER KILN	3.5	LB/T CAO	BACT-PSD	FACILITY ALSO INCLUDES WAREHOUSE AND SHIPPING AREA THAT IS FOR THE ADDITIONAL PRODUCTION OF PAPER PRODUCT. NO POLLUTANTS ARE GENERATED FROM THIS AREA. KILNS HAVE NEW LOW NOX BURNERS AND THE NOX LIMIT IS BASED ON AP-42 EMISSION FACTORS.

Table E-1a RBLC Search Results of Lime Kiln NOx Controls

WV-0016	APPLE GROVE PULP AND PAPER COMPANY, INC	NY	R14-11	6/17/1996	ESP, VENTURI SCRUBBER, MULTICYCLONE, SELECTIVE NON-CATALYTIC REDUCTION SYSTEM, FABRIC FILTER, BLEACH PLANT USES A CHLORIDE OXIDE PROCESS: ELEMENTAL CHLORINE-FREE (ECF) TECHNOLOGY.	65600	LB/H	21.8	LB/H	BACT-PSD	This Facility Was Never Built. There Are No Plans for Construction. Plant Wide Emissions (T/YR) : H2SO4 = 137.5, Chloroform = 0.5758, Carbon Tetrachloride = 0.0335, Methylene Chloride = 50.84, HCL = 22.2, Formaldehyde = 121.55, Benzene = 0.9358, Cl2 = 0.1
SC-0045	WILLAMETTE INDUSTRIES - MARLBORO MILL	SC	1680-0043	4/17/1996	GOOD COMBUSTION CONTROL	450	T/D CAO	175	PPM	BACT-OTHER	1) SO2 Limit Higher Because of NCG Incineration. 2) VOX, NOX, & CO Looked at as One BACT Unit Because of Their Interdependence. 3) Temperature Monitoring for Trs Gas Control.
NH-0006	GROVETON PAPER BOARD, INC.	NH	NOT AVAILABLE	5/31/1995	NONE	16.5	GAL/MIN@50+-5% SOLID	0.85	LBS/TON BLACK LIQ/SL	RACT	
WI-0097	NEKOOSA PAPER INCORPORATED	WI	94POY067	3/9/1995	THE PERMITTEE SHALL MAINTAIN AND OPERATE THE LIME KILN UNDER EFFICIENT COMBUSTION CONDITIONS.	45	MMBTU/H	21.62	LB/H	BACT-PSD	START UP AND COMPLIANCE DATES ARE NOT AVAILABLE.
FL-0087	CHAMPION INTERNATIONAL CORP	FL	PSD-FL-200	3/25/1994	GOOD COMBUSTION			200	PPM	BACT-PSD	This Modification Results from a Consent Order for Wastewater Violations. Modifications Include Construction Of a New Nat. Gas Fired No. 6 Power Boiler, Surrendering of The Operation Permits for Existing No. 1 and No. 2 Power Boilers, Mod to Bleach Plants
AL-0152	GULF STATES PAPER CORP.	AL	105-0001-X026	1/31/1994	NONE INDICATED	650	TONS CAO/D	175	PPMV @ 10% O2	BACT-PSD	

Table E-1b RBLC Search Results of Lime Kiln PM Controls

RBLCID	FACILITY	STATE	PERMIT NUMBER	PERMIT DATE	THRUPUT	THRUPUT UNIT	CONTROLS	EMISSION LIMIT	EMISSION LIMIT UNIT	BASIS
MS-0075	GEORGIA-PACIFIC MONTICELLO	MS	1500-00007	7/9/2003	200	MM BTU/HR	GOOD COMBUSTION PRACTICES AND KILN DESIGN	21.2	LB/HR	BACT-PSD
GA-0095	WEYERHAEUSER - FLINT RIVER OPERATIONS	GA	2631-193-0013-V-01-1	5/28/2003	370	T/D	ESP	0.01	GR/DSCF @ 10% O2	MACT
LA-0174	PORT HUDSON OPERATIONS	LA	PSD-LA-581 (M-2)	1/25/2002	340	T/D	WET SCRUBBERS	25.76	LB/H	BACT-PSD
LA-0174	PORT HUDSON OPERATIONS	LA	PSD-LA-581 (M-2)	1/25/2002	340	T/D	WET SCRUBBERS	25.76	LB/H	BACT-PSD
LA-0174	PORT HUDSON OPERATIONS	LA	PSD-LA-581 (M-2)	1/25/2002	270	T/D	ELECTROSTATIC PRECIPITATOR	20.45	LB/H	BACT-PSD
LA-0174	PORT HUDSON OPERATIONS	LA	PSD-LA-581 (M-2)	1/25/2002	270	T/D	ELECTROSTATIC PRECIPITATOR	20.45	LB/H	BACT-PSD
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	240	T CAO/D	NO DATA	34	T/YR	BACT-OTHER
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	250	T CAO/D	NO DATA	35.6	T/YR	BACT-OTHER
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	325	T CAO/D	NO DATA	0.06	GR/DSCF @ 10% O2	BACT-OTHER
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	140	T CAO/D EACH	NO DATA	0.03	GR/DSCF @ 10% O2	BACT-OTHER
SC-0084	BOWATER COATED PAPER DIVISION	SC	2400-0005-CO-CT	10/31/2001			ESP	0.03	GR/DSCF @ 10% O2	BACT-PSD
LA-0122	MANSFIELD MILL	LA	PSD-LA-93 (M-6)	8/14/2001	142	MMBTU/H	VENTURI SCRUBBER USING CAUSTIC SOLUTION	39.2	LB/H	BACT-PSD
LA-0155	ST. FRANCISVILLE MILL	LA	PSD-LA-540 (M-2)	4/29/2001	12.25	T CAO/H	NONE INDICATED. STACK TESTS WILL BE CONDUCTED.	7.35	LB/H	OTHER
OR-0031	HALSEY PULP MILL	OR	22-0027	3/2/2001	156	T CAO/D	NONE INDICATED	2.2	LB/T LIME PRODUCTION	BACT-PSD
OR-0031	HALSEY PULP MILL	OR	22-0027	3/2/2001	156	T CAO/D	NOT IN PERMIT	2.2	LB/T LIME PRODUCTION	BACT-PSD
TX-0263	DONAHUE INDUSTRIES, INC. PAPER MILL	TX	PSD-TX-437	10/17/2000			SCRUBBER	22.7	LB/H	BACT-PSD
MS-0029	WEYERHAEUSER COMPANY	MS	1680-00044	9/10/1996	504	T/D CAO	ESP M.O.420297 ENVIRONMENTAL ELEMENTS CORPORATION	0.033	GR/DSCF @ 10% O2	BACT-PSD
MS-0029	WEYERHAEUSER COMPANY	MS	1680-00044	9/10/1996	504	T/D CAO	ESP M.O.420297 ENVIRONMENTAL ELEMENTS CORPORATION	0.033	GR/DSCF @ 10% O2	BACT-OTHER
FL-0111	BUCKEYE FLORIDA, L.P.	FL	1230001-004-AC / PSD-FL-232	8/13/1996	750	T/D LIME	ESP	20	LB/H	BACT-PSD
WV-0016	APPLE GROVE PULP AND PAPER COMPANY, INC	WV	R14-11	6/17/1996	65600	LB/H	FABRIC FILTER -MINIMUM CONTROL EFFICIENCY OF 99.96%	1.88	LB/H	BACT-PSD
SC-0045	WILLAMETTE INDUSTRIES - MARLBORO MILL	SC	1680-0043	4/17/1996	450	T/D CAO	ESP	0.033	GR/DSCF	BACT-OTHER
WI-0097	NEKOOSA PAPER INCORPORATED	WI	94POY067	3/9/1995	45	MMBTU/H	ESP. ALTERNATE LIMIT IS FOR FUEL OIL (0.067 GR/DSCF), STANDARD EMISSION LIMIT IS FOR NATURAL GAS (0.05 GR/DSCF).	9.9	LB/H	BACT-PSD
FL-0087	CHAMPION INTERNATIONAL CORP	FL	PSD-FL-200	3/25/1994	---	---	NO DATA	10.9	LB/H	BACT-PSD
AL-0152	GULF STATES PAPER CORP.	AL	105-0001-X026	1/31/1994	650	TONS CAO/D	BOTH GRAIN LOADING LIMITS AT 10% OXYGEN. ALSO 22 LB/H @ 10% O2 GAS, 42 LB/H OIL.	22	LB/H @ 10% O2 (GAS)	BACT-PSD

TABLE E-1c RBLC Search Results of Lime Kiln VOC Controls

RBLCID	FACILITY	STATE	PERMIT NUMBER	PERMIT DATE	CONTROLS	THRUPUT	THRUPUT UNIT	EMISSION LIMIT	EMISSION LIMIT UNIT	BASIS
MS-0075	GEORGIA-PACIFIC MONTICELLO	MS	1500-00007	7/9/2003	GOOD COMBUSTION PRACTICES	200	MM BTU/HR	NONE	N/A	BACT-PSD
LA-0122	MANSFIELD MILL	LA	PSD-LA-93 (M-6)	8/14/2001	VENTURI SCRUBBER USING FRESH WATER	142	MMBTU/H	8.3	LB/H	BACT-PSD
TX-0263	DONAHUE INDUSTRIES, INC. PAPER MILL	TX	PSD-TX-437	10/17/2000	NONE INDICATED	---	---	7.5	LB/H	BACT-PSD
WV-0016	APPLE GROVE PULP AND PAPER COMPANY, INC	WV	R14-11	6/17/1996	NONE INDICATED	65600	LB/H	2.4	LB/H	BACT-PSD
SC-0045	WILLAMETTE INDUSTRIES - MARLBORO MILL	SC	1680-0043	4/17/1996	GOOD COMBUSTION CONTROL	450	T/D CAO	50	PPM	BACT-OTHER
WI-0097	NEKOOSA PAPER INCORPORATED	WI	94POY067	3/9/1995	SYNTHETIC MINOR LIMIT	45	MMBTU/H	6.44	LB/H	BACT-PSD
FL-0087	CHAMPION INTERNATIONAL CORP	FL	PSD-FL-200	3/25/1994	NONE INDICATED	---	---	104	PPMVD @ 10% O2	BACT-PSD
AL-0152	GULF STATES PAPER CORP.	AL	105-0001-X026	1/31/1994	NONE INDICATED	650	TONS CAO/D	0.69	LB/T CAO	BACT-PSD
WA-0022	JAMES RIVER CORP.	WA	PSD-88-3 & DE-88-360 MODIFICAT	9/26/1991	NONE INDICATED	---	---	45	T/YR	LAER
ME-0030	LINCOLN PULP AND PAPER CO.,INC	ME	A-177-71-A/R	9/25/1991	PROPER KILN OPERATION	650	ADT/D	25	PPMV @ 10% O2	BACT-PSD
FL-0058	GEORGIA-PACIFIC CORPORATION	FL	PSD-FL-171	6/12/1991	COMBUSTION CONTROL	---	---	185	PPMVD @ 10% O2	BACT-PSD
LA-0074	WILLAMETTE INDUSTRIES INC	LA	PSD-LA-562	2/4/1991	DESIGN & OPERATION	1740	ADT/D PULP	17.2	LB/H	BACT-PSD
AL-0047	ALABAMA RIVER PULP CO.	AL	106-0010	1/22/1990	NONE INDICATED	465	T/D CAO	78	PPMV AT 10% O2	BACT-PSD
MS-0015	WEYERHAEUSER CO.	MS	1680-00044	10/24/1989	GOOD COMBUSTION PRACTICES	21	T/H	1	LB/T CAO	BACT-OTHER
ME-0009	BOISE CASCADE CORP.	ME	A-214-71-E-A/R	7/18/1989	NONE INDICATED	327	T/D PRODUCT	2	LB/H	BACT-PSD
AL-0042	CHAMPION INTERNATIONAL	AL	707-0001	7/18/1989	NONE INDICATED	300	T/D CAO	31	PPMV AT 10% O2	BACT-PSD
MN-0011	BOISE CASCADE	MN	102A-89-OT-2	5/12/1989	COMBUSTION CONTROL	230	T/D	11.4	LB/H	BACT-PSD
SC-0016	UNION CAMP PULP AND PAPER MILL	SC	1900-0046	5/1/1989	KILN DESIGN & OPERATION	265	T/D CAO	1.6	LB/T CAO	BACT-PSD
AL-0039	MEAD COATED BOARD	AL	211-0004	10/1/1988	NONE INDICATED	1200	T ADP/D	78	PPMV AT 10% O2	BACT-PSD
SC-0015	WILLAMETTE INDUSTRIES	SC	1680-0043	9/29/1988	KILN DESIGN & OPERATION	220	T/D CAO	8.8	LB/H	BACT-PSD

TABLE E-1d RBLC Search Results of Lime Kiln CO Controls

RBLCID	FACILITY	STATE	PERMIT NUMBER	PERMIT DATE	CONTROLS	THRUPUT	THRUPUT UNIT	EMISSION LIMIT	EMISSION LIMIT UNIT	BASIS
MS-0075	GEORGIA-PACIFIC MONTICELLO	MS	1500-00007	7/9/2003	GOOD COMBUSTION PRACTICES AND KILN DESIGN	200	MM BTU/HR	11.7	LB/HR	BACT-PSD
LA-0174	PORT HUDSON OPERATIONS	LA	PSD-LA-581 (M-2)	1/25/2002	GOOD EQUIPMENT DESIGN AND PROPER COMBUSTION TECHNIQUES	340	T/D	15.8	LB/H	BACT-PSD
LA-0174	PORT HUDSON OPERATIONS	LA	PSD-LA-581 (M-2)	1/25/2002	GOOD EQUIPMENT DESIGN AND PROPER COMBUSTION TECHNIQUES	270	T/D	12.56	LB/H	BACT-PSD
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	No Controls	140 each	T CAO/D	1400	PPMDV @ 10% O2	BACT-OTHER
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	No Controls	240	T CAO/D	1400	PPMDV @ 10% O2	BACT-OTHER
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	No Controls	250	T CAO/D	1400	PPMDV @ 10% O2	BACT-OTHER
WA-0303	LONGVIEW FIBRE COMPANY	WA	PSD-01-03	12/10/2001	No Controls	325	T CAO/D	500	PPMDV @ 10% O2	BACT-OTHER
LA-0122	MANSFIELD MILL	LA	PSD-LA-93 (M-6)	8/14/2001	Good Process Controls	142	MMBTU/H	2	LB/H	BACT-PSD
LA-0155	CROWN PAPER COMPANY	LA	PSD-LA-540(M-2)	4/29/2001	No Controls	12.25	T CAO/HR	4.9	LB/H	BACT-OTHER
TX-0263	DONAHUE INDUSTRIES, INC. PAPER MILL	TX	PSD-TX-437	10/17/2000	No Controls			22.9	LB/H	BACT-OTHER
NC-0070	WEYERHAEUSER COMPANY	NC	04291R19	11/25/1998	No Controls	500	BDT/DAY	14.6	LB/H	BACT-PSD
MS-0029	WEYERHAEUSER COMPANY	MS	1680-00044	9/10/1996	EFFECTIVE OPERATION OF THE KILN	504	T/D CAO	50	LB/H	BACT-PSD
WV-0016	APPLE GROVE PULP AND PAPER COMPANY, INC	NY	R14-11	6/17/1996	No Controls	65600	LB/H	6.9	LB/H	BACT-PSD
SC-0045	WILLAMETTE INDUSTRIES - MARLBORO MILL	SC	1680-0043	4/17/1996	GOOD COMBUSTION CONTROL	450	T/D CAO	75	PPM	BACT-OTHER
WI-0097	NEKOOSA PAPER INCORPORATED	WI	94POY067	3/9/1995	THE PERMITTEE SHALL MAINTAIN AND OPERATE THE LIME KILN UNDER EFFICIENT COMBUSTION CONDITIONS.	45	MMBTU/H	15.12	LB/H	BACT-PSD
FL-0087	CHAMPION INTERNATIONAL CORP	FL	PSD-FL-200	3/25/1994	GOOD COMBUSTION			45	PPM	BACT-PSD
AL-0152	GULF STATES	AL	105-0001-X026	1/31/1994	GOOD COMBUSTION	650	T/D CAO	80	PPM	BACT-PSD
ME-0030	LINCLON PULP AND PAPER	ME	A-177-71-A/R	9/25/1991	PROPER KILN OPERATION	650	ADT/DAY	1	LB/ADT	BACT-PSD

TABLE E-1e RBLC Search Results of Lime Kiln SAM Controls

RBLCID	FACILITY	STATE	PERMIT NUMBER	PERMIT DATE	CONTROLS	THRUPUT	THRUPUT UNIT	EMISSION LIMIT	EMISSION LIMIT UNIT	BASIS	NOTES
OK-0103	WEYERHAEUSER COMPANY	OK	97-057-C (M-4) PSD	10/13/2004	LIME KILN - INHERENT SCRUBBING	---	---	0.002	LB/MM BTU	BACT-PSD	Lime Kiln-FUEL IS PET COKE AND NAT. GAS
MS-0075	GEORGIA-PACIFIC MONTICELLO	MS	1500-00007	7/9/2003	CAUSTIC SCRUBBER	200	MM BTU/HR	---	---	BACT-PSD	
AL-0152	GULF STATES	AL	105-0001-X026	1/31/1994	NO CONTROLS	650	T/D CAO	1.2	LB/HR	BACT-PSD	Lime Kiln # 3
AL-0047	ALABAMA RIVER PULP	AL	106-0010	1/22/1990	NO CONTROLS	465	T/D CAO	0.9	LB/HR	BACT-PSD	LIME KILN # 2

TABLE E-5

TOTAL ANNUAL COST SPREADSHEET PROGRAM--ELECTROSTATIC PRECIPITATORS [1]

COST BASE DATE: Second Quarter 1987 [2]

VAPCCI (1st Quarter 2006--FINAL): [3] 133.6

INPUT PARAMETERS:		
-- Inlet stream flowrate (acfm):	85,000	(a)
-- Inlet stream temperature (oF):	450	(a)
-- Particulate type:	lime kiln dust	
-- ESP type:	flat plate	
-- ESP 'options' included? ('yes'=1; 'no'=0):	1	
-- Inlet particulate loading (gr/ft3):	17.0	(based on design conditions-1,447,619 grains/min / 85,000 acfm)
-- Particulate mass median diameter (microns):	5	(assume same as cement kiln dust)
-- Most penetrating particle size (microns):	2	
-- Particle rapping puff size (microns):	5	
-- Particulate resistivity (ohm-cm):	2.00E+07	
-- Overall PM collection efficiency (fraction):	0.99768	(based on design conditions)
-- PM migration velocity (cm/s):	16.0	
-- Sneakage factor:	0.07	
-- Rapping reentrainment factor:	0.124	
-- Gas free space permittivity (F/m):	8.85E-12	
-- Average field/sparking field adjust. factor:	0.7937	
-- ESP pressure drop (in. w.c.):	0.50	
-- Material of construction (see list below):[4]	1	

DESIGN PARAMETERS	
-- Overall penetration:	0.002
-- Specific collection area #1 (ft2/1000 acfm):	192.6
-- Gas viscosity (kg/m-s):	1.64E-05
-- Electric field at sparking (V/m):	7.04E+05
-- Average electric field (V/m):	5.59E+05
-- Loss factor:	0.19
-- Number of collecting sections in ESP:	4

-- Section 'Lookup Table':

Efficiency:	No. Sections:
0	2
0.965	3
0.990	4
0.998	5
0.999	6

TABLE E-5

-- Average section penetration:	0.2195
-- Section collection penetration:	0.0419
-- Particle size change factor, D (micron):	0.2195
-- Particle size change factor, MMDrp (micron):	2.517

-- Section parameters:

Section #	MMDi	SCAi
1	7	2.50
2	5.172	3.39
3	4.574	3.83
4	4.379	4.00
5	0.000	0.00
6	0.000	0.00

-- Specific collection area #2 (ft2/1000 acfm):	69.69
-- SCA #2/SCA #1 (SCA ratio):	0.36

-- SCA Ratio 'Lookup Table':

No. Sections	SCA Ratio (avg.)
2	2.60
3	2.65
4	2.89
5	2.96
6	3.09

-- SCA Ratio (avg.)-THIS STREAM:	2.89
-- SCA = SCA Ratio (avg.) x SCA #1:	556.6
-- Total collector plate area (ft2):	47313

CAPITAL COSTS

Equipment Costs ($):	
-- Basic ESP	527,925
-- ESP 'standard options'	237,566
-- Auxiliaries (ductwork, etc.)	0
-- Total (base)	765,492
' (escalated)	1,442,499
Purchased Equipment Cost ($):	1,702,149
Total Capital Investment ($):	3,812,814

ANNUAL COST INPUTS:

Operating factor (hr/yr):	8,760	
Operating labor rate ($/hr):	22.37	(Mill data)
Operating labor factor (hr/sh):	1.0	
Electricity price ($/kWhr):	0.035	(Mill data)
Dust disposal ($/ton):	17	(Mill data)
Annual interest rate (fraction):	0.07	
Control system life (years):	20	
Capital recovery factor:	0.0944	
Taxes, insurance & admin. factor:	0.00	

TABLE E-5

ANNUAL COSTS ($/yr):

Item	Cost ($/yr)	Wt. Factor	W.F. (cond.)
Operating labor	24,495	0.017	----
Supervisory labor	3,674	0.003	----
ESP coordinator labor	8,165	0.006	----
Maintenance labor	4,125	0.003	0.046
Maintenance materials	17,021	0.012	----
Electricity	30,500	0.022	----
Dust disposal	921,021	0.656	----
Overhead	34,489	0.025	----
Taxes, insurance, administrative	0	0.000	----
Capital recovery	359,903	0.256	0.276
Total Annual Cost	1,403,393	1.000	1.000

Operating Labor Factor 'Lookup Table'

Plate Area (ft2):	Factor (hr/sh):
0	0.5
10000	1.0
100000	1.5
1000000	2.0

Notes:

[1] This spreadsheet was developed based on data and procedures in Chapter 6 of the OAQPS CONTROL COST MANUAL (4th Edition). However, modifications were made to SCA calculation procedure (SCA #2) to correct equation discontinuities and other anomalies.

[2] Base equipment costs reflect this date.

[3] VAPCCI = Vatavuk Air Pollution Control Cost Index (for electrostatic precipitators) corresponding to year and quarter shown. Base equipment cost, purchased equipment cost, and total capital investment have been escalated to this date via the VAPCCI and control equipment vendor data.

[4] Enter one of the following numbers: carbon steel--'1'; 316 stainless steel--'1.3'; Carpenter 20 (CB-3)--'1.9'; Monel-400--'2.3'; Nickel-200--'3.2'; titanium--'4.5'.

(a) Based on original design data from Zurn, July 1974 (scrubber mfg.)

TABLE E-6

TOTAL ANNUAL COST SPREADSHEET PROGRAM--HI-ENERGY (VENTURI) SCRUBBERS [1]

COST BASE DATE: June 1988 [2]

VAPCCI (1st Quarter 2006--FINAL): [3]	133.6	

INPUT PARAMETERS

-- Inlet stream flowrate (acfm):	85,000	(a)
-- Inlet stream temperature (oF):	450	
-- Inlet moisture content (molar, fraction):	0.36	(based on design conditions)
-- Inlet absolute humidity (lb/lb b.d.a.): [4]	0.3491	
-- Inlet water flowrate (lb/min):	8996.4	(based on design condition of 1,080 gal/min)
-- Saturation absolute humidity (lb/lb b.d.a.):	0.4596	(based on design outlet conditions)
-- Saturation enthalpy temperature term (oF):[5]	180.2	
-- Saturation temperature (oF):	172.0	(based on design outlet conditions)
-- Inlet dust loading (gr/dscf):	45.69	(based on design outlet conditions)
-- Overall control efficiency (fractional):	0.99768	(based on design outlet conditions)
-- Overall penetration (fractional):	0.00232	
-- Mass median particle diameter (microns): [6]	5	(assume same as cement kiln dust)
-- 84th % aerodynamic diameter (microns): [6]	3.4	
-- Particle cut diameter (microns): [6]	0.44	
-- Scrubber liquid solids content (lb/lb H2O):	2.300E-02	(grain loading picked up by scrubber water)
-- Liquid/gas (L/G) ratio (gpm/1000 acfm):	12.7	(1,080/85)
-- Recirculation pump head (ft of water):	100	
-- Material of construction (see list below):[7]	1	

DESIGN PARAMETERS

-- Scrubber pressure drop (in. w.c.): [8]	24.73	
-- Inlet dry air flow rate (dscfm): [9]	31,684	(based on design conditions)
-- Inlet (= outlet) air mass rate (lb/min):	2375	
-- Water recirculation rate (gpm):	553	(based on design conditions)
-- Outlet water mass rate (lb/min):	1091	
-- Outlet total stream flow rate (acfm):	65,757	
-- Scrubber liquid bleed rate (gpm):	496.00	(based on design conditions)
-- Scrubber evaporation rate (gpm):	-31.00	(based on design conditions)
-- Scrubber liquid makeup rate (gpm):	527.00	(based on design conditions)

CAPITAL COSTS

Equipment Costs ($):	
-- Scrubber (base)	87,522
' (escalated)	133,345
-- Other (auxiliaries, e.g.)	0
-- Total	133,345
Purchased Equipment Cost ($):	157,347
Total Capital Investment ($):	300,534

TABLE E-6

ANNUAL COST INPUTS

Operating factor (hr/yr):	8,760
Operating labor rate ($/hr):	22.37
Maintenance labor rate ($/hr):	24.61
Operating labor factor (hr/sh):	2
Maintenance labor factor (hr/sh):	1.5
Electricity price ($/kWhr):	0.035
Chemicals price (specify) ($/ton):	0
Process water price ($/1000 gal):	0.20
Wastewater treatment ($/1000 gal):	0.25
Overhead rate (fractional):	0.60
Annual interest rate (fractional):	0.07
Control system life (years):	20
Capital recovery factor (system):	0.0944
Taxes, insurance, admin. factor:	0.00

ANNUAL COSTS

Item	Cost ($/yr)	Wt. Fact.	W.F.(cond.)
Operating labor	48,990	0.106	----
Supervisory labor	7,349	0.016	----
Maintenance labor	40,417	0.087	----
Maintenance materials	40,417	0.087	----
Electricity--fan	90,117	0.194	----
Electricity--recirculation pump	4,900	0.011	
Chemicals	0	0.000	----
Process water	55,398	0.120	----
Wastewater treatment	65,174	0.141	----
Overhead	82,304	0.178	0.474
Taxes, insurance, administrative	0	0.000	----
Capital recovery	28,368	0.061	0.061
Total Annual Cost ($/yr)	463,435	1.000	1.000

Notes:

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[1] Data used to develop this program were taken from 'Estimating Costs of Air Pollution Control' (CRC Press/Lewis Publishers, 1990).

[2] Base equipment costs reflect this date.

[3] VAPCCI = Vatavuk Air Pollution Control Cost Index (for wet scrubbers) corresponding to year and quarter shown. Base equipment cost, purchased equipment cost, and total capital investment have been escalated to this date via the VAPCCI and control equipment vendor data.

[4] Program calculates from the inlet moisture content.

[5] To obtain the saturation temperature, iterate on the saturation humidity. Continue iterating until the saturation temperature and the saturation enthalpy term are approximately equal.

TABLE E-6

[6] Both the 'mass median' and '84th percentile aerodynamic' diameters are obtained from a log-normal distribution of the inlet stream particle diameters. The particle cut diameter is a graphical function of the the penetration, the mass median diameter, and the standard deviation of the particle size distribution.(For detailed guidance in determining these particle sizes, see "Wet Scrubbers: A Practical Handbook" by K.C. Schifftner and H.E. Hesketh (CRC Press/Lewis Publishers, 1986). A condensed procedure is given in "Estimating Costs of Air Pollution Control" by W.M. Vatavuk (CRC Press/Lewis Publishers, 1990).)

[7] Enter one of the following numbers: carbon steel--'1'; rubber-lined carbon steel--'1.6'; epoxy-coated carbon steel--'1.6'; fiber-reinforced plastic (FRP)--'1.6'.

[8] The scrubber pressure drop is extremely sensitive to the particle cut diameter. Hence, the user must determine the cut diameter with great care.

[9] Measured at 70 oF and 1 atmosphere.

(a) Based on original design data from Zurn, July 1974 (scrubber mfg.)

ATTACHMENT F

COPY OF BACT DETERMINATION FOR WEYERHAEUSER – FLINT RIVER OPERATIONS, GEORGIA SIP PERMIT APPLICATION NO. 14050, MARCH 2003

Prevention of Significant Air Quality Deterioration Review
Of Weyerhaeuser – Flint River Operations
Located in Macon County, Georgia

PRELIMINARY DETERMINATION
SIP Permit Application No. 14050
March 2003

State of Georgia
Department of Natural Resources
Environmental Protection Division
Air Protection Branch

Stationary Source Permitting Program (SSPP)
Prepared by
Heather Cottrell – Chemicals Unit
Modeling Approved by: Jim Stogner Data and Modeling Unit
Reviewed and Approved by:
Heather Abrams – Chemicals Unit Coordinator Jimmy Johnston – SSPP Manager
Ron Methier – Chief, Air Protection Branch

Attachment F

Federal Rule – 40 CFR 63 Subpart MM

NESHAP Subpart MM, *NESHAP for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills*, promulgated on January 12, 2001, requires the reductions of HAP emissions from the combustion sources at pulp mills that are major HAP sources. Specifically, the NESHAP requires HAP reductions from new or existing lime kilns. Using PM as a surrogate for metal HAP, the limit for the new lime kiln is 0.010 gr/dscf at ten percent oxygen. The subpart also requires reporting and corrective actions at an opacity value of 20 percent. It should be noted that the 20 percent excess emission trigger is not a standard under 40 CFR 63 Subpart MM. For this reason in Georgia Rule 391-3-1-.02(2)(b) – Visible Emissions is not subsumed although it has an opacity limit of 40%. Although compliance does not need to be achieved until March 13, 2004, for other existing units (recovery furnace, smelt dissolving tank), the new lime kiln must be in compliance upon commencement of operation.

A dry ESP will be installed to control PM emissions from the lime kiln. A COMS will be used to monitor the opacity.

State and Federal – Startup and Shutdown and Excess Emissions

Excess emission provisions for startup, shutdown, maintenance, and malfunction are provided in Georgia Rule 391-3-1-.02(2)(a)7. Excess emissions from the lime kiln will most likely result from a malfunction of the dry ESP (for particulate matter control). The facility cannot anticipate or predict malfunctions of control equipment; however, the dry ESP should be operational over 99 percent of the time. The facility will minimize emissions during periods of startup, shutdown, and malfunction.

4.0 CONTROL TECHNOLOGY REVIEW – Lime Kiln

Nitrogen Oxides (NO_X)

NO_X is formed from a series of chemical reactions in which diatomic nitrogen (N_2) and oxygen (O_2) present in the combustion air dissociate and react to form NO_X. This kind of NO_X is usually referred to as thermal NO_X and is primarily dependent on the combustion flame temperature. Another source of NO_X formation is when nitrogen in fuel undergoes oxidation in the presence of combustion air. Fuel NO_X production is a function of the fuel nitrogen content.

Available control technologies to control the NO_X emissions that will be generated in the proposed lime kiln include low NO_X burners, flue gas recirculation, oxidation/reduction scrubbing, selective catalytic reduction, selective non-catalytic reduction, and non-selective catalytic reduction. These technologies, as well as good design and operation practices, were evaluated for control of the NO_X emissions from the proposed lime kiln.

Step 1: Identify all control technologies

In reviewing the BACT alternatives to control emissions of NO_X from the facility, Weyerhaeuser considered low NO_X burners, flue gas recirculation, oxidation/reduction scrubbing, selective catalytic reduction, selective non-catalytic reduction, non-selective catalytic reduction, and good design and operation practices as noted in the following table:

Option 1: Low NO_X Burners (LNB)
Option 2: Flue Gas Recirculation (FGR)
Option 3: Oxidation/Reduction Scrubbing (O/R)
Option 4: Selective Catalytic Reduction (SCR)
Option 5: Selective Non-Catalytic Reduction (SNCR)
Option 6: Non-Selective Catalytic Reduction (NSCR)
Option 7: Good Design and Operation

Step 2: Eliminate technically infeasible options

Option 1 – Low NO_X Burners (LNB)

Traditional burner design introduces both the fuel and air into one combustion zone. To obtain optimal flames, large amounts of excess air must be combined with the fuel. This relatively "uncontrolled" combustion creates high flame temperatures. To control the generation of thermal NO_X, LNB technology stages combustion in the high temperature zone of the flame. The first stage is a fuel-rich, oxygen-lean atmosphere where little oxygen is available for NO_X formation and which reduces peak flame temperatures by delaying the completion of the combustion process. Combustion is then completed downstream in the second stage where excess air is available but temperatures are lower than the hottest portion of the flame core.

Although LNB have been extensively tested and used in the utility boilers and industrial furnaces, the transfer of this technology to lime processing has been met with difficulties, particularly when burning natural gas. Burner flame properties are critical to the quality control and calcining process to convert a high percentage of mud to reburnt lime in the lime kiln. The burner flame shape and properties have a dramatic effect on calcining efficiency. Poor efficiency increases energy usage and decreases the calcining capacity of the kiln. Due to these technical complexities, the conversion of a standard lime kiln burner to low NO_X design is not yet technically feasible. Further, no commercially available LNB is on the market for a lime kiln application.

Due to such technical and operational difficulties in addition to the unavailability, LNB are not a technically feasible control for NO_X emissions from the lime kiln.

Option 2 – Flue Gas Recirculation (FGR)

FGR redirects the post-combustion exhaust gas back to the primary combustion chamber to create a lower O_2 content atmosphere. This oxygen-lean atmosphere provides less O_2 for NO_X formation. Due to increased mass flow, peak flame temperature is lowered. Therefore, FGR reduces both fuel and thermal NO_X.

Major barriers to using FGR are: 1) it would reduce the peak flame temperature below the temperature necessary for proper lime formation, and 2) a long and lazy flame will be produced, which is not acceptable for ensuring lime quality. FGR would also require an excessive amount of ducting from the stack to the kiln inlet.

Finally, FGR has never been demonstrated on a lime kiln and is considered a technically infeasible control technology for lime kilns.

Option 3 – Oxidation/Reduction Scrubbing (O/R)

Several proprietary NO_X removal processes are commercially available such as Tri-Mer Corporation's TRI-NO_X and BOC's $LoTO_X$ System. It has been reported that O/R scrubbing has a theoretical NO_X removal efficiency of 90 percent. The basic elements of the system are:

1) Cooling of the gas stream to its dew point temperature (150 °F to 250 °F) which condenses a portion of the water vapor in the gas and generates condensate that requires disposal,

2) Low temperature oxidation of the NO_X, CO, and SO_2 to higher oxides through controlled injection of ozone or sodium chlorite in a static mixer or reaction duct (the ozone/NO_X ratios required to produce the desired NO_X oxidation are reported to be less than stoichiometric amounts),

$$NO + O_3 \rightarrow NO_2 + O_2$$

$$2NO_2 + O_3 \rightarrow N_2O_5 + O_2$$

$$CO + O_3 \rightarrow CO_2 + O_2$$

$$SO_2 + O_3 \rightarrow SO_3 + O_2$$

3) Absorption of higher vapor forms of nitrogen and sulfur oxides in a wet scrubber that produces nitric, sulfuric, and carbonic acid solution. These acids must be recovered and neutralized by the use of sodium hydroxide in the scrubber water (caustic scrubbing),

$$2\,NaOH + 2\,NO_2 + 1/2\,O_2 \rightarrow 2\,NaNO_3 + H_2O$$

$$N_2O_5 + H_2O \rightarrow 2\,HNO_3$$

4) Once neutralized, the resultant scrubber water, containing nitrate solution, can be discharged to a sanitary sewer system.

Due to heavy dust loading upstream of the ESP, the O/R scrubbing must be located downstream of the ESP. Saturated flue gas from the scrubber requires heating before exiting through the flue stack to prevent in-stack condensation of acid gases and other adverse ambient impacts. Further, bleed air or a water spray cooling tower could be required to cool the gases, thus increasing the size of the ID fan and its power consumption. When using bleed air, cooling the gases to the dew point temperature will condense a portion of the water vapor and acid vapor. This condensate must be properly disposed since it cannot be used in other portions of the lime kiln process. Also, oxygen must be supplied to cells that generate the ozone. This requires installation of very large liquid oxygen tanks. The liquid oxygen is withdrawn from the tank, sent through a vaporizer, and then to the generating cells. Considerable safety practices must be exercised when dealing with handling and vaporizing liquid oxygen. Finally, the ability of the O/R Scrubbing System to perform on a lime kiln or a similar source has never been demonstrated, particularly in the presence of CO_2 from both calcination and combustion and is not listed for lime kilns in the RACT/BACT/LAER Clearinghouse.
O/R Scrubbing is considered a technically infeasible control technology for the lime kiln installation.

Option 4 – Selective Catalytic Reduction (SCR)

SCR is an exhaust gas treatment process in which ammonia (NH_3) or urea is injected into the exhaust gas upstream of a catalyst bed. The NH_3 reacts to form nitrogen (N_2) and water on the surface of the catalyst. The overall chemical reaction is represented by the following equation.

$$NH_3 + NO + 1/4\ O_2 \rightarrow N_2 + 3/2\ H_2O$$

In the SCR process, urea or NH_3 from a liquid storage tank is vaporized and injected into the exhaust prior to the catalyst. The exhaust gas/ammonia mixture passes over the catalyst. The function of the catalyst is to lower the activation energy of the NO decomposition reaction, therefore, lowering the temperature necessary to carry out the reaction.

Several technical and operational difficulties exist with SCR technology. The SCR process is temperature sensitive. Efficient operation requires constant exhaust temperatures within a defined range, usually ± 50°F. Any load fluctuation resulting in exhaust gas temperature fluctuations reduces removal efficiency and upsets the NH_3/NO_X molar ratio. A low temperature results in slow reaction rates which leads to low nitrogen oxides conversion, and unreacted NH_3 passing through the reactor bed (ammonia slip). A high temperature results in shortened catalyst life and can lead to the oxidation of NH_3 and the formation of additional NO_X.[4] Under ideal conditions the catalytic reaction can result in NO_X removal between 60 and 90 percent.[5] SCR technology has not been applied to lime kilns due to the variable exhaust temperatures associated with the process. Further, the optimum temperature range for the catalytic reaction is 575 °F to 750 °F.[6] A lime kiln typically operates in the 1,600 – 2,700 °F range.

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[4] Marvin M. Schorr, GE Industrial & Power Systems, "NO_X Control For Gas Turbines: Regulation and Technology", for presentation at the Association of Energy Engineers World Energy Engineering Congress, October 11, 1990, page 6.

[5] *Air Pollution Engineering Manual*. Air & Waste Management Association. Edited by A.J. Buinicore A.J. and W.T. Davis, page 244.

[6] W.R. Epperly and J.E. Hoffman, "Control of Ammonia and Carbon Monoxide Emissions in SNCR Technologies," July 14, 1989. Paper presented at the 1989 Summer National AIChE Meeting, page 3.

Additional concerns with using a SCR system include the hazards involved with storing large quantities of NH_3 and with disposal of spent catalyst which has been contaminated by SO_2 and Cl_2. The NH_3 also causes potential corrosion problems. Because anhydrous NH_3 used in SCR systems is stored in pressurized vessels, leaks in ammonia supply systems can result in toxic vapor releases. NH_3 transportation, transfer operations, and use can be hazardous because of potential equipment failure and human error. The EPA has listed NH_3 as a hazardous substance (40 CFR 355, Appendix A), and as a toxic chemical (40 CFR §372.65). The Clean Air Act Amendments of 1990 also list NH_3 as extremely hazardous (Section 112(r)(3)). Therefore emissions of ammonia may be subject to several other regulatory requirements.

Another operating condition that has a major impact on SCR performance is the NH_3/NO_X molar ratio. Ammonia is typically injected to produce a NH_3/NO_X molar ratio of 1.05-1.1/1 to achieve NO_X conversions of 80 to 90 percent with an ammonia slip of about 10 ppm.[7] Increasing this ratio would drastically increase the ammonia slip, with little change in conversion, and decreasing the ratio would result in lower conversion.

The ammonia may also react with sulfur to form ammonium bisulfate, which has the potential to create a visible and/or detached plume. The lime may also react with the sulfur to form calcium sulfate. Ammonium bisulfate and calcium sulfate coatings, along with other dusts, will block the catalyst pores, thereby reducing the catalyst effectiveness.

The SCR unit could be placed downstream of the ESP to alleviate the catalyst blockage problem; however, the flue gas is less than 500 °F and would require a heat exchanger system to achieve the desired reaction temperature. The necessary equipment includes a catalytic reactor, heat exchanger, and blower.

This technology is not listed for lime kilns in the RACT/BACT/LAER Clearinghouse. SCR is not considered to be technically feasible for controlling NO_X emissions from lime kilns.

Option 5 – Selective Non-Catalytic Reduction (SNCR)

SNCR is an exhaust gas treatment process in which urea or ammonia is injected into the exhaust gas. High temperatures, normally between 1,300 °F and 1,900 °F, promote the reaction between NH_3 and NO_X to form nitrogen (N_2) and water. The overall chemical reaction is represented by the following equation.

$$NH_3 + NO + 1/4\ O_2 \rightarrow N_2 + 3/2\ H_2O$$

In this process, NH_3 from a liquid storage tank is vaporized and injected into the exhaust. The system is temperature dependent.

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[7] *Alternative Control Techniques Document - NO_X Emissions from Cement Manufacturing.* U.S. EPA. EPA-453/R-94-004, March 1994, pages 5-14.

Several difficulties preclude use of an SNCR for control of NO_X emissions from a lime kiln. If burner temperatures exceed 2,000 °F, the NH_3 injected with the SNCR will begin to oxidize, creating additional NO_X. Another difficulty involves maintaining the correct NH_3/NO_X ratio during any load fluctuations. Any excess NH_3 would be released into the atmosphere, creating NH_3 slip. Not only does NH_3 slip result in emissions to the atmosphere, but leads to the formation of ammonium salts. These salts can result in a visible plume. In addition, the NH_3 injection, storage, and waste by-product collection system must be properly designed for spill containment and waste removal. Ammonia is listed as a hazardous substance (40 CFR 302.1), as an extremely hazardous substance (40 CFR 355, Appendix A), and is regulated under the Chemical Release Provisions of the Clean Air Act Amendments of 1990 (Section 112(r)).

Use of this control technology in a lime kiln would cause several concerns. Due to load and exhaust gas temperature fluctuations, optimum NH_3/NO_X molar ratio, as well as correct reaction temperatures, would be extremely difficult to monitor and maintain, and release of NH_3 into the atmosphere can occur. Further, it is likely that formation of NH_3 salts would occur which could result in an increase of process downtime. In addition, the hazards involved with the storage of NH_3 and the increased emissions from NH_3 slip cause environmental and safety concerns.

The correct temperature window of 1,300 °F to 1 900 °F occurs inside the rotating body of the kiln. Locating injection nozzles in such an area is not technically feasible at the present time and has not been attempted on any lime kiln.

SNCR has never been demonstrated on a lime kiln and is not listed on the RACT/BACT/LAER Clearinghouse. SNCR is considered a technically infeasible control technology for the lime kiln.

Option 6 – Non-Selective Catalytic Reduction (NSCR)

NSCR is an exhaust gas treatment technique for NO_X reduction. It is the type of catalyst control used to treat automobile exhaust and typically uses a platinum/rhodium catalyst. Use of NSCR reduces emissions of NO_X, CO, and VOC simultaneously across the catalyst bed, but it is only effective in fuel rich combustion air. To achieve a fuel-rich environment, excess combustion air must be kept to a minimum, resulting in an exhaust gas with less than three percent oxygen by volume (ideally, the oxygen content should be less than half a percent by volume for proper operation).

The Flint River lime kiln will normally operate with stack exhaust gas oxygen concentrations much higher than 3 percent (by volume). Decreasing the excess air, and thus the O_2 concentrations, would result in increased CO emissions - an unacceptable compromise. In addition to the operational incompatibility of the control strategy, various problems will arise from the fuel-borne contaminants causing catalyst fouling (dust, SO_2, and Cl_2 in the flue gas can poison the catalyst), excessive backpressure, plugging of the catalyst, and efficiency reduction.

NSCR is technically infeasible for lime kiln NO_X emissions control.

Step 3: Rank remaining control technologies by control effectiveness

Table 3: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Good Design and Operation	Reduction of emissions to 175 ppmvd at 10% O_2

Step 4: Evaluate most effective controls and document

Since there is only one control option remaining, the use of good design and operation will be the only option evaluated.

Option 7 – Good Design and Operation

The formation of NO_X is minimized by proper kiln design and operation. Generally, emissions are minimized when the lime kiln temperature is kept at the lower end of the desired range and when the distribution of air at the air and fuel injection zones is controlled. Ideally, maintaining a low-oxygen condition near fuel injection points approaches an off-stoichiometric staged combustion process.

A high thermal efficiency would lead to less consumption of heat and fuel and would produce less NO_X emissions. General improvement in thermal efficiency is one design method of reducing NO_X formation, since less fuel is used.

Step 5: Select BACT

The proposed lime kiln will utilize good design and operation practices to minimize NO_X emissions.

Conclusion – NO_X Control

The Division has determined that Weyerhaeuser's proposal to use good design and operation practices for the proposed lime kiln to minimize NO_X emissions constitutes BACT. The BACT emission limit has been established as 175 ppmvd at 10 percent oxygen. This limit shall be taken as a 3-hour average limit.

Summary – Control Technology Review for Lime Kiln

To fulfill the PSD permitting requirements for NO_X, a BACT analysis was conducted for the new lime kiln. The BACT selection for the lime kiln is summarized in Table 4. The emission limit selected is representative of previous PSD BACT determination levels published in U.S. EPA's RACT/BACT/LAER Clearinghouse (RBLC) database for lime kilns of similar type and size.

Table 4: BACT Summary for the Proposed Lime Kiln

Pollutant	Control Technology	Proposed BACT Limit	Averaging Period
NO_X	Good Design and Operation	175 ppmvd at 10 percent oxygen	3-hour