Prevention of Significant Air Quality Deterioration Review Of Brunswick Cellulose, Inc. Pulp & Paper Mill Located in Glynn County, Georgia

PRELIMINARY DETERMINATION

SIP Permit Application No. 16576 submitted January 19, 2006

State of Georgia
Department of Natural Resources
Environmental Protection Division
Air Protection Branch
Stationary Source Permitting Program

Prepared by: **Wendy Troemel – Chemicals Unit**
Modeling Approved by: **Peter Courtney - Data and Modeling Unit**
Reviewed and Approved by: **David Matos – Chemicals Unit Coordinator** **James Capp – Stationary Sources Permitting Program Manager** **James Johnston – Planning & Support Program Manager** **Heather Abrams – Chief, Air Protection Branch**

SUMMARY

The Environmental Protection Division (EPD) has reviewed the application submitted by Brunswick Cellulose, Inc. Pulp & Paper Mill (hereafter Brunswick Mill or BCI) for a permit to optimize the mill to support a potential future capacity of 3,000 air-dried tons of pulp per day (ADTP) at its Kraft pulp mill located in Brunswick, Georgia (Glynn County). The proposed project includes installation of various new equipment, including a lime kiln rated up to 850 tons calcium oxide (CaO) per day and associated control equipment, up to four additional digesters, a set of evaporators (replaces two existing evaporator sets), a bleach plant (replaces all three existing bleach plants), and a pulp washing system (replaces both existing washing systems). Existing Recovery Boilers #5 and #6; Nos. 3, 4, and 5 paper machines; the woodyard; and the recaustisizing operations will also be modified and/or upgraded.

The proposed project will result in an increase in emissions from the facility. The sources of these increases in emissions include the modified systems, the new systems, and systems which will potentially be debottlenecked by the project. In summary, all mill systems are potentially impacted.

The modification of the Brunswick Mill due to this mill optimization project will result in an emissions increase in particulate matter (PM/PM_{10}), nitrogen oxides (NO_X), carbon monoxide (CO), volatile organic compounds (VOC), total reduced sulfur (TRS), lead (Pb), and hydrogen sulfide (H_2S). A Prevention of Significant Deterioration (PSD) analysis was performed for the facility for all pollutants to determine if any increase was above the "significance" level. The PM/PM_{10}, NO_X, CO, VOC, and H_2S emissions increases were above the PSD significant level threshold.

BCI is located in Glynn County, which is classified as "attainment" or "unclassifiable" for SO_2, $PM_{2.5}$ and PM_{10}, NO_X, CO, and ozone (VOC) in accordance with Section 107 of the Clean Air Act, as amended August 1977.

The EPD review of the data submitted by BCI related to the proposed modifications indicates that the project will be in compliance with all applicable state and federal air quality regulations. It is the preliminary determination of the EPD that the proposal provides for the application of Best Available Control Technology (BACT) for the control of PM/PM_{10}, NO_X, CO, VOC, and H_2S, as required by federal PSD regulation 40 CFR 52.21(j). In accordance with EPA's October 23, 1997 guidance memo "Interim Implementation of New Source Review Requirements for $PM_{2.5}$," PM_{10} is used as a surrogate for meeting the PSD requirements for $PM_{2.5}$.

The Federal Land Manager (FLM) was notified and given the opportunity to review the application for new construction or modifications. Wolf Island Wilderness Area (26 km) and Okefenokee Swamp Wilderness Area (64 km) are the Class I Areas within 200 km of the facility.

It has been determined through approved modeling techniques that the estimated emissions will not cause or contribute to a violation of any ambient air standard or allowable PSD increment in the area surrounding the facility or in Class I areas located within 200 km of the facility. It has further been determined that the proposal will not cause impairment of visibility or detrimental effects on soils or vegetation. Any air quality impacts produced by project-related growth should be inconsequential.

This Preliminary Determination concludes that an Air Quality Permit should be issued to Brunswick Cellulose, Inc. for the modifications necessary to optimize the mill. Various conditions have been incorporated into the current Title V operating permit to ensure and confirm compliance with all applicable air quality regulations. A copy of the draft permit amendment is included in Appendix A.

1.0 INTRODUCTION

On January 18, 2006, BCI submitted an application for an air quality permit to optimize the mill to support a future potential capacity of 3,000 ADTP. The facility is located at 1400 West Ninth Street in Brunswick, Glynn County.

BCI is located in an attainment area for all criteria pollutants. Any proposed project at the plant is required to undergo a PSD applicability analysis in order to determine if the project triggers a PSD review for any pollutant. If a plant's operation is listed as one of the 28 industrial source categories specified in the PSD regulations and emits more than 100 tons per year of a PSD pollutant, the plant is considered an existing major source. Kraft pulp mills fall in the list of the 28 industrial source categories and the mill emits in excess of 100 tons per year of at least one criteria pollutant. This facility is therefore considered a major source under the PSD program. As a major source, any project that results in a significant increase of any PSD-regulated pollutant, as well as a net increase in the PSD-regulated pollutant over the contemporaneous 5-year period greater than the significance thresholds, triggers a PSD review.

Based on the proposed project description and data provided in the permit application, the estimated incremental increases of regulated pollutants from the facility are listed in Table 1-1 below:

Table 1-1: Net Change in Emissions Due to the Major PSD Modification

Pollutant	Baseline 24-month Period	Increase from Mill Optimization Project		Contemporaneous Increases (tpy)	Total Emissions Increase (tpy)
		Past Actual	Future Projected		
PM/PM_{10}	1996-1997	414	1,124	(24.9)	686
VOC	1996-1997	804	1,249	33	479
NO_X	2003-2004	2,126	3,733	151.7	1,759
CO	1997-1998	3,811	5,472	443	2,104
SO_2	2001-2002	3,652	3,569	0	(82.9)
TRS	1997-1998	145	150	0	4.56
Pb	2003-2004	0.17	0.29	0	0.13
Fluorides	2000-2001	N/A	N/A	N/A	N/A
H_2S	N/A	15.83	79.04	7	70.2
SAM	2003-2004	76.30	60.91	0	(15.4)
Vinyl Chloride	1997-1998	0.033	0.039	0	0.01

The definition of baseline 24-month actual emissions is the average emission rate, in tons per year, at which the emission unit actually emitted the pollutant during any consecutive 24-month period selected by the facility within the 10-year period immediately proceeding the date a complete permit application was received by EPD. In this case, the 10-year period is the calendar years 1996-2005. The net increases were calculated by subtracting the past actual emissions (based upon the annual average emissions from the 24-month time period as noted in Table 1-1) from the future projected emissions of the modified equipment and associated emission increases from non-modified equipment. Future projected emissions were based on maximum production capacity or throughput (operating 8,760 hours per year), requested BACT limits, and existing Permit limits. "Contemporaneous Increases" include projects within the past 5 years that caused either an increase or decrease in the pollutant. Table 1-2 below compares the emissions summary to the PSD significant emissions rates to determine which pollutants, if any, will classify the modification as a major modification under PSD. The emission calculations for Tables 1-1 and 1-2 can be found in detail in the facility's PSD application (see Table 3-1 and Exhibit A of Application No. 16576). These calculations have been reviewed and approved by the Division.

Table 1-2: Emissions Increases from the Project

Pollutant	Total Emissions Increase (tpy)	PSD Significant Emission Rate (tpy)	Subject to PSD Review
PM	686	25	**Yes**
PM_{10}	686	15	**Yes**
VOC	479	40	**Yes**
NO_X	1,759	40	**Yes**
CO	2,104	100	**Yes**
SO_2	(82.9)	40	No
TRS	4.56	10	No
Pb	0.13	0.6	No
Fluorides	N/A	3	No
H_2S	70.2	10	**Yes**
SAM	(15.4)	7	No
Vinyl Chloride	0.01	1	No

Based on the information presented in Tables 1-1 and 1-2 above, the proposed modification, as specified per Georgia Air Quality Application No. 16576, is classified as a major modification under PSD because the future projected emissions of PM/PM_{10}, VOC, NO_X, CO, and H_2S exceed the PSD significance levels. Through its new source review (NSR) procedure, EPD has evaluated BCI's proposal for compliance with State and Federal requirements. The findings of EPD have been assembled in this Preliminary Determination.

2.0 PROCESS DESCRIPTION

According to Application No. 16576, BCI has proposed to optimize the mill to support a future potential capacity of 3,000 ADTP per day. The facility will be installing many new pieces of equipment, removing other equipment from service, and modifying several existing systems at the mill. The Brunswick Mill permit application and supporting documentation are included in Appendix A of this Preliminary Determination and can be found online at www.georgiaair.org/airpermit. No modifications are being made to Power Boilers #4, #6, and #7.

- Lime Kiln #6 (Source Code: L560) – The new lime kiln will be rated at up to 850 tons CaO per day, with 300 MMBtu/hour maximum heat input. The facility will burn natural gas, tall oil, No. 6 fuel oil, and petroleum coke in the lime kiln. Air pollution control equipment will be an electrostatic precipitator (ESP) (Source Code: LEP2) to control PM emissions, followed by a scrubber (Source Code: LKS2) to control TRS and SO_2 emissions. The facility has proposed to install Continuous Emissions Monitoring Systems (CEMS) for TRS, oxygen, NO_X and CO. The new lime kiln is subject to 40 CFR 60 Subpart BB, 40 CFR 63 Subpart MM, and Georgia Rules (b), (e), and (g).

- Petroleum Coke Grinding Equipment Group (Source Code: PC01) – The facility has requested the ability to burn petroleum coke (pet coke) in the new lime kiln. Pet coke will enter the site via truck or rail and unloaded into a pet coke bin. The pet coke will be moved by a conveyor to be ground up. Heated air will then transport the ground pet coke to the pulverized storage silo, which will feed the burner on the lime kiln. Two baghouses and one bin vent (Source Codes: BIN1, BIN2, and BIN3) will control PM emissions from the raw material storage bin, grinding operations, and pulverized storage silo, respectively. Heat for the system will come from indirect heat from steam; however, a natural gas/propane backup duct burner rated at 5 MMBtu/hr will be installed to ensure heat can be applied to the system if steam is unavailable. The pet coke grinding equipment is subject to Georgia Rules (b), (e), and (g).

- Bleach Plant #4 (Source Code: BG06) – This new bleach plant will replace existing Bleach Plants Nos. 1-3 (Group Source Code: BG01). It is a 4-stage medium consistency bleach line. A new scrubber (Source Code: BPS4) will control emissions from the bleach plant. The existing chlorine dioxide (ClO_2) generators are not being replaced; however one existing methanol storage tank is being relocated. Also, the existing Bleach Plant 2nd Stage Washers and Bleach Plant 2nd & 4th Stage Towers (Source Codes: BG03 and BG07) are being removed. One existing scrubber will remain to control emissions from the ClO_2 storage and the R-3 and SVP-LITE ClO_2 generators. The new bleach plant is subject to 40 CFR 63 Subpart S.

- Evaporator Group (Equipment Group: RG10) - New Evaporator Set #6 (Source Code: R495) will replace sets #3 and #4 (Source Codes: 405V through 413V, R442, and R443) and Concentrator #1 (Source Code: R483). The evaporator is a 6-effect falling film design and will produce a higher concentration liquor (~72% black liquor solids) than is currently generated with the #3 and #4 sets. The new evaporator set will have an integrated steam stripper (Source Code: R500) to assist the existing steam stripper. The pre-evaporator system will be modified with a new cooling tower bay and associated equipment. Off-gases are collected in the Low Volume High Concentration (LVHC) collection system and incinerated in the primary or backup incinerator. The new evaporator set is subject to 40 CFR 60 Subpart BB and 40 CFR 63 Subpart S.

- Brownstock Washer System (Source Code: PG30) – The new washer system will replace both existing washers systems (Source Codes: PG27 and PG28). New screens and deckers will be installed after the oxygen delignification system (permitted under Application No. 15835). Off-gases are collected in the High Volume Low Concentration (HVLC) collection system for destruction in Recovery Boilers #5 or #6. The new washer system is subject to 40 CFR 60 Subpart BB and 40 CFR 63 Subpart S.

- Batch Digesters (Existing Equipment Group: PG01) – The facility will install up to 4 new digesters at 5,850 ft^3 each (Source Codes: P230-P233). The facility currently has 19 digesters in 2 different sizes. The facility will also upgrade the air evacuation system so that displaced vapors currently vented to atmosphere during chip fill will be captured and incinerated in the HVLC collection system for destruction in Recovery Boilers #5 or #6. The gum side capping valves, gum chip conveyors, and steam valves and lines will be increased. Off-gases after the accumulator and turpentine system are collected in the LVHC collection system and incinerated in the primary or backup incinerator. The new digesters are subject to 40 CFR 60 Subpart BB and 40 CFR 63 Subpart S.

- Chip Thickness Screening System (Source Code: W090) – The mill currently screens chips by size, but not by thickness. This new system will allow the mill to screen out oversized and undersized chips to improve overall digester yields. This system is entirely enclosed, and should have no visible emissions. Also in the woodyard, the facility may install a new outbound truck scale to better manage truck volume, an air density separation system to remove metal and knots from oversized chips, a chip conditioner to fracture oversized chips, a third crane to manage truck volume, a stacker/reclaimer for chip storage, a new bark stacker/reclaimer, replace two existing chip storage piles, and remove the fines cyclone from operation. The existing woodyard equipment is not subject to any rules or regulations; however, the woodyard should be subject to Georgia Rule (n).

- Recovery Boiler #6 (Source Code: R407) – The facility will modify this existing unit in order to reach a future potential capacity of 6 million pounds of black liquor solids per day (BLS/day) on a continuous basis. The unit can currently achieve this capacity on an hourly basis, but cannot maintain this capacity continuously. The facility will modify the existing water/steam circulation circuit to allow for an increased steaming rate, modify the combustion air system, upgrade the ESP (Source Code: REP6), install various pumps and piping, and replace primary air ports. The facility has proposed to install CEMS for NO_X and CO. No new rules are triggered with the modification of this unit.

- Recovery Boiler #5 (Source Code: R401) – The facility will modify this existing unit in order to reach a future potential capacity of 4 million pounds BLS/day on a continuous basis. The unit can currently achieve this capacity on an hourly basis, but cannot maintain this capacity continuously. The facility will install an indirect liquor heater, install various pumps and piping, replace the economizer to reduce plugging, replace the superheater, upgrade the ESP (Source Code: REP5), and install a new superheater with additional area in front of the existing screen tubes. The facility has proposed to install CEMS for NO_X and CO. No new rules are triggered with the modification of this unit.

- Smelt Tank #6 (Source Code: R408) – The facility may replace the scrubber (Source Code: RSS6) in order to comply with permit limits once the higher black liquor solids throughput is achieved. No new rules are triggered with the modification of this unit.

- Lime Slakers (Source Code: LG09) – The facility will replace one slaker (Source Code: L514) with a new slaker (Source Code: L561) with a dedicated set of causticizers (Source Code: L556) and a dedicated scrubber (Source Code: LSS3). Also, the facility will upgrade various pumps and piping, install mud washers, install new instrumentation and controls, and install additional green liquor clarification. The lime slakers are subject to Georgia Rules (b) and (e).

- Nos. 3, 4, & 5 Paper Machines (Source Code: MG10) – The paper machines will be upgraded to support the facility mill capacity. For No. 3 Paper Machine, the mill will add dryer capacity; install a new reel, rail system, and unwind stand and crane sized to handle 7 sets of 48" diameter rolls; install new reel spools; and install a new winder sized to process up to 1,350 tons per day of scaled production. For No. 4 Paper Machine, the mill will install a new calendar; install a new reel, rail system, and reel spools; and rebuild the winder. For No. 5 Paper Machine, the mill will modify the dryer and rebuild the reel and winder. The equipment is not currently subject to any rules and regulations. The modifications will not trigger any additional rules.

- Wastewater Treatment System (Source Code: OG01) – The existing wastewater treatment system will be modified. Eight acres of the front aeration portion of the Aerated Stabilization Basin (ASB) will be modified to be a complete mix zone. A new dike will be constructed to create an additional 1-day residence time, fully mixed basin to enhance BOD_5 reduction. The mill may relocate aerators as needed, install new rainbirds for foam control, and install a new bio-augmentation system to the ASB. The equipment is not currently subject to any rules and regulations. The modifications will not trigger any additional rules.

3.0 REVIEW OF APPLICABLE RULES AND REGULATIONS

State Rules

- Georgia Rules for Air Quality Control (Georgia Rule) 391-3-1-.03(1) requires that any person prior to beginning the construction or modification of any facility which may result in an increase in air pollution shall obtain a permit for the construction or modification of such facility from the Director upon a determination by the Director that the facility can reasonably be expected to comply with all the provisions of the Act and the rules and regulations promulgated there under. Georgia Rule 391-3-1-.03(8)(b) continues that no permit to construct a new stationary source or modify an existing stationary source shall be issued unless such proposed source meets all the requirements for review and for obtaining a permit prescribed in Title I, Part C of the Federal Act [i.e., Prevention of Significant Deterioration of Air Quality], and Section 391-3-1-.02(7) of the Georgia Rules (i.e., PSD).

- Georgia Rule (b) [391-3-1-.02(2)(b)] is a general rule limiting the opacity of emissions from a source to less than 40 percent. This regulation applies to existing equipment Recovery Boilers #5 and 6 (when not firing black liquor solids) and Smelt Tank #6. The opacity from both recovery boilers has been, and will continue to be, monitored using a Continuous Opacity Monitoring System (COMS). No monitoring for opacity from Smelt Tank #6 is needed due to a low likelihood of violation. For Recovery Boilers #5 and 6 and Smelt Tank #6, no conditions need to be modified or added in order to meet the requirements of this rule. The Permit will be modified to incorporate the requirements of this rule for Lime Kiln #6, Lime Slaker #3, and Pet Coke Grinding Equipment.

- Georgia Rule (e) [391-3-1-.02(2)(e)], commonly known as the process weight rule, limits PM emissions based on the following equations:

$$\text{For } P \leq 30 \text{ ton/hr}, \quad E = 4.1 \times P^{0.67}$$
$$\text{For } P > 30 \text{ ton/hr}, \quad E = 55 \times P^{0.11} - 40$$

  where E = emission rate (lb/hr) and P = process input rate (ton/hr). This regulation applies to existing equipment Recovery Boilers #5 and 6 and Smelt Tank #6. New equipment Lime Kiln #6, Lime Slaker #3, and the Petroleum Coke Grinding Equipment Group are subject to Georgia Rule (e). Because the limit is based on the process input weight, the limit is not considered subsumed by any other PM limit. The Permit will be modified to incorporate the requirements of this rule for Lime Kiln #6, Lime Slaker #3, and Petroleum Coke Grinding Equipment.

- Georgia Rule (g) [391-3-1-.02(2)(g)] applies to all fuel-burning sources, including new Lime Kiln #6 and the duct burner for the Petroleum Coke Grinding Equipment. The facility has indicated they will burn natural gas, No. 6 fuel oil, tall oil, and petroleum coke in the new lime kiln; therefore the facility is subject to all SO_2 requirements of Paragraph 1. While Paragraph 2 limits the percentage of sulfur, by weight, in the fossil fuel burned to 3.0% for fuel-burning sources with a maximum heat input equal to or greater than 100 MMBtu/hr, pet coke is known to have a higher sulfur content (usually 6-7%). The inherent scrubbing nature of the lime kiln should reduce SO_2 emissions; additionally, the facility is installing a scrubber on the unit. Paragraph 3 allows the facility to burn a higher sulfur fuel with certain restrictions; in this case, the facility will need to conduct performance testing to ensure compliance with the appropriate emission limit. The Petroleum Coke duct burner will burn natural gas and propane, which are inherently low in sulfur. The duct burner fuel will be limited to 2.5% sulfur, by weight.

- Georgia Rule (n) [391-3-1-.02(2)(n)] applies to all sources which contribute to fugitive dust. The existing woodyard equipment is subject to this rule, but is not included in the existing permit.

- Georgia Rule (gg) [391-3-1-.02(2)(gg)] applies to kraft pulp mills. It regulates total reduced sulfur (TRS) compound emissions from recovery furnaces, digesters, evaporators, smelt dissolving tanks, and lime kilns at mills in operation on or before September 24, 1976. This facility has undergone many modifications since that date, so the requirements of 40 CFR 60 Subpart BB apply, and Georgia Rule (gg) is not applicable to this modification. All limits under Georgia Rule (gg) are equivalent to or subsumed by more stringent PSD and Subpart BB limits. No conditions need to be added to the Permit.

Prevention of Significant Deterioration – 40 CFR 52.21

The regulations for PSD in 40 CFR 52.21 require that any new major source or modification of an existing major source be reviewed to determine the air quality impact resulting from the increase in emissions of all pollutants subject to regulations under the Clean Air Act. The PSD review requirements apply to any new or modified source which belongs to one of 28 specific source categories having potential emissions of 100 tons per year or more of any regulated pollutant, or to all other sources having potential emissions of 250 tons per year or more of any regulated pollutant. They also apply to any modification of a major stationary source which results in a significant net emission increase of any regulated pollutant. This facility belongs to one of the 28 specific source categories and emits regulated pollutants greater than 100 tons per year and is therefore subject to 40 CFR 52.21.

The PSD regulations require that any major stationary source or major modification subject to the regulations meet the following requirements:

- Application of BACT for each regulated pollutant that would be emitted in significant amounts;
- Analysis of the ambient air impact;
- Analysis of the impact on soils, vegetation, and visibility;
- Analysis of the impact on Class I areas; and
- Public notification of the proposed plant in a newspaper of general circulation

Definition of BACT

The PSD regulation requires that BACT be applied to all regulated air pollutants emitted in significant amounts. Section 169 of the Clean Air Act defines BACT as an emission limitation reflecting the maximum degree of reduction that the permitting authority (in this case, EPD), on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such a facility through application of production processes and available methods, systems, and techniques. In all cases BACT must establish emission limitations or specific design characteristics at least as stringent as applicable New Source Performance Standards (NSPS). In addition, if EPD determines that there is no economically reasonable or technologically feasible way to measure the emissions, and hence to impose an enforceable emissions standard, it may require the source to use a design, equipment, work practice or operations standard or combination thereof, to reduce emissions of the pollutant to the maximum extent practicable.

The BACT determination should, at a minimum, meet two core requirements.[1] The first core requirement is that the determination follow a "top-down" selection approach. The second core requirement is that the selection of a particular control system as BACT must be justified in terms of the statutory criteria and supported by the record and must explain the basis for the rejection of other more stringent candidate control systems.

[1] The discussion of the core requirements is taken from the Preamble to the Proposed NSR Reform, 61 FR 38272.

EPD's procedures for performing a top down BACT analysis are set forth in EPA's Draft New Source Review Workshop Manual (Manual), dated October 1990. One critical step in the BACT analysis is to determine if a control option is technically feasible.[2] If a control is determined to be infeasible, it is eliminated from further consideration. The Manual applies several criteria for determining technical feasibility. The first is straightforward: if the control has been installed and operated by the type of source under review, it is demonstrated and technically feasible.

For controls not demonstrated using this straightforward approach, the Manual applies a more complex approach that involves two concepts for determining technical feasibility: availability and applicability. A technology is considered available if it can be obtained through commercial channels. An available control is applicable if it can be reasonably installed and operated on the source type under construction. A technology that is available and applicable is technically feasible.

The Manual provides some guidance for determining availability. For example, a control is generally considered available if it has reached the licensing and permitting stages of development. However, the Manual further provides that a source would not be required to experience extended time delays or resource penalties to allow research to be conducted on new technologies. In addition, the applicant is not expected to experience extended trials learning how to apply a technology on a dissimilar source type. Consequently, technologies in the pilot scale testing stages of development are not considered available for BACT.

As mentioned before, the Manual also requires available technologies to be applicable to the source type under construction before a control is considered technically feasible. For example, deployment of the control technology on the existing source with similar gas stream characteristics is generally a sufficient basis for concluding technical feasibility. However, even in this instance, the Manual would allow for an applicant to make a demonstration on the contrary. For example, an applicant could show that unresolved technical difficulties with applying a control to the source under consideration (e.g., size of the unit, location of the proposed site, and operating problems related to the specific circumstances of the source) make a control technically infeasible.

According to the Environmental Appeals Board (see In re: Kawaihae Cogeneration Project, 7 E.A.D. 107 at page 1996, EAB 1997), the section on "collateral environmental impacts" of a proposed technology has been interpreted to mean that "if application of a control system results directly in the release (or removal) of pollutants that are not currently regulated under the Act, the net environmental impact of such emissions is eligible for consideration in making the BACT determination." The Appeals Board continues, "The Administration has explained that the primary purpose of the collateral impacts clause is… to temper the stringency of the technological requirements whenever one or more of the specified collateral impacts – energy, environmental, or economic – renders the use of the most effective technology inappropriate." Lastly, the Appeals Board states, "Unless it is demonstrated to the satisfaction of the permit issuer that such unusual circumstances exist, then the permit applicant must use the most effective technology."

The five steps of a top-down BACT review procedure identified by EPA per BACT guidelines are listed below:

- Step 1: Identification of all control technologies;
- Step 2: Elimination of technically infeasible options;
- Step 3: Ranking of remaining control technologies by control effectiveness;
- Step 4: Evaluation of the most effective controls and documentation of results; and
- Step 5: Selection of BACT.

---

[2] Discussion on technical feasibility is taken from the PSD Final Determination for AES Londonberry, L.L.C., Rockingham County, New Hampshire, authored by the U.S. EPA Region I, Air Permits Program.

The following is a discussion of the applicable federal rules and regulations pertaining to the equipment that is the subject of this preliminary determination, which is then followed by the top-down BACT analysis.

New Source Performance Standards

40 CFR 60 Subpart A

40 CFR 60 Subpart A – "*General Provisions*," imposes generally applicable provisions for initial notifications, initial compliance testing, monitoring, and recordkeeping requirements. Various existing equipment at the facility is subject to certain New Source Performance Standards and by extension Subpart A. New equipment Lime Kiln #6, Evaporator Set #6, and Digesters are subject to 40 CFR 60 Subpart BB and 40 CFR 60 Subpart A.

Existing Permit Condition 3.3.24 subjects the entire facility to the applicable requirements of 40 CFR 60 Subpart A, so no conditions need to be modified or added in order to meet the requirements of this rule.

40 CFR 60 Subpart BB

40 CFR 60 Subpart BB – "*Standards of Performance for Kraft Pulp Mills,"* regulates TRS and PM emissions from evaporators, digesters, lime kilns, recovery furnaces, brown stock washers and smelt dissolving tanks at facilities that commence construction or modification after September 24, 1976. Existing equipment Recovery Boiler #6, Smelt Tank #6, Lime Kiln #5, 2 digesters, Steam Stripper, and Primary and Backup NCG Incinerator and associated Scrubber are considered existing equipment under this regulation. New equipment Lime Kiln #6, Evaporator Set #6, Brownstock Washer System, and Digesters will be regulated as new equipment under the rule. Recovery Boiler #5 is not currently subject to the rule and is being modified in this project. It was constructed after September 24, 1976 and may therefore become subject to 40 CFR 60 Subpart BB if this project constitutes a "modification" or "reconstruction."

An NSPS "modification" is triggered if a regulated pollutant is increased on a maximum actual short-term (i.e., lb/hr) basis as a result of the proposed project. The proposed project will not increase Recovery Boiler #5 capacity for firing black liquor solids on a lb/hour bases and is therefore not expected to result in an increase in either TRS or PM emissions on a lb/hour basis. Although the project will not increase the boiler's hourly liquor firing rate, the modifications will allow the unit to sustain this higher throughput for an extended period of time and allow for an increase on an annual basis. Therefore, the unit is not being "modified" as defined under 40 CFR 60.

An evaluation of whether the project meets the requirements of "reconstruction" must also be performed. Reconstruction is defined as the replacement of components of an existing facility to such an extent 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 40 CFR Part 60. The costs of the proposed modifications to Recovery Boiler #5 are estimated at $6,800,000 and the estimated replacement cost for an equivalent sized recovery boiler is $60,000,000. The costs are well below 50% of the replacement costs; therefore the modifications will not trigger 40 CFR 60 Subpart BB for this unit.

For lime kilns, Subpart BB establishes a PM limit of 0.067 gr/dscf at 10% O_2 for gaseous fossil fuel, and 0.13 gr/dscf at 10% O_2 for liquid fossil fuel. Both limits are subsumed by the more stringent 40 CFR 63 Subpart MM limit of 0.010 gr/dscf at 10% O_2. PM emissions will be controlled with an ESP. TRS emissions are limited to 8 ppm at 10% O_2. The lime kiln is required to use a CEMS to monitor TRS emissions, as well as oxygen. For digesters, brownstock washer systems, and evaporator systems, TRS emissions are limited to 5 ppm by volume at 10% O_2, unless the gases are combusted in a recovery furnace, lime kiln, or incinerator, which must comply with the minimum temperature (1200^{o}F) and residence time (0.5 seconds) requirement prescribed by the subpart. The gases from the new digesters and new evaporator set will vent to the LVHC NCG system, which contains a primary and backup incinerator for destruction. The gases from the new washer system will vent to the HVLC system for incineration in either of Recovery Boilers #5 or #6.

The Permit will be modified to incorporate the requirements of this rule for new equipment Lime Kiln #6, Evaporator Set #6, Brownstock Washer System, and Digesters.

40 CFR 60 Subpart Db

40 CFR 60 Subpart Db – "*Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units*," provide standards of performance for steam generators and steam generating units for which construction commenced after June 19, 1984. Power Boilers #6 and #7 and Recovery Boiler #6 are considered steam-generating units as defined in 40 CFR 60.41b and are subject to this New Source Performance Standard.

Recovery Boiler #5 is not currently subject to the rule, but is being modified in this project. It was constructed prior to June 19, 1984, and has a boiler rating greater than 100 MMBtu/hr. The unit may therefore become subject to 40 CFR 60 Subpart Db if this project constitutes a modification or reconstruction. While Recovery Boiler #5 is not currently subject to the rule and is being modified in this project, the project does not meet the definition of "modification" or "reconstruction" under 40 CFR 60 Subpart A, as discussed above in the applicability for 40 CFR 60 Subpart BB.

No permit conditions need to be added to or modified in the Permit for this rule.

National Emissions Standards For Hazardous Air Pollutants

40 CFR 63 Subpart A

40 CFR 63 Subpart A – "*General Provisions*," imposes generally applicable provision for initial notifications, initial compliance testing, monitoring, and recordkeeping requirements. Various existing and new equipment at the facility is subject to 40 CFR 63 Subparts S, MM, DDDDD, and GGGGG, and by extension Subpart A.

Existing Permit Condition 3.3.25 subjects the entire facility to the applicable requirements of 40 CFR 63 Subpart A, so no conditions need to be modified or added in order to meet the requirements of this rule.

40 CFR 63 Subpart S

40 CFR 63 Subpart S – "*National Emission Standards for Hazardous Air Pollutants for the Pulp and Paper Industry*," regulates HAP emissions from pulping sources, including digesters and washer systems.

The facility controls the HAPs from each LVHC system (digester, turpentine recovery, evaporator, steam stripper systems, and any other equipment serving the same function) in the kraft pulp mill utilizing the incinerator/scrubber system. The scrubber on the bleaching process requires an outlet concentration of chlorinated HAP of 10 ppm or less. Process condensates are stripped and emissions are controlled by the LVHC NCG system. Since the mill is a bleached process, the requirement is 11.1 lbs per ton of the total HAP mass from the pulping process condensates for collection. They have chosen to remove 10.2 lbs HAP per ton of ODP as their compliance demonstration limit. Also, the HAP concentration at the outlet of the incinerators must be 20 ppm or less.

The facility collects the HVLC emissions from the pine washers, gum washers, pine washer seal tanks, gum washer seal tanks, pine foam tank, and pine dump tank. These emissions are routed to Recovery Boilers #5 and #6 for destruction by introduction into the combustion air. The washer hood systems will be modified so that each fully encloses the washers. Note that the existing deckers and knotters/screens are not subject to the requirements of 40 CFR 63 Subpart S since they fall below the minimum levels outlined in 40 CFR 63.443(a)(ii) and 40 CFR 63.443(a)(iv).

All applicable requirements of 40 CFR 63 Subpart S have been incorporated into the Permit for existing equipment.

The gases from the new digesters and new evaporator set will vent to the LVHC NCG system, which contains a primary and backup incinerator for destruction. The new brownstock washer system emissions will vent to the HVLC System, where emissions are incinerated in either of the Recovery Boilers. The new bleach plant will be incorporated into the Permit. The Permit will be modified to include the new equipment. Also, BCI will need to test and/or retest several pieces of equipment in order to demonstrate full compliance with 40 CFR 63 Subpart S after all modifications are complete.

40 CFR 63 Subpart MM

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*," regulates HAP emissions from chemical recovery operations, such as recovery furnaces, smelt dissolving tanks, and lime kilns. The rule allows the facility to use PM emissions as surrogates for HAPs. Recovery Boilers #5 and #6, Smelt Tanks #5 and #6, and Lime Kiln #5 are considered existing sources for this rule and the requirements have been incorporated into the Permit. If a unit is reconstructed as defined by 40 CFR 63 Subpart MM, the standards for new sources will apply to the reconstructed unit. Reconstruction is triggered if the costs for the modifications exceed 50% of the cost to install a new unit. Of these units, Recovery Boilers #5 and #6 and Smelt Tank #6 are being modified during this project. The project costs for this project are well below 50% of the equivalent replacement costs. Therefore Recovery Boilers #5 and #6 and Smelt Tank #6 are not being reconstructed per 40 CFR 63 Subpart MM by the proposed project. Boilers #5 and #6, Smelt Tanks #5 and #6, and Lime Kiln #5 will continue to be covered under the existing unit limits.

The new Lime Kiln #6 will be regulated as a new source under this rule. The facility will utilize both an ESP and a scrubber to control emissions from this source. The rule limits PM to 0.010 gr/dscf at 10% O_2, which is more stringent than the 40 CFR 60 Subpart BB limits. The rule requires a COMS if an ESP is used to control PM emissions. If a wet scrubber is used, the facility must continuously monitor pressure drop across the scrubber and scrubbing liquid flow rate. However, the facility has requested alternative monitoring for scrubber pressure drop and the COMS. The facility submitted a letter dated September 19, 2006, requesting a 40 CFR 63 Subpart MM alternative monitoring plan. EPD approved the request made by the facility in a letter from Richard Taylor (ISMP) dated September 26, 2006. The approved alternative monitoring plan is as follows:

- No. 6 Lime Kiln Scrubber – Scrubber Supply Pressure in lieu of the requirement of scrubber pressure drop (40 CFR 63.864(e)(10))

- No. 6 Lime Kiln ESP – Secondary Power Levels in lieu of the requirement of a continuous opacity monitor (40 CFR 63.864(e)(13)).

The Permit will be modified to include the new equipment. Lime Kiln #6 will be to be tested in order to establish operating parameters to demonstrate compliance with 40 CFR 63 Subpart MM.

40 CFR 63 Subpart DDDDD

40 CFR 63 Subpart DDDDD – "*National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Processes,"* regulates HAP emissions from solid, liquid, and gaseous fuel fired boilers and indirect process heaters that are located at the facility. Power Boilers #4, #6, and #7 appear to be the only units at the facility that will be subject to this regulation. Recovery Boilers #5 and #6 are not subject to this regulation because they are regulated under 40 CFR 63 Subpart MM. However, no modifications will be made to Power Boilers #4, #6, and #7 during this project.

Applicability to this standard will not occur until the compliance date of September 13, 2007, as noted in existing Permit Condition 3.3.35. The specific requirements for this subpart will be included in a future Permit amendment.

State and Federal – Startup and Shutdown and Excess Emissions

Excess emission provisions for startup, shutdown, and malfunction are provided in Georgia Rule 391-3-1-.02(2)(a)7. Excess emissions from the units associated with the proposed project would most likely results from a malfunction of the associated control equipment. The facility cannot anticipate or predict malfunctions. However, the facility is required to minimize emissions during periods of startup, shutdown, and malfunction.

40 CFR 64 – Compliance Assurance Monitoring

Under 40 CFR 64, the *Compliance Assurance Monitoring* Regulations (CAM), facilities are required to prepare and submit monitoring plans for certain emission units with the Title V application. The CAM Plans provide an on-going and reasonable assurance of compliance with emission limits. Under the general applicability criteria, this regulation applies to units that use a control device to achieve compliance with an emission limit and whose pre-controlled emissions levels exceed the major source thresholds under the Title V permitting program. Although other units may potentially be subject to CAM upon renewal of the Title V operating permit, such units are not being modified under the proposed project and need not be considered for CAM applicability at this time.

Therefore, this applicability evaluation only addresses the Primary and Backup Incinerators, which employ an air pollution control device to control SO_2 and sulfuric acid mist (H_2SO_4). Based on this analysis, BCI has submitted a CAM Plan that describes the general and performance criteria for two performance indicators for each pollutant – scrubbant pH and scrubbant recirculation flow rate, which the facility already monitors as part of the existing Permit. The CAM Plan appears in Part 5.2 of the Permit Amendment.

4.0 CONTROL TECHNOLOGY REVIEW

The proposed project will result in increased emissions of a number of pollutants, including PM/PM_{10}, VOC, NO_X, CO, TRS, Pb, and H_2S. However, only the increased emissions for PM/PM_{10}, VOC, NO_X, CO, and H_2S are significant enough to trigger PSD review. In accordance with EPA's October 23, 1997 guidance memo "Interim Implementation of New Source Review Requirements for $PM_{2.5}$," PM_{10} is used as a surrogate for meeting the PSD requirements for $PM_{2.5}$.Table 4-1 contains a summary of each piece of equipment that underwent BACT analysis, the proposed BACT limit, and the proposed control technology.

Table 4-1 – BACT & Control Technology Summary

	PM/PM_{10}		NO_X		CO		VOC		H_2S	
Units	**BACT Limit**	**Control Tech.**	**BACT Limit**	**Control Tech.**	**BACT Limit**	**Control Tech.**	**BACT Limit**	**Control Tech.**	**BACT Limit**	**Control Tech.**
Recovery Boiler #5	0.021 gr/dscf @ 8% O_2	Dry ESP	100 ppm @ 8% O_2	Staged Combust.	300 ppm @ 8% O_2	GCP*	0.04 lb/ MMBtu	GCP*	4 ppm @ 8% O_2	NDCE/ GCP*
Recovery Boiler #6	0.021 gr/dscf @ 8% O_2	Dry ESP	100 ppm @ 8% O_2	Staged Combust.	300 ppm @ 8% O_2	GCP*	0.04 lb/ MMBtu	GCP*	4 ppm @ 8% O_2	NDCE/ GCP*
Lime Kiln #6	0.01 gr/dscf @ 10% O_2	Dry ESP/ Wet Scrubber	300 ppm @ 10% O_2	GCP*	1.12 lb/ton CaO	GCP*	25 ppm @ 10% O_2	GCP*	8 ppm @ 10% O_2	Good Operating Practices
Lime Slaker #3	0.07 lb/ton CaO	Wet Scrubber	--		--		Workplace Standard**	Good Work Practices	--	
Recausticizer	--		--		--		Workplace Standard**	Good Work Practices	--	
Green Liquor Clarifier	--		--		--		Workplace Standard**	Good Work Practices	--	
Lime Mud Washer	--		--		--		Workplace Standard**	Good Work Practices	--	
Bleach Plant #4	--		--		1.69 lb/ UODTP	None	0.092 lb/ ADTP	Good Work Practices	--	
Primary Incinerator	--		0.456 lb/ADTP	None	--		--		--	
Back-up Incinerator	--		0.456 lb/ADTP	None	--		--		--	
Paper Machine #3	Workplace Standard ***	Good Work Practices	--		--		Workplace Standard ***	Good Work Practices	--	
Paper Machine #4	Workplace Standard ***	Good Work Practices	--		--		Workplace Standard ***	Good Work Practices	--	
Paper Machine #5	Workplace Standard ***	Good Work Practices	--		--		Workplace Standard ***	Good Work Practices	--	
Pet Coke Storage Silos	0.01 gr/dscf	Baghouse/ Bin Vent	--		--		--		--	
Pet Coke Grinder Duct Burner	--		0.1 lb/ MMBtu	$LowNO_X$ Burners/ GCP*	84 lb/mmscf	GCP*	5.5 lb/mmscf	GCP*	--	

* GCP - Good Combustion Practices
** Only fresh process water will be used in the causticizing operations, not process condensates.
***Any use of solid powered additives at the paper machines will be handled in an enclosed manner. The pulp sent to the paper machines will go through a final rinse using freshwater or whitewater at the bleach plant to ensure VOC content is minimized. Additives used will either have no VOC or have negligible content.

Recovery Boiler #5

Recovery Boiler #5 was installed in 1971. Rated at 600 MMBtu/hr, it burns natural gas, No. 6 fuel oil, and black liquor solids. Emissions are controlled by Recovery Boiler #5 ESP. Primary emissions from Recovery Boiler #5 are PM/PM_{10}, SO_2, NO_X, CO, VOC, and TRS. The furnace is expected to have the potential capacity to fire 4,000,000 pounds BLS/day after the modifications outlined in the application.

Because PM/PM_{10}, VOC, NO_X, CO, and H_2S emissions increases from Recovery Boiler #5 have triggered PSD applicability, only these emissions were evaluated for BACT. The facility proposed a fuel oil usage limit for Recovery Boiler #5 in order to avoid PSD review for SO_2. The facility also proposed a lower TRS emission limit for Recovery Boiler #5 in order to avoid PSD review for TRS.

Recovery Boiler #5 – PM Emissions

Step 1: Identify all control technologies

The currently available PM controls include ESPs, wet ESPs (WESP), baghouses, and high efficiency wet scrubbers. In the case of an ESP, high voltage electrodes impart a negative charge to the particles entrained in the exhaust gas stream. These negatively charged particles are then attracted to a grounded collecting surface, which is positively charged. The cleaned gas then exits out the ESP. Inside the ESP, the particles build up on the collecting plates. At periodic intervals, the plates are rapped, causing the particles to fall into hoppers in dry ESPs. The particles are then removed from the hoppers, typically by a rotary screw arrangement. In the case of wet ESPs a liquid wash down collects the particulates and wet sluicing is used to remove the particles. ESPs offer very high efficiencies for particulates of very small size (above 1 micron in size).

Dry filtration is a common method for removing dry particulate matter from many types of industrial gas streams. Filters are available in a variety of types, materials, and sizes. Fabric filters are reusable filters that can be cleaned by shaking, reversing the airflow, or pulsing the airflow.

Wet scrubbers remove particulates from a gas stream by capturing the particles in liquid droplets. Scrubber systems are generally more expensive to purchase and operate than dry filtration. However, they present a particulate removal efficiency alternative for applications where dry filtration is not recommended based on particulate characteristics such as those with a very high moisture content.

Option 1: Dry Electrostatic Precipitator
Option 2: Wet Electrostatic Precipitator
Option 3: Dry Filtration (Baghouse)
Option 4: Wet Scrubber

Step 2: Eliminate technically infeasible options

While baghouses offer the best particulate control for the smallest particles, the high moisture content of the exhaust gases along with the hydroscopic nature of the salt cake would blind a baghouse; therefore it is not considered a practical solution. There are no known applications of baghouses on recovery furnaces. A wet scrubber or a WESP or ESP would be technically feasible for the control of PM emissions from a recovery furnace.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

ESPs are considered the most effective means of PM control from a recovery furnace. Most operating recovery furnaces utilize this technology. A venturi scrubber would be technically viable; however the scrubber would not be expected to be as effective as a WESP or ESP and would create a new waste water stream, which would add to the load to the waste water treatment plant.

Step 4: Evaluating the Most Effective Controls and Documentation

The most utilized PM control technology for recovery furnaces are WESPs and ESPs. Since Recovery Boiler #5 currently utilizes an ESP for PM emission control and ESPs are the most effective technology for removing PM emissions from recovery furnaces, no additional controls are being proposed for the project. The mill is, however, planning to upgrade the existing Recovery Boiler #5 ESP.

Step 5: Selection of BACT

Table 4-2 of Application No. 16576 provides a listing of the PM emissions limits and controls that are currently in place for the recovery furnaces in the EPA RACT/BACT/LAER Clearinghouse database (RBLC). As shown, the ranges of permitted emission limits for PM emissions from a recovery furnace are from 0.021 gr/dscf @ 8% O_2 to 0.06 gr/dscf @ 8% O_2.

The lowest currently permitted and proven emission limit for PM_{10} emission from a recovery furnace is 0.021 gr/dscf. For PM emissions, Recovery Boiler #5 is currently only subject to Georgia rule (e) and 40 CFR 63 Subpart MM. The state process weight rate rule sets a PM emission limit based on a calculated formula as follows:

$E = (55*P^{0.11}) - 40$

where E = emission rate, lb/hr

P = process weight rate in tons/hr = 125 tons of black liquor solids (BLS/hr)

$E = (55*125^{0.11}) - 40 = 53.55$ lbs/hr

The process weight rate rule results in a PM emission limit of 0.025 gr/dscf based on an expected maximum standard dry flow rate of approximately 230,000 dscfm @ 8% O_2. The proposed BACT level will result in a reduction in the PM emission allowable for the unit from 0.025 gr/dscf to 0.021 gr/dscf.

Conclusion – PM Control

The Division has determined that BCI's proposal to use a dry ESP to minimize the emissions of PM constitutes BACT for Recovery Boiler #5. The BACT emission limit has been established as 0.021 gr/dscf @ 8% O_2. Compliance with the PM limit must be demonstrated by the completion of a stack test after the modification of the unit. The mill currently monitors secondary power on the ESP and maintains a minimum of 160,000 volt-amps on Recovery Boiler #5 ESP. This value was chosen by the mill based on design factors and operating experience. Historical annual compliance testing has demonstrated that the unit will meet the proposed BACT level if this power value is maintained. The most recent test on November 9, 2005 showed PM emissions of 0.013 gr/dscf @ 8% O_2 (or 23.96 lb/hour) with an average of secondary power at 416,436 volt-amps on the ESP. The mill proposes to continue to conduct annual stack testing as required by the Permit. An initial performance test will be conducted to verify or reestablish the current minimum volt-amp requirements as outlined in Permit Condition 6.1.7.c.iv(C).

Summary – PM Control Technology Review for Recovery Boiler #5

To fulfill the PSD permitting requirements for PM, a BACT analysis was conducted for the modified Recovery Boiler #5. The BACT selection for Recovery Boiler #5 is summarized below in Table 4-2. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-2: BACT Summary for Recovery Boiler #5 - PM

Pollutant	Control Technology	Proposed BACT Limit
PM	Existing Dry ESP (to be upgraded)	0.021 gr/dscf @ 8% O_2

Recovery Boiler #5 – NO_X Emissions

Step 1: Identify all control technologies

NO_X is a product of combustion in the recovery furnace. NO_X is formed in combustion processes by two mechanisms called fuel-bound NOx and thermal NO_X. Fuel NO_X is formed when nitrogen contained in the fuel being burned is oxidized and converted to NO_X. The amount of fuel bound NOx created is dependent upon the type and amount of nitrogen content in the fuel being burned, which in the case of the recovery furnaces is black liquor solids and fuel oil. Thermal NO_X is from the direct conversion of the nitrogen contained in the combustion air to NO_X at higher temperatures in the flame region. The amount of thermal NO_X being formed is largely dependent upon temperatures in the flame zone of the boiler; therefore by controlling combustion temperatures, thermal NO_X can be controlled.

The control technologies for NO_X included combustion control techniques such as operating with low excess air or operating staged combustion technologies to reduce combustion temperatures and thereby reduce thermal NO_X formation. Flue gas recirculation (FGR) can also be utilized. In FGR part of the flue gas from the boiler is recirculated back into the furnace to replace part of the combustion air. This results in a reduction of the temperatures in the combustion zone and in turn reduces thermal NO_X. Low NO_X burners utilize staged combustion where in the first stage the fuel is burned in an oxygen lean environment to reduce combustion temperature, which is then followed by a more oxygen rich stage to complete the combustion process. The net effect of this is to reduce temperatures in the hottest portion of the flame zone and thereby reduce thermal NO_X.

In addition to these combustion controls there are several add-on control technologies to control NO_X. These include Selective Non-Catalytic Reduction (SNCR), Selective Catalytic Reduction (SCR), and oxidation/reduction scrubbing. In SNCR, urea or ammonia is injected into the furnace in an area of the boiler region with temperatures between 1,600 to 1,900˚F. When injected the ammonia and NO_X break down to form nitrogen and water. SCR also utilizes ammonia/urea injection to complete the same reaction, but the reaction occurs across a catalyst bed, which allows the reaction to occur at much lower temperatures (500 to 800˚F).

In an oxidation/reduction scrubber the gases are cooled to dew point temperature and ozone is injected into the exhaust stream to oxidize the NO_X further into a form that can be absorbed in a wet scrubber (N_2O_5). The resulting scrubber water becomes a weak nitric acid solution, which can be neutralized with sodium hydroxide. Such a scrubber would also control CO and SO_2 with the same mechanism. These scrubbers are however limited in their applications to highly concentrated NO_X streams such as that seen in the chemical process industry and not in combustion processes.

Option 1: Low Excess Air
Option 2: Operating Staged Combustion Technologies
Option 3: Flue Gas Recirculation (FGR)
Option 4: Low-NO_X Burners
Option 5: Selective Non-Catalytic Reduction (SNCR)
Option 6: Selective Catalytic Reduction (SCR)
Option 7: Oxidation/reduction Scrubbing

Step 2: Eliminate technically infeasible options

Much of the NO_X formed in a recovery furnace comes from fuel bound nitrogen and not thermal NO_X. For this reason the combustion techniques to reduce combustion temperature (FGR, low NO_X burners, etc.) are not effective in a recovery furnace. Furthermore, these techniques cannot be physically applied to the unique process of black liquor combustion. The use of add-on control technologies (SNCR, SCR, and scrubbing) have also not been successfully applied to recovery furnaces. To date these technologies have only been applied to standard combustion boilers (gas, fuel oil, coal combustion, etc.) and turbines. It is unclear, however, how the injection of ammonia would impact the chemical recovery process occurring in a recovery furnace or if the technology would be successful. There are also safety concerns associated with injecting ammonia into a recovery furnace, which potentially could lead to explosive conditions if water (a by-product of the NO_X reduction technology) is formed in the furnace. Good operating practices, including the use of staged combustion to reduce thermal NO_X, is therefore considered the only demonstrated NO_X reduction technology for use on a recovery furnace.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good operating practices including staged combustion is considered the only remaining NO_X control technique.

Step 4: Evaluating the Most Effective Controls and Documentation

Good operating practices including staged combustion is considered the only remaining NO_X control technique.

Step 5: Selection of BACT

Table 4-3 of Application No. 16576 lists the permitted emission rates for NO_X from recovery furnaces as listed in the RBLC. These permitted emission rates vary from 70 ppm to 210 ppm @ 8% O_2. It should be noted that the several of the lowest permitted ppm levels are for new furnaces, while this proposed BACT level is for the modification of an existing furnace. A NO_x testing evaluation conducted by National Council for Air and Stream and Improvement (NCASI) concluded that NO_X emissions can increase with increasing heat content, which increases with black liquor solids content. After the modifications to the evaporator systems, Recovery Boiler #5 will burn black liquor at up to 72% solids, which will be higher than some of the furnaces listed in the RBLC. Furthermore, NO_X will also vary with nitrogen content in the black liquor solids, which would be expected to vary with the wood species being utilized by the mill. In an evaluation completed by NCASI, it was concluded that the majority of the NO_X emissions are attributable to fuel bound NO_X and not thermal NO_X. The proposed NO_X BACT level must, therefore, account for those process variables that impact the formation of fuel bound NO_X such as variations in the nitrogen content and solids content.

BCI proposes a NO_X BACT limit of 100 ppm @ 8% O_2, with compliance being demonstrated on a 12-hour average basis. Some units in the RBLC have lower permitted NO_X emission limits on a concentration basis; however, these are new units constructed in the mid 1990's and are designed for lower emission limits. The proposed project is based on modifications being made to existing furnaces and therefore any changes made to the furnaces have to be within the current recovery furnace configuration and design. Furthermore, most of the proposed modifications are changes that involve the unit's steam tubes, which recover the heat generated in the boiler and do not involve the combustion component of the furnaces. By improving the unit's ability to recover energy, the unit will operate more efficiently and therefore less auxiliary fuels will be required by other mill steam generating sources. The changes involved do not include significant modifications to the combustion elements of the recovery furnace boiler. By comparison, the estimated $7,000,000 expenditure on Recovery Boiler #5 represents a small fraction (estimated at 12%) of the replacement costs for a new furnace, which suggests a limited scope in terms of changes to the boiler's overall design.

The proposed BACT level is on a concentration basis and for Recovery Boiler #5, this will result in NO_X emissions of 1.98 lb NO_X/ton BLS. It is worth noting, that several of the units included in the RBLC that have lower concentration basis limits have equivalent or higher NO_X emissions on a lb/ton BLS basis. Champion in Alabama (1.95 lb/ton BLS), Boise Cascade in Maine (1.83 lb/ton BLS), Consolidate Papers in Wisconsin (2.45 lb/ton BLS), Scott Paper in Alabama (2.04 lb/ton BLS), and Longview Fiber in Washington (four units at 2.06 lb/ton BLS) all have BACT limits that are roughly equivalent or higher than the proposed values for BCI on a lb/ton BLS basis, but are listed in the RBLC with lower limits on a concentration basis. Insufficient data is available to complete these calculations for all units included in the RBLC.

The proposed NO_X emission limit is intended to allow for variations in the nitrogen content of wood species as well as variations in the solids content of the liquor being fired, which can vary over time. The units in the RBLC may have wood species with lower nitrogen contents and may be operating at lower solids firing contents, which would both tend to result in lower NO_X emissions.

By proposing to install a CEMS for NO_X, the mill will be able to demonstrate compliance on a continuous basis, as opposed to many of the units in the RBLC that are limiting compliance demonstrations to annual stack testing demonstrations. This will mean the mill will show compliance under all operating conditions including variations in solids content firing and variations in wood species.

Conclusion – NO_X Control

The Division has determined that BCI's proposal to use good operating practices, including staged combustion, to minimize the emissions of NO_X constitutes BACT for Recovery Boiler #5. The BACT emission limit has been established as 100 ppm at 8% O_2. The mill proposes to comply with the BACT limit on a 12-hour average basis and is proposing to install a CEMS on Recovery Boiler #5 in order to document compliance with the proposed BACT limit. The use of continuous direct pollutant measurement will offer assurance of continuous compliance by the mill. By documenting compliance on a 12-hour basis, the mill will be assuring compliance during all operating conditions including variations in wood species and black liquor solids content.

Summary – NO_X Control Technology Review for Recovery Boiler #5

To fulfill the PSD permitting requirements for NO_X, a BACT analysis was conducted for the modified Recovery Boiler #5. The BACT selection for Recovery Boiler #5 is summarized below in Table 4-3. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-3: BACT Summary for Recovery Boiler #5 - NO_X

Pollutant	Control Technology	Proposed BACT Limit
NO_X	Good combustion practices (staged combustion)	100 ppm @ 8% O_2 (on a 12-hour average basis)

Recovery Boiler #5 – CO Emissions

Step 1: Identify all control technologies

CO is a result of incomplete combustion and can typically be minimized through the use of good combustion practices including assurance of sufficient air to fuel ratios. Good combustion practices can be enhanced through the use of staged combustion, which involves the injection of combustion air at different levels in the furnace. Beyond combustion controls the remaining carbon monoxide could be oxidized to CO_2 in a second downstream control device. This could be an incinerator, which would raise the temperature of the gases to combustion temperatures, or a catalyst bed, which would allow the process to occur at a lower temperature by moving the gases across a bed of catalyst material (usually consisting of a precious metal). In the case of an incinerator, the oxidation process would require additional fuel combustion to convert the CO to CO_2. Fuel would also be required for a CO catalyst application because the exhaust gas temperatures would not be sufficiently high for a catalyst to be effective. Possible forms of oxidizers could include Regenerative Thermal Oxidizers (RTO) and catalytic oxidizers.

Option 1: Staged Combustion and Good Combustion Practices
Option 2: Catalytic Oxidizer/RTO

Step 2: Eliminate technically infeasible options

CO control through the utilization of good combustion controls is designed into Recovery Boiler #5. CO emissions could be further reduced through the addition of an oxidation technology such as a catalytic oxidizer. This is a transfer technology from industrial boiler control, but has never been attempted on a recovery furnace where sulfate carry over is present. If this technology were found to be feasible, the exhaust gas stream temperature must be significantly higher for an oxidation catalyst to be effective. At exhaust gas temperatures below 800°F, the oxidation catalyst becomes ineffective. The average exhaust temperature of the recovery boiler exhaust gases is roughly 350°F. An oxidation catalyst would not, therefore, be effective at reducing CO emissions in a recovery furnace unless the exhaust gas temperature was raised considerably by reheating. Raising the temperature of the gases would require significant heat injection through additional fuel firing or through a derating of the boiler. In either case, significant energy costs would result. Furthermore, significant emissions would result from the combustion needed to either raise the temperature of the exhaust gases or through increased fuel consumption to make up for the loss in boiler efficiency if the unit was derated. In either case significant increases in other higher priority pollutants such as NO_X would result. Based on these energy and environmental costs, neither oxidation alone or with a catalyst is considered practically feasible or beneficial.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good combustion operations practices are considered the only feasible control method.

Step 4: Evaluating the Most Effective Controls and Documentation

The only technology in use for minimizing carbon monoxide emissions from recovery furnaces is good combustion operation practices. Currently, Recovery Boiler #5 is operated with good combustion practices.

Step 5: Selection of BACT

Table 4-4 of Application No. 16576 provides a listing of the CO emissions limits for recovery furnaces in the RBLC. These limits range from 169 to 879 ppm and control technologies include combustion control, furnace design and operation, and good combustion practices. The lowest listing in the clearinghouse is for the SD Warren Mill in Maine, which is no longer operating so the mill could not be contacted to verify if this level has been demonstrated. BCI proposes CO BACT to be defined as good combustion practices and an emission rate of 300 ppm @ 8% O_2. There are some units with lower limits (200 ppm). Many of the units listed in the RBLC are for new units and incorporate a more modern designed combustion air system, while the BCI proposed limit is for a modified unit. Furthermore, Recovery Boiler #5 will be utilized to combust the HVLC gases from the mill's washers and would contribute to an increase in VOC loading to the furnace and could result in an increase in CO emissions from the furnaces. The proposed BACT emission limit is intended to apply during all operating conditions, which includes firing black liquor solids and fuel oil separately or in combination. BCI proposes to demonstrate compliance using a CEM for CO. For several units listed in the RBLC with lower CO emission limits, compliance was demonstrated with a stack test. This would represent a single 3-hour event and would not capture all operating conditions and variability, as will be the case with the proposed CO CEM compliance method. Demonstrating compliance over a wide range of operating conditions on a continuous basis is considered as strict as documenting compliance with the lower limit using a single annual test under ideal and controlled conditions.

Conclusion – CO Control

The Division has determined that BCI's proposal to use good combustion operations to minimize the emissions of CO constitutes BACT for Recovery Boiler #5. The BACT emission limit has been established as 300 ppm at 8% O_2. The mill is proposing to install a CEMS for CO emissions on Recovery Boiler #5 to demonstrate continuous compliance with the BACT level. The use of continuous direct pollutant measurement will offer assurance of continuous compliance by the mill. The mill proposes compliance with the limit on a 30-day rolling average basis. By operating a CEMS, the mill will be assuring compliance during all operating conditions.

Summary – CO Control Technology Review for Recovery Boiler #5

To fulfill the PSD permitting requirements for CO, a BACT analysis was conducted for the modified Recovery Boiler #5. The BACT selection for Recovery Boiler #5 is summarized below in Table 4-4. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-4: BACT Summary for Recovery Boiler #5 - CO

Pollutant	Control Technology	Proposed BACT Limit
CO	Good combustion practices	300 ppm @ 8% O_2 (30-day rolling average basis)

Recovery Boiler #5 – VOC Emissions

Step 1: Identify all control technologies

As with CO, VOC emissions result from incomplete combustion of organics in the fuel stream. Like CO, VOCs can be controlled through oxidization as well as catalytic technologies. VOCs could also be controlled through carbon absorption, where the gases are passed over a carbon bed and the VOCs are absorbed on the activated carbon. Once spent, the carbon would need to be regenerated on or off site. VOCs can also be controlled through some emissions sources using biofiltration technologies, where the gases are passed through a bed of biodegradable material and the VOCs are degraded by the microorganisms contained in the biofilter.

Option 1: Staged Combustion and Good Combustion Practices
Option 2: Oxidation
Option 3: Carbon Absorption
Option 4: Biofiltration Technologies

Step 2: Eliminate technically infeasible options

As with CO, VOC is thought to be best controlled through the utilization of good combustion practices. The use of an additional oxidizer with or without a catalyst would not be considered practically feasible. As noted in the CO BACT analysis section, the oxidation of the gas stream would require the flue gases to be elevated to a temperature of a minimum of 800°F for a catalytic oxidizer to be effective (thermal oxidizer would require even higher temperatures). Raising the flue gas temperatures to this high level would require the use of significant amounts of additional fuel and would result in the generation of additional air pollutants (NO_X, SO_2, etc.). The utilization of additional fuel and the generation of additional emissions would make the use of an oxidization technology impractical.

Because of the high exhaust temperatures in a recovery furnace, the use of a biofilter is also not considered technically feasible. The high temperatures of the gases leaving the furnace would kill the bugs in a biofilter. A carbon bed would also be considered impractical because the bed would likely be quickly contaminated by other pollutants in the exhaust stream (SO_2, TRS, etc.). Neither technology has been demonstrated on a recovery furnace.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good combustion operations practices are considered the only feasible control method.

Step 4: Evaluating the Most Effective Controls and Documentation

The most effective control technology for minimizing VOC emissions from recovery furnaces is good combustion operation practices. Currently, Recovery Boiler #5 utilizes good combustion practices.

Step 5: Selection of BACT

Table 4-5 of Application No. 16576 provides a listing of the VOC emissions limits for recovery furnaces in the RBLC. These limits range from 0.03 to 0.0956 lb/MMBtu and control technologies include combustion control, furnace design and operation, and good combustion practices. Currently there are no regulations that limit VOC emissions from recovery furnaces. BCI proposes VOC BACT to be defined as good combustion practices and an emission rate of 0.04 lb/MMBtu. There are some units in the RBLC with lower limits, however, many of the units listed in the RBLC are new units and would incorporate a more modern designed air combustion system. Recovery Boiler #5 is a modified unit. Recovery Boiler #5 is utilized to combust the HVLC NCGs from the mill's washers, which would contribute to an increase in VOC loading to the furnace and could result in an increase in VOC emissions from the furnaces.

Conclusion – VOC Control

The Division has determined that BCI's proposal to use good combustion operations to minimize the emissions of VOC constitutes BACT for Recovery Boiler #5. The BACT emission limit has been established as 0.04 lb/MMBtu. Like CO, the amount of VOC emitted from a recovery furnace is a measure of the completeness of the combustion process occurring in the furnace. By ensuring sufficient oxygen content and good fuel and air mixing, the CO and VOC emissions from the boiler are expected to be below the proposed BACT emission levels. The proposed CEMS for CO will be considered a good representative surrogate for VOC emissions. BCI proposes to conduct a stack test for VOCs while operating the CO CEMS. If the mill demonstrates compliance with both the CO (through CEMS) and VOC emission limit during the test, then it is expected that compliance with the VOC emission limit will be maintained as long as compliance with the CO emission limit is maintained.

Summary – VOC Control Technology Review for Recovery Boiler #5

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for the modified Recovery Boiler #5. The BACT selection for Recovery Boiler #5 is summarized below in Table 4-5. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-5: BACT Summary for Recovery Boiler #5 - VOC

Pollutant	Control Technology	Proposed BACT Limit
VOC	Good combustion practices	0.04 lb/MMBtu

Recovery Boiler #5 – H_2S Emissions

Step 1: Identify all control technologies

The TRS compounds from recovery furnaces consist of hydrogen sulfide (H_2S), methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. The amount of H_2S emissions are highly dependent upon the type of evaporator (direct or indirect) used to concentrate the black liquor solids. Direct contact evaporators use furnace exhaust gases to concentrate black liquor solids while non-contact evaporators utilize indirect heat from steam generated by the furnace to concentrate the liquor under vacuum. Indirect contact evaporators result in significantly less TRS compounds being emitted.

TRS emissions can be reduced by process modifications and improved operating conditions, efficient operation of the recovery furnace, by avoiding overloading and by maintaining sufficient oxygen, residence time, and turbulence. The utilization of non-direct contact evaporators (NDCE) in new recovery furnaces reduces TRS emissions substantially. White liquor scrubbers are also effective in controlling a portion of TRS emissions, primarily H_2S, but not the organic forms of TRS (methyl mercaptan, dimethyl sulfide, and dimethyl disulfide).

Option 1: Good Combustion Practices
Option 2: Non-Direct Contact Evaporator (NDCE)
Option 3: White Liquor Scrubber

Step 2: Eliminate technically infeasible options

An NDCE system that is designed for low odor emissions is very effective in the reduction of TRS emissions. The use of a caustic scrubber could reduce H_2S emissions. Both of these systems are technically feasible for the use in reducing TRS emissions from a recovery furnace.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

The utilization of a NDCE design for recovery furnaces is most effective in the reduction of H_2S emissions. The use of caustic scrubbers for the reduction of H_2S has not been demonstrated on recovery furnaces. The mill also utilizes a dry ESP on Recovery Boiler #5.

Step 4: Evaluating the Most Effective Controls and Documentation

The most effective control technology for minimizing H_2S emissions from recovery furnaces is furnace design (NDCE system) and good operating practices. Recovery Boiler #5 utilizes an NDCE system and good operating practices.

Step 5: Selection of BACT

Table 4-6 of Application No. 16576 provides a listing of the TRS emissions limits for recovery furnaces listed in the RBLC. The only permit limit listed for H_2S is 4 ppm (Inland Paperboard and Packaging Inc. in Rome, GA), which operates a low odor design NDCE system design. BCI proposes BACT level for H_2S at 4 ppm @ 8% O_2, which matches the only BACT level currently listed in the RBLC.

Conclusion – H_2S Control

The Division has determined that BCI's proposal to use good combustion operations and a NDCE system to minimize the emissions of H_2S constitutes BACT for Recovery Boiler #5. The BACT emission limit has been established as 4 ppm @ 8% O_2. The existing TRS CEMS will be utilized to demonstrate compliance with the proposed H_2S BACT. The mill would propose to complete an initial stack test for H_2S and TRS emissions. This test will be used to establish the ratio of H_2S to TRS in the exhaust gas from Recovery Boiler #5. The TRS CEMS data and the established H_2S/TRS ratio will then be used to calculate the H_2S on a 12-hour average basis in order to demonstrate continued compliance with the H_2S emission limit on a 12-hour average basis.

Summary – H_2S Control Technology Review for Recovery Boiler #5

To fulfill the PSD permitting requirements for H_2S, a BACT analysis was conducted for the modified Recovery Boiler #5. The BACT selection for Recovery Boiler #5 is summarized below in Table 4-6. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-6: BACT Summary for Recovery Boiler #5 – H_2S

Pollutant	Control Technology	Proposed BACT Limit
H_2S	NDCE system and good operating practices	4 ppm @ 8% O_2 (12-hour average basis)

Recovery Boiler #6

Recovery Boiler #6 was installed in 1990. Rated at 800 MMBtu/hr, it burns propane, No. 2 fuel oil, methanol, and black liquor solids. Emissions are controlled by Recovery Boiler #6 ESP. Primary emissions from Recovery Boiler #6 are PM/PM_{10}, SO_2, NO_X, CO, VOC, and TRS. The furnace is expected to have the potential capacity to fire 6,000,000 pounds of BLS/day after the modifications outlined in the application.

Because only PM/PM_{10}, VOC, NO_X, CO, and H_2S emissions increases from Recovery Boiler #6 have triggered PSD applicability, only these emissions were evaluated for BACT.

Recovery Boiler #6 – PM Emissions

Step 1: Identify all control technologies

The theory and operation of each of available control technology was discussed in detail in Recovery Boiler #5 BACT analysis for PM.

Step 2: Eliminate technically infeasible options

As discussed in Recovery Boiler #5 BACT analysis for PM, baghouses are not considered a practical solution.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

As discussed in Recovery Boiler #5 BACT analysis for PM, WESPs and ESPs are considered the most effective means of PM control from a recovery furnace.

Step 4: Evaluating the Most Effective Controls and Documentation

The most utilized PM control technology for recovery furnaces are WESPs and ESPs. Since Recovery Boiler #6 currently utilizes an ESP for PM emission control and ESPs are the most effective technology for removing PM emissions from recovery furnaces, no additional controls are being proposed for the project. The mill is, however, planning to upgrade the existing Recovery Boiler #6 ESP.

Step 5: Selection of BACT

Table 4-2 of Application No. 16576 provides a listing of the PM emissions limits for recovery furnaces found in the RBLC. The ranges of permitted emission limits for PM emissions from a recovery furnace is from 0.021 gr/dscf @ 8% O_2 to 0.06 gr/dscf @ 8% O_2.

The lowest currently permitted and proven emission limit for PM_{10} emission from a recovery furnace is 0.021 gr/dscf. Recovery Boiler #6 is currently subject to 40 CFR 40 Subpart BB, 40 CFR 63 Subpart MM, and Georgia rule (e). Both 40 CFR 40 Subpart BB and 40 CFR 63 Subpart MM have limits of 0.044 gr/dscf @ 8% O_2. The state process weight rate rule sets a PM emission limit based on a calculated formula as follows:

$E = (55*P^{0.11}) - 40$

Where: E = emission rate, lb/hr

P = process weight rate in tons/hr = 125 tons of black liquor solids (BLS/hr)

$E = (55*125^{0.11}) - 40 = 53.55$ lbs/hr

This equates to an approximate grain loading value of 0.023 gr/dscf based on an expected maximum standard dry flow rate of about 277,283 dscfm @ 8% O_2. The proposed BACT level, therefore, will result in a reduction in the PM emission limit from 0.023 gr/dscf to 0.021 gr/dscf for Recovery Boiler #6.

Conclusion – PM Control

The Division has determined that BCI's proposal to use a dry ESP to minimize the emissions of PM constitutes BACT for Recovery Boiler #6. The BACT emission limit has been established as 0.021 gr/dscf @ 8% O_2. Compliance with the PM limit must be demonstrated by the completion of a stack test after the modification of the unit. The mill currently monitors secondary power on the ESP and maintains a minimum of 170,000 volt-amps on Recovery Boiler #6 ESP. This value was chosen by the mill based on design factors and operating experience. Historical annual compliance testing has demonstrated that the unit will meet the proposed BACT level if this power value is maintained. The most recent test on December 8, 2005 showed PM emissions of 0.007 gr/dscf @ 8% O_2 (or 17 lb/hour) with an average of secondary power at 549,618 volt-amps on the ESP. The mill proposes to continue to conduct annual stack testing as required by the Permit. An initial performance test will be conducted to verify or reestablish the current minimum volt-amp requirements as outlined in Permit Condition 6.1.7.c.iv(B).

Summary – PM Control Technology Review for Recovery Boiler #6

To fulfill the PSD permitting requirements for PM, a BACT analysis was conducted for the modified Recovery Boiler #6. The BACT selection for Recovery Boiler #6 is summarized below in Table 4-7. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-7: BACT Summary for Recovery Boiler #6 - PM

Pollutant	Control Technology	Proposed BACT Limit
PM	Dry ESP	0.021 gr/dscf @ 8% O_2

Recovery Boiler #6 – NO_X Emissions

Step 1: Identify all control technologies

The theory and operation of each available NO_X control technology was discussed in detail in Recovery Boiler #5 BACT analysis for NO_X.

Step 2: Eliminate technically infeasible options

As discussed in Recovery Boiler #5 BACT analysis for NO_X, good operating practices, including the use of staged combustion to reduce thermal NO_X, is considered the only demonstrated NO_X reduction technology for use on a recovery furnace.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good operating practices including staged combustion is considered the only remaining NO_X control technique.

Step 4: Evaluating the Most Effective Controls and Documentation

Good operating practices including staged combustion is considered the only remaining NO_X control technique.

Step 5: Selection of BACT

As discussed in Recovery Boiler #5 BACT analysis for NO_X, Table 4-3 of Application No. 16576 lists the permitted emission rates for NO_X from recovery furnaces as listed in the RBLC. After the modifications to the evaporator systems, Recovery Boiler #6 will burn black liquor at up to 72% solids, which will be higher than some of the furnaces listed in the RBLC.

BCI proposes a NO_X BACT limit of 100 ppm @ 8% O_2, with compliance being demonstrated on a 12-hour average basis. The proposed BACT level is on a concentration basis and for Recovery Boiler #6 this will result in NO_X emissions of 1.74 lb NO_X/ton BLS. The proposed NO_X emission limit is intended to allow for variations in the nitrogen content of wood species as well as variations in the solids content of the liquor being fired, which can vary over time. The units in the RBLC may have wood species with lower nitrogen contents and may be operating at lower solids firing contents, which would both tend to result in lower NO_X emissions.

By proposing to install a CEMS for NO_X, the mill will be able to demonstrate compliance on a continuous basis, as opposed to many of the units in the RBLC that are limiting compliance demonstrations to annual stack testing demonstrations. This will mean the mill will show compliance under all operating conditions including variations in solids content firing and variations in wood species.

Conclusion – NO_X Control

The Division has determined that BCI's proposal to use good operating practices, including staged combustion to minimize the emissions of NO_X constitutes BACT for Recovery Boiler #6. The BACT emission limit has been established as 100 ppm at 8% O_2. The mill proposes to comply with the BACT limit on a 12-hour average basis and is proposing to install a CEMS on Recovery Boiler #6 in order to document compliance with the proposed BACT limit. The use of continuous direct pollutant measurement will offer assurance of continuous compliance by the mill. By documenting compliance on a 12-hour basis, the mill will be assuring compliance during all operating conditions including variations in wood species and black liquor solids content.

Summary – NO_X Control Technology Review for Recovery Boiler #6

To fulfill the PSD permitting requirements for NO_X, a BACT analysis was conducted for the modified Recovery Boiler #6. The BACT selection for Recovery Boiler #6 is summarized below in Table 4-8. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-8: BACT Summary for Recovery Boiler #6 - NO_X

Pollutant	Control Technology	Proposed BACT Limit
NO_X	Good operating practices (staged combustion)	100 ppm @ 8% O_2 (12-hour average basis)

Recovery Boiler #6 – CO Emissions

Step 1: Identify all control technologies

The theory and operation of each available CO control technology was discussed in detail in Recovery Boiler #5 BACT analysis for CO.

Step 2: Eliminate technically infeasible options

As discussed in Recovery Boiler #5 BACT analysis for CO, good combustion practice is considered the only demonstrated CO reduction technology for use on a recovery furnace.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good combustion operations practices are considered the only feasible control method.

Step 4: Evaluating the Most Effective Controls and Documentation

The only technology in use for minimizing carbon monoxide emissions from recovery furnaces is good combustion operation practices. Currently, Recovery Boiler #6 is operated with good combustion practices.

Step 5: Selection of BACT

As discussed in Recovery Boiler #5 BACT analysis for CO, Table 4-4 of Application No. 16576 provides a listing of the CO emissions limits for recovery furnaces in the RBLC. See Recovery Boiler #5 BACT analysis for NO_X for more detail. BCI proposes CO BACT to be defined as good combustion practices and an emission rate of 300 ppm @ 8% O_2. Recovery Boiler #6 will be utilized to combust the HVLC gases from the mill's washers and would contribute to an increase in VOC loading to the furnace and could result in an increase in CO emissions from the furnaces. The proposed BACT emission limit is intended to apply during all operating conditions, which includes firing black liquor solids and fuel oil separately or in combination. BCI proposes to demonstrate compliance using a CEMS for CO.

Conclusion – CO Control

The Division has determined that BCI's proposal to use good combustion operations to minimize the emissions of CO constitutes BACT for Recovery Boiler #6. The BACT emission limit has been established as 300 ppm at 8% O_2. The mill is proposing to install a CEMS for CO emissions on Recovery Boiler #6 to demonstrate continuous compliance with the BACT level. The use of continuous direct pollutant measurement will offer assurance of continuous compliance by the mill. The mill proposes compliance with the limit on a 30-day rolling average basis. By operating a CEMS, the mill will be assuring compliance during all operating conditions.

Summary – CO Control Technology Review for Recovery Boiler #6

To fulfill the PSD permitting requirements for CO, a BACT analysis was conducted for the modified Recovery Boiler #6. The BACT selection for Recovery Boiler #6 is summarized below in Table 4-9. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-9: BACT Summary for Recovery Boiler #6 - CO

Pollutant	Control Technology	Proposed BACT Limit
CO	Good combustion practices	300 ppm @ 8% O_2 (30-day rolling average basis)

Recovery Boiler #6 – VOC Emissions

Step 1: Identify all control technologies

The theory and operation of each available VOC control technology was discussed in detail in Recovery Boiler #5 BACT analysis for VOC.

Step 2: Eliminate technically infeasible options

As discussed in Recovery Boiler #5 BACT analysis for VOC, good combustion practice is considered the only demonstrated VOC reduction technology for use on a recovery furnace.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good combustion operations practices are considered the only feasible control method.

Step 4: Evaluating the Most Effective Controls and Documentation

The most effective control technology for minimizing VOC emissions from recovery furnaces is good combustion operation practices. Currently, Recovery Boiler #6 utilizes good combustion practices.

Step 5: Selection of BACT

As discussed in Recovery Boiler #5 BACT analysis for VOC, Table 4-5 of Application No. 16576 provides a listing of the VOC emissions limits for recovery furnaces in the RBLC. Currently there are no regulations that limit VOC emissions from recovery furnaces. BCI proposes VOC BACT to be defined as good combustion practices and an emission rate of 0.04 lb/MMBtu. Recovery Boiler #6 is utilized to combust the HVLC NCGs from the mill's washers, which would contribute to an increase in VOC loading to the furnace and could result in an increase in VOC emissions from the furnaces.

Conclusion – VOC Control

The Division has determined that BCI's proposal to use good combustion operations to minimize the emissions of VOC constitutes BACT for Recovery Boiler #6. The BACT emission limit has been established as 0.04 lb/MMBtu. Like CO, the amount of VOC emitted from a recovery furnace is a measure of the completeness of the combustion process occurring in the furnace. By ensuring sufficient oxygen content and good fuel and air mixing, the CO and VOC emissions from the boiler are expected to be below the proposed BACT emission levels. The proposed CEMS for CO will be considered a good representative surrogate for VOC emissions. BCI proposes to conduct a stack test for VOCs while operating the CO CEMS. If the mill demonstrates compliance with both the CO (through CEMS) and VOC emission limit during the test, then it is expected that compliance with the VOC emission limit will be maintained as long as compliance with the CO emission limit is maintained.

Summary – VOC Control Technology Review for Recovery Boiler #6

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for the modified Recovery Boiler #6. The BACT selection for Recovery Boiler #6 is summarized below in Table 4-10. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-10: BACT Summary for Recovery Boiler #6 - VOC

Pollutant	Control Technology	Proposed BACT Limit
VOC	Good combustion practices	0.04 lb/MMBtu

Recovery Boiler #6 – H_2S Emissions

Step 1: Identify all control technologies

The theory and operation of each available H_2S control technology was discussed in detail in Recovery Boiler #5 BACT analysis for H_2S.

Step 2: Eliminate technically infeasible options

As discussed in Recovery Boiler #5 BACT analysis for H_2S, an NDCE system that is designed for low odor emissions is very effective in the reduction of TRS emissions. Dry bottom ESPs have also been found to reduce TRS.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

As discussed in Recovery Boiler #5 BACT analysis for H_2S, the utilization of a NDCE design for recovery furnaces is most effective in the reduction of H_2S emissions. The use of caustic scrubbers for the reduction of H_2S has not been demonstrated on recovery furnaces. The mill also utilizes a dry ESP on Recovery Boiler #6.

Step 4: Evaluating the Most Effective Controls and Documentation

The most effective control technology for minimizing H_2S emissions from recovery furnaces is furnace design (NDCE system) and good operating practices. Recovery Boiler #6 utilizes a NDCE system and good operating practices.

Step 5: Selection of BACT

Table 4-6 of Application No. 16576 provides a listing of the TRS emissions limits for recovery furnaces listed in the RBLC. The only permit limit listed for H_2S is 4 ppm (Inland Paperboard and Packaging Inc. in Rome, Georgia), which operates a low odor design NDCE system design. BCI proposes BACT level for H_2S at 4 ppm @ 8% O_2, which matches the only BACT level currently listed in the RBLC.

Conclusion – H_2S Control

The Division has determined that BCI's proposal to use good combustion operations and a NDCE system to minimize the emissions of H_2S constitutes BACT for Recovery Boiler #6. The BACT emission limit has been established as 4 ppm @ 8% O_2. The existing TRS CEMS will be utilized to demonstrate compliance with the proposed H_2S BACT. The mill would propose to complete an initial stack test for H_2S and TRS emissions. This test will be used to establish the ratio of H_2S to TRS in the exhaust gas from Recovery Boiler #6. The TRS CEMS data and the established H_2S/TRS ratio will then be used to calculate the H_2S on a 12-hour average basis in order to demonstrate continued compliance with the H_2S emission limit on a 12-hour average basis.

Summary – H_2S Control Technology Review for Recovery Boiler #6

To fulfill the PSD permitting requirements for H_2S, a BACT analysis was conducted for the modified Recovery Boiler #6. The BACT selection for Recovery Boiler #6 is summarized below in Table 4-11. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-11: BACT Summary for Recovery Boiler #6 – H_2S

Pollutant	Control Technology	Proposed BACT Limit
H_2S	NDCE system and good operating practices	4 ppm @ 8% O_2 (12-hour average basis)

Lime Kiln #6

Lime Kiln #6 is a new unit. It burns natural gas, No. 6 fuel oil, tall oil, and petroleum coke. Emissions will be controlled by Lime Kiln #6 ESP for PM and Lime Kiln #6 Scrubber for TRS and SO_2. Primary emissions from Lime Kiln #6 are PM/PM_{10}, SO_2, NO_X, CO, VOC, TRS, and H_2S.

Only PM/PM_{10}, VOC, NO_X, CO, and H_2S emissions from Lime Kiln #6 were evaluated for BACT.

From an environmental perspective there is an advantage of burning petroleum coke in Lime Kiln #6 as opposed to a boiler. Petroleum coke is a by-product of the fuel oil distillation process and the use of this by-product offsets the use of fossil fuels that would otherwise be need in the kiln. By burning the material instead of disposing of it, landfill space is conserved. Furthermore, by burning the petroleum coke in a lime kiln, the sulfur contained in the fuel will be recovered inside the caustic environment in the lime kiln. This will allow the sulfur to reenter the pulp making process and allow for the beneficial use of the sulfur contained in the fuel. The unit will also operate a scrubber, which will provide additional SO_2 collection. There is a significant advantage of burning the petroleum coke in a lime kiln, where the sulfur contained in the fuel can be reused in the pulping process as opposed to use in a boiler at another facility where the sulfur contained in the petroleum coke could result in SO_2 emissions or a new waste stream.

Lime Kiln #6 – PM Emissions

Step 1: Identify all control technologies

The currently available PM controls include ESP, WESPs, and high efficiency wet scrubbers. The theory and operation of these control technologies was discussed in detail in the Recovery Boiler #5 BACT analysis for PM.

Step 2: Eliminate technically infeasible options

A venturi scrubber or a WESP or ESP would be technically feasible for control of PM emissions from Lime Kiln #6.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

The most efficient control technology for PM is an ESP, based on Table 4-7 of Application No. 16576.

Step 4: Evaluating the Most Effective Controls and Documentation

The units with the lowest emission rates are controlled by ESPs. No WESPs are listed in the RBLC.

Step 5: Selection of BACT

Table 4-7 of Application No. 16576 presents the results from the RBLC for PM/PM_{10} emissions from lime kilns. As shown, the PM emission rates vary from 0.01 gr/dscf to 0.15 gr/dscf. Lime Kiln #6 will burn petroleum coke, No. 6 fuel oil, tall oil, or natural gas to convert lime mud (calcium carbonate) to calcium oxide. Lime Kiln #6 will use an ESP followed by a venturi scrubber to control PM emissions. The most stringent PM emission rate which has been demonstrated is 0.01 gr/dscf @ 10% O_2. BCI proposes a BACT emission limit of 0.01 gr/dscf @ 10% O_2 for Lime Kiln #6.

Conclusion – PM Control

The Division has determined that BCI's proposal to use a dry ESP, followed by a venturi scrubber, to minimize the emissions of PM constitutes BACT for Lime Kiln #6. The BACT emission limit has been established as 0.01 gr/dscf @ 10% O_2. Compliance with PM emission limit will be demonstrated by the completion of a stack test after installation of the unit. During the stack test, the mill will establish a minimum secondary power for the ESP and minimum scrubbant recirculation rate, scrubbant supply pressure, and pH for the scrubber on a continuous basis. This is similar to the compliance currently used for the existing Lime Kiln #5 control systems.

Summary – PM Control Technology Review for Lime Kiln #6

To fulfill the PSD permitting requirements for PM, a BACT analysis was conducted for the new Lime Kiln #6. The BACT selection for Lime Kiln #6 is summarized below in Table 4-12. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-12: BACT Summary for Lime Kiln #6 - PM

Pollutant	Control Technology	Proposed BACT Limit
PM	Dry ESP followed by Wet Scrubber	0.01 gr/dscf @ 10% O_2

Lime Kiln #6 – NO_X Emissions

Step 1: Identify all control technologies

NO_X emissions result from the combustion of fuels in the lime kiln. Lime Kiln #6 will burn natural gas, No. 6 fuel oil, tall oil, or petroleum coke. The RBLC identifies NO_X controls utilized on the listed lime kilns as combustion controls which include the control of air and fuel mixtures. NO_X combustion control systems such as SCR, SNCR, and oxidation/reduction scrubbers have never been applied to lime kilns.

Step 2: Eliminate technically infeasible options

SCR has not been applied to lime kilns and the use of SNCR would result in the risk of product contamination. The use of ammonia injection in boilers does not raise a concern because excess ammonia is emitted out the boiler's exhaust. In the case of a lime kiln, however, excess ammonia could enter the lime, which in turn could contaminate the finished product (pulp used as diaper filling). SCR is not feasible because moisture in the exhaust gas and the wet particulate would quickly foul the catalyst bed. Good combustion control is considered the only technical feasible control for NO_X emissions from the lime kiln.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good combustion operation practices is considered the only remaining NO_X control technique.

Step 4: Evaluating the Most Effective Controls and Documentation

The most effective control technology for minimizing NO_X emissions is good combustion operation practices.

Step 5: Selection of BACT

Table 4-8 of Application No. 16576 provides a listing of the NO_X emissions limits for lime kilns found in the RBLC. The range of permitted emission limits are from 112 to 340 ppm NO_X @ 10% O_2. Several listed lime kilns are shown with lb/hr emission rates; however, without detailed stack exhaust data these emission rates could not be correlated into a NO_X concentration for comparison to the new lime kiln. The RBLC identifies the NO_X controls utilized on the listed lime kilns as combustion controls, which include the control of air and fuel mixtures and low NO_X burners.

As discussed previously, NO_X emissions come from a fuel bound component and a thermal NO_X component. The amount of NO_X from Lime Kiln #6 is expected to be significantly impacted by the nitrogen content of the fuel being burned. As a comparison, petroleum coke has roughly 7 times more fuel bound nitrogen as No. 6 fuel oil on a lb/MMBtu basis (1.4 lb/MMBtu vs. 0.2 lb/MMBtu).

There are only two mills listed in the clearinghouse that burn petroleum coke. These are the two kilns located at the Graymont Bellefonte Plant (#6 and #7 lime kilns) and the two kilns located at the Georgia Pacific mill in Port Hudson, Louisiana (#1 and #2 lime kilns). The #6 lime kiln at the Graymont site has been built, but its NO_X emissions have not been tested, therefore, its permitted emission rate is unproven. This unit was permitted with an emission rate of 205 lb/hr or 4.1 lb/ton CaO. The #1 lime kiln at the Georgia Pacific Port Hudson mill has undergone a single compliance stack test, which showed compliance with its 48.78 lb/hr (3.44 lb NO_X/ton CaO) emission limit. The actual achievable emission rate for the newly proposed kiln is expected to be contingent on the final source of the petroleum coke fuel burned and its nitrogen content.

The proposed NO_X BACT level for Lime Kiln #6 is 250 ppm NO_X @ 10% O_2 while firing pet coke, which is roughly equivalent to 4.1 lb NO_X/ton CaO and 145 lb NO_X/hr. As indicated by the results of the RBLC search, there is very little documented experience concerning what NO_X emissions would be expected from a lime kiln burning petroleum coke (a single test on one kiln). The proposed BACT limit is intended to allow for variations in the burner system and fuel, which would include variations in the nitrogen content of the fuels being burned which is outside the control of the mill. Pet coke firing in the lime kiln is typically substituted for gas or oil at a maximum of 80%. If the facility is not firing pet coke, BCI will accept a 150 ppm NO_X @ 10% O_2 limit. BCI has indicated that they will either operate with no pet coke, or will be operating at as close to 80% substation as possible while complying with the permit limits.

BCI acquired recent test data of lime kilns firing pet coke. In March 2006, GP-Monticello, MS tested a lime kiln with a throughput of 350 tons/day CaO and testing showed NO_X emissions of 304 ppm, or 79 lb/hr, at 73% pet coke substitution. This lime kiln does not have a NO_X monitor. Additionally, in April 2006, GP-Port Hudson, LA tested a lime kiln with a throughput of 252 tons/day CaO and testing showed NO_X emissions of 245 ppm, or 31 lb/hr, at 75% pet coke substitution. These results indicate that the proposed limit while firing pet coke is reasonable, if not even low, based on BCI's proposed lime throughput of 850 tons/day. Additionally, since it appears that the ppm, lb/hr, and lb/CaO limits do not directly correlate, a NO_X limit of 145 lb/hr while firing pet coke will be included in the permit.

In order to ensure continuous compliance with the BACT limit it is proposed that the mill install a NO_X CEMS in order to document continuous compliance on a 30-day rolling average basis. This will ensure that adjustments in the fuel and air systems can be made whenever required in order to achieve compliance with the BACT limit. Lime Kiln #6 will burn a mix of fuels; therefore, the NO_X CEMS will provide immediate feedback to kiln operators so that adjustments can be made to maintain compliance with the NO_X emission limit.

Conclusion – NO_X Control

The Division has determined that BCI's proposal to use good operating practices, including staged combustion to minimize the emissions of NO_X constitutes BACT for Lime Kiln #6. The BACT emission limit has been established as 250 ppm at 10% O_2 while firing pet coke. When not firing pet coke, the facility has accepted a 150 ppm at 10% O_2. BCI proposes to install a NO_X CEMS on the new Lime Kiln #6 to maintain compliance with the proposed NO_X emission limit. The mill will demonstrate compliance on a 30-day rolling average basis as proposed in the BACT analysis section. During initial performance testing, the facility will determine the maximum amount of pet coke that will be fired.

Summary – NO_X Control Technology Review for Lime Kiln #6

To fulfill the PSD permitting requirements for NO_X, a BACT analysis was conducted for the new Lime Kiln #6. The BACT selection for Lime Kiln #6 is summarized below in Table 4-13. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-13: BACT Summary for Lime Kiln #6 - NO_X

Pollutant	Control Technology	Proposed BACT Limit
NO_X	Good combustion practices	250 ppm @ 10% O_2 (30-day rolling average basis) while firing pet coke – 145 lb/hr NO_X emissions 150 ppm @ 10% O_2 (30-day rolling average basis) while firing fuels other than pet coke

Lime Kiln #6 – CO Emissions

Step 1: Identify all control technologies

CO emissions result from incomplete combustion, so they can typically be minimized through the use of good combustion practices including assuring sufficient air to fuel ratios. The use of oxidation technologies have been applied to reduce CO emissions. The theory and operation of each available CO control technology was discussed in detail in Recovery Boiler #5 BACT analysis for CO.

Step 2: Eliminate technically infeasible options

CO emissions are best controlled through the utilization of good combustion controls, which include proper air to fuel mixture in the fuel burner. Good combustion controls will assure that sufficient air and fuel mixtures are supplied to the kiln to ensure complete combustion occurs and the CO emissions are minimized. The utilization of an oxidation technology would not be practical because of the high temperatures that are required and the emissions that would result from additional fuel utilization.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good combustion operations practices are considered the only feasible control method.

Step 4: Evaluating the Most Effective Controls and Documentation

The most effective control technology for minimizing CO emissions from lime kilns is good combustion operation practices.

Step 5: Selection of BACT

Table 4-9 of Application No. 16576 provides a listing of the CO emissions limits and controls that are currently in place for the lime kilns in the RBLC. The range of permitted emission limits are from 45 ppm to 1,400 ppm. All units utilize good combustion control for CO emissions. After verifying the clearinghouse data, it was found that most of the units have not been tested for CO emissions. The ones that had been tested only burned natural gas and No. 2 fuel oil, whereas the proposed lime kiln will burn petroleum coke, No. 6 fuel oil, tall oil, and natural gas. The two petroleum coke fired units at Georgia Pacific Port Hudson were permitted at 1.12 lb CO/ton CaO and the two units at the Graymont Bellefonte plant were permitted at 28.6 and 41.1 lb CO/ton CaO. Brunswick proposes using good combustion practices and an emission rate of 1.12 lb CO/ton CaO to match the lowest of these permitted emission rates. This equates to a CO emission rate of 115 ppm CO @ 10% O_2, which is lower than the majority of the units listed in the RBLC on a concentration basis.

Conclusion – CO Control

The Division has determined that BCI's proposal to use good combustion operations to minimize the emissions of CO constitutes BACT for Lime Kiln #6. The BACT emission limit has been established as 1.12 lb CO/ton CaO. The mill is proposing to install a CEMS for CO emissions on Lime Kiln #6 to demonstrate continuous compliance with the BACT levels. The use of continuous direct pollutant measurement will offer assurance of continuous compliance by the mill. The mill would propose compliance with the limit on a 30-day rolling average basis. By operating a CO CEMS, the mill will be assuring compliance during all operating conditions.

Summary – CO Control Technology Review for Lime Kiln #6

To fulfill the PSD permitting requirements for CO, a BACT analysis was conducted for the new Lime Kiln #6. The BACT selection for Lime Kiln #6 is summarized below in Table 4-14. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-14: BACT Summary for Lime Kiln #6 - CO

Pollutant	Control Technology	Proposed BACT Limit
CO	Good combustion practices	1.12 lb/ton CaO (30-day rolling average basis)

Lime Kiln #6 – VOC Emissions

Step 1: Identify all control technologies

VOC emissions result from incomplete combustion, therefore, they can typically be minimized through the use of good combustion practices including assuring sufficient air to fuel ratios. The use of oxidation technologies have been applied to reduce VOC emissions.

Step 2: Eliminate technically infeasible options

VOC emissions are best controlled through the utilization of good combustion controls, which include proper air to fuel mixture in the fuel burner. Good combustion controls will assure that sufficient air and fuel mixtures are supplied to the kiln to ensure complete combustion occurs and the VOC emissions are minimized. The utilization of an oxidation technology would not be practical because of the high temperatures that are required and the emissions that would result from additional fuel utilization.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good combustion operations practices are considered the only feasible control method.

Step 4: Evaluating the Most Effective Controls and Documentation

As specified, the most effective control technology for minimizing VOC emissions from lime kilns is good combustion operation practices.

Step 5: Selection of BACT

Table 4-10 of Application No. 16576 provides a listing of the VOC emissions limits and controls that are currently in place for the lime kilns in the RBLC. The range of permitted emission limits are from 25 to 185 ppm. All units utilize good combustion control for VOC emissions. After verifying the clearinghouse data, it was found that most of the units have not been tested for VOC emissions. The ones that had been tested only burned natural gas and No. 2 fuel oil, whereas the proposed lime kiln will burn petroleum coke, No. 6 fuel oil, tall oil, and natural gas. The proposed BACT limit for VOC is 25 ppm @ 10% O_2, which matches the lowest permitted concentration level in the RBLC.

Conclusion – VOC Control

The Division has determined that BCI's proposal to use good combustion operations to minimize the emissions of VOC constitutes BACT for Lime Kiln #6. The BACT emission limit has been established as 25 ppm at 10% O_2. The mill is proposing to install a CO CEMS on Lime Kiln #6 to demonstrate continuous compliance with the CO BACT levels. VOC and CO emissions are both reflective of good combustion practices; therefore, the CO CEMS will also insure VOC emissions are minimized. The mill proposes to conduct a stack test to ensure that VOC compliance is maintained when CO compliance is being achieved.

Summary – VOC Control Technology Review for Lime Kiln #6

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for the new Lime Kiln #6. The BACT selection for Lime Kiln #6 is summarized below in Table 4-15. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-15: BACT Summary for Lime Kiln #6 - VOC

Pollutant	Control Technology	Proposed BACT Limit
VOC	Good combustion practices	25 ppm @ 10% O_2

Lime Kiln #6 – H_2S Emissions

Step 1: Identify all control technologies

H_2S in the form of TRS emissions are emitted from the lime kiln. These emissions originate from the small amount of cooking liquor still present in the lime mud that is feed to the kiln. For the most part, this TRS is oxidized in the kiln and is emitted as SO_2, which, in turn, is scrubbed out in the scrubber. The TRS leaving the kiln is predominately H_2S but also contains a small percentage of organic TRS. The ratio of organic TRS to H_2S emissions depends on liquor quality and how well the lime mud is washed and thusly can vary daily. The primary control device for TRS is the kiln itself. The kiln operates at very high temperatures in order to calcine the lime mud to form quick lime. In so doing, any TRS present in the mud is typically oxidized to form SO_2. The kiln then serves as both as a piece of production equipment and as well as an oxidizer. The facility has proposed two control devices for the new lime kiln - a scrubber followed by an ESP. The primary function of the scrubber is to remove particulate and sulfur dioxide formed in the kiln. The scrubber removes a small amount of H_2S but has no affect on TRS. The only function of the ESP is to remove residual particulate leaving the scrubber. No other control options are feasible. Further oxidation of the gases would have very little benefit since the products of combustion (NO_X and SO_2) would be greater than the small amount of TRS that would be reduced. Further scrubbing is not feasible either since the primary scrubber utilizes an alkaline scrubbing medium, which is as effective as possible for removing acid gases.

Option 1: Efficient lime mud washing
Option 2: Proper operation of the lime kiln
Option 3: Additional oxidization technologies
Option 4: Additional scrubbing

Step 2: Eliminate technically infeasible options

Further scrubbing and an additional oxidizer are not technically feasible options.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Efficient lime mud washing and proper operation of the kiln to maintain a good oxidizing atmosphere are considered the best control for H_2S emissions from the lime kiln.

Step 4: Evaluating the Most Effective Controls and Documentation

Table 4-19 of Application No. 16576 provides a current listing of kiln BACT decisions taken from the RBLC. There is no listing for H_2S, only TRS as a generic group is listed, although several of the listing state “TRS reported as H_2S”. Where TRS was not reviewed but the Kiln was reviewed for other pollutants the table states “no listing” (for TRS). The majority of the listings report 8 ppm @ 10% O_2 but several listings report 20 ppm as BACT presumably because these are rebuilt kilns as opposed to new designs. The lowest concentration listed is 8 ppm.

Step 5: Selection of BACT

The RBLC does not include any listings for H_2S emissions. Additionally, there is no existing relational data for H_2S and TRS. It is suspected that most of the TRS is composed of H_2S. The lowest TRS limit in the RBLC is 8 ppm @ 10% O_2. Lime Kiln #6 is subject to a limit of 8 ppm TRS @ 10% O_2 under NSPS Subpart BB. The mill proposes to meet this same limit for H_2S and proposes to operate a TRS CEMS (as required by NSPS) to demonstrate continuous compliance with the limit. Part of the mill optimization is an upgrade to the entire causticizing area so residual H_2S in the lime mud should be minimized as much as possible since the new equipment will be state of the art. The use of good operational practices (efficient lime mud washing) in the lime kiln will ensure that TRS emissions entering the kiln are minimized. Additionally, operating the kiln so that a proper oxidizing atmosphere is maintained (typically excess O_2 greater than 0. 5%) will minimize H_2S emissions.

Conclusion – H_2S Control

The Division has determined that BCI’s proposal to use good operational practices (efficient lime mud washing) to minimize the emissions of H_2S constitutes BACT for Lime Kiln #6. The BACT emission limit has been established as 8 ppm @ 10% O_2. The facility will conduct a test for H_2S emissions while operating the TRS CEMS in order to prove compliance with the limit. A TRS CEMS will be utilized to demonstrate compliance with the proposed H_2S BACT limit. Compliance will be demonstrated on a 12-hour average as is required by 40 CFR 60 Subpart BB for TRS emissions.

Summary – H_2S Control Technology Review for Lime Kiln #6

To fulfill the PSD permitting requirements for H_2S, a BACT analysis was conducted for the new Lime Kiln #6. The BACT selection for Lime Kiln #6 is summarized below in Table 4-16. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-16: BACT Summary for Lime Kiln #6 – H_2S

Pollutant	Control Technology	Proposed BACT Limit
H_2S	Good operating practices (efficient lime mud washing)	8 ppm @ 10% O_2 (12-hour average basis)

Lime Slaker #3

Lime Slaker #3 is a new unit. PM Emissions will be controlled by Lime Slaker #3 Scrubber. Primary emissions from Lime Slaker #3 are PM/PM_{10} and VOC.

Only PM/PM_{10} and VOC emissions were evaluated for BACT from Lime Slaker #3.

Lime Slaker #3 – PM Emissions

Step 1: Identify all control technologies

The currently available PM controls include baghouses, ESPs, WESPs, and high efficiency wet scrubbers. The theory and operation of these control technologies was discussed in detail in the Recovery Boiler #5 BACT analysis for PM.

Step 2: Eliminate technically infeasible options

A venturi scrubber would be technically feasible for control of PM from the lime slaker. This is the same technology utilized for the existing lime slakers at the mill. It is expected that because of the high moisture content of the off gases that a baghouse would not be practical for operation on a lime slaker. The moisture would cause blinding of the baghouse and prevent collected material from being shaken free from the bag. An ESP or WESP would also likely have difficulty with the very high moisture content of the gases leaving the slaker. It is likely that the moisture would cause the build-up of solid material on the plates, which would prevent the unit from working properly.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

The only proven control device in place on lime slakers are wet scrubbers. As noted previously, neither a baghouse, ESP, nor WESP would be a technically feasible option.

Step 4: Evaluating the Most Effective Controls and Documentation

Wet scrubbers are the most effective PM emission controls for lime slakers.

Step 5: Selection of BACT

Table 4-11 of Application No. 16576 presents the results from the RBLC search completed for PM emissions from lime slakers. The only two units in the RBLC with emission limits are shown at 0.07 and 0.11 lb/ton CaO; both controlled by wet scrubbers. The mill plans to install a new scrubber on new Lime Slaker #3. Based on available emission factors it is expected that the mill can achieve a proposed PM BACT emission rate of 0.07 lb/ton CaO for the new lime slaker.

Conclusion – PM Control

The Division has determined that BCI's proposal to use a venturi scrubber to minimize the emissions of PM constitutes BACT for Lime Slaker #3. The BACT emission limit has been established as 0.07 lb/ton CaO. BCI proposes to maintain the scrubbant flow rate at the rate determined by performance testing in order to assure consistent compliance with the proposed PM emission limit.

Summary – PM Control Technology Review for Lime Slaker #3

To fulfill the PSD permitting requirements for PM, a BACT analysis was conducted for the new Lime Slaker #3. The BACT selection for Lime Slaker #3 is summarized below in Table 4-17. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-17: BACT Summary for Lime Slaker #3 - PM

Pollutant	Control Technology	Proposed BACT Limit
PM	Wet Scrubber	0.07 lb/ton CaO

Lime Slaker #3 – VOC Emissions

Step 1: Identify all control technologies

Oxidation technologies could be utilized on the lime slaker exhaust stream.

Step 2: Eliminate technically infeasible options

Though technically feasible, the use of oxidation technology on the lime slaker to control VOC emissions is not practical because of the very low amount of emissions involved.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

There are no economically reasonable control technologies for VOC controls from slakers.

Step 4: Evaluating the Most Effective Controls and Documentation

No VOC controls are considered economically reasonable for the proposed lime slaker. Through sampling on similar lime slakers, NCASI has determined VOC emissions to 0.041 lb/ton CaO. The total emissions from the new slaker are estimated at 3 tpy, which are not large enough to warrant the high capital cost of the installation of a VOC control device and the associated energy costs. An evaluation completed by NCASI as part of the development of 40 CFR 63 Subpart S concluded that the annualized costs associated with the collection of similar emissions from a black liquor oxidation system for combustion in a boiler on site would be up to $1,300,000 per year. This estimate included the piping, fans, condensers, and safety related equipment such as flame arrestors and rupture discs for a vapor collection and transport system. A slaker exhaust collection system would likely result in lower costs due to a lower exhaust flow rate; however, much of the same equipment would be required as in the case of the black liquor oxidation system. The original industry estimate was scaled up for the size of the mill involved and then scaled down to the exhaust flow rate for the slaker. This resulted in an estimated annualized cost of $60,000 per year to operate such a system on the new lime slaker. With an estimated annual emission rate of 3 tpy of VOCs, this would equate to a cost of $20,000 per ton of VOC reduced, which would not be considered cost effective. Additionally, there are no existing slakers with control devices for VOC emissions.

Step 5: Selection of BACT

There are no VOC emission limits listed in the RBLC for lime slakers. The NCASI factor of 0.041 lb/ton CaO equates to approximately 3 tpy. This insignificant emissions level will be maintained by ensuring that only fresh water (not process condensates) will be used in making up lime in the slakers.

Conclusion – VOC Control

The Division has determined that no additional control technologies are needed to meet the requirements of BACT for Lime Slaker #3. Because no VOC controls are in place, no additional monitoring is considered warranted.

Summary – VOC Control Technology Review for Lime Slaker #3

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for the new Lime Slaker #3. The BACT selection for Lime Slaker #3 is summarized below in Table 4-18. No applicable emission limit was found in the RBLC regarding VOC emission limits for lime slakers.

Table 4-18: BACT Summary for Lime Slaker #3 - VOC

Pollutant	Control Technology	Proposed BACT
VOC	None	Good Operating Practices - Use of fresh water in operations

Caustisizing Area

The only emissions from the Caustisizing Area – the Recaustisizer, Green Liquor Clarifier, and Mud Washer - are VOC.

Caustisizing Area – VOC Emissions

Step 1: Identify all control technologies

The recaustisizer, green liquor clarifier, and lime mud washer are all small sources of VOC emissions. Because they are located in the same area of the mill, they were evaluated together for the BACT assessment. Oxidiation technologies could be utilized on these caustisizer-area exhaust streams. If an oxidation technology was utilized, it is expected that a centralized collection system would be installed to combust the gases in an existing combustion unit (boiler or lime kiln).

Step 2: Eliminate technically infeasible options

None are eliminated.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Oxidation technologies are technically feasible to control VOC emissions from recaustisizers, green liquor clarifiers, and lime mud washers.

Step 4: Evaluating the Most Effective Controls and Documentation

Though technically possible, the use of oxidation technology on these three caustisizing area sources to control VOC emissions would not practical because of the very small amount of emissions involved. An evaluation completed by the pulp and paper industry as part of the development of 40 CFR 63 Subpart S concluded that the annualized costs associated with the collection of similar emissions from a black liquor oxidation system for combustion in a boiler on site would be up to $1,300,000 per year. Based on the size of BCI and the estimated flow rate for the three exhaust streams, this would equate to an estimated annualized cost of $430,000 per year for the collection of the off-gases form these three sources. Combined, the source would be expected to emit a total 4.6 tons per year of VOC, which would equate to an estimated VOC control cost of $93,000/ton VOC reduced, which is not considered cost effective.

Step 5: Selection of BACT

Of the three above-listed caustisizing units, only one is listed in the RBLC. A green liquor clarifier is permitted for International Paper located in Mansfield, LA at 2.1 lb/hr VOC or 0.21 lb VOC/ton CaO and had no emission controls. There are no VOC emission limits listed in the RBLC for a recaustisizer or lime mud washer.

The NCASI factors for the recaustisizer, green liquor clarifier, and lime mud washer are 8.3 E-4 lb/ton CaO, 0.066 lb/ton CaO, and 0.012 lb/ton CaO, respectively. Based on an increased lime production of 310,250 tpy, this equates to a total of 12.23 tpy for all three casutisizing units. This insignificant emissions level will be maintained by ensuring that only fresh water (not process condensates) will be used in these casutisizing operations.

Conclusion – VOC Control

The Division has determined that no additional control technologies are needed to meet the requirements of BACT the Caustisizing Area. Because no VOC controls are in place, no additional monitoring is considered warranted.

Summary – VOC Control Technology Review for Caustisizing Area

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for the new Caustisizing Area. The BACT selection for the Caustisizing Area is summarized below in Table 4-19. No applicable emission limits were found in the RBLC regarding VOC emissions from the caustisizing operations.

Table 4-19: BACT Summary for Caustisizing Area - VOC

Pollutant	Control Technology	Proposed BACT Limit
VOC - Recausticizer	None	Good Operating Practices - Use of fresh water in operations
VOC – Green Liquor Clarifier	None	Good Operating Practices - Use of fresh water in operations
VOC – Mud Washer	None	Good Operating Practices - Use of fresh water in operations

Bleach Plant #4

Bleach Plant #4 is a new unit. Emissions will be controlled by Bleach Plant #4 Scrubber. Primary emissions from Bleach Plant #4 are CO and VOC. Only these emissions were evaluated for BACT.

Bleach Plant #4 –CO Emissions

Step 1: Identify all control technologies

CO emissions could theoretically be controlled through oxidation technologies.

Step 2: Eliminate technically infeasible options

An oxidizer (which could include a RTO or catalytic oxidizer) could technically be utilized for the control of CO emissions from the bleach plant. Such control technology has not been applied to bleach plants and in fact may not be feasible because of the small amount of Cl_2 and ClO_2 at elevated temperatures may cause extreme corrosive conditions that would reduce the life of the unit. The use of an oxidizer would result in significant fuel requirements and would result in additional emissions, including NO_X. The presence of chlorine compounds in the vent stream could potentially result in even more harmful toxic compounds emitted from the oxidizer. Because the technology is unproven on bleach plants and significant environmental issues could arise as well as higher fuel usage would result, the use of oxidation technology was not evaluated further.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

There are no technically and/or economically reasonable control technologies for CO controls for bleach plants.

Step 4: Evaluating the Most Effective Controls and Documentation

There are no documented controls for CO emissions for bleach plants.

Step 5: Selection of BACT

Table 4-12 of Application No. 16576 provides a summary of the CO emission rates listed in the RBLC for bleach plants. Because there are no proven controls that could be applied to control CO emissions without significant environmental and energy impacts, the proposed BACT level is based on the reasonably expected emission rates for the bleach plant with no additional emission controls. These estimates are based on emission studies completed by NCASI (Technical Bulletin No. 760). These studies have found that the amount of CO emissions vary significantly depending upon the sequence of chemicals used in the bleaching process. The NCASI study included 34 separate CO stack tests at different bleach plants with varying bleaching sequences and feedstock. This study found CO emissions varied from 0.20 to 1.69 lb/ODTP. In addition to the bleaching sequence, the type of wood furnish used for producing pulp also appears to impact CO emissions, with softwood resulting in higher emissions than hardwood.

The variation in CO levels is related only to the process and no add-on technology. Since the process type is unique for every type of product, the selection of a pulping process can not be considered in determining BACT. No bleach plants have been identified that operate add-on controls for CO emissions and oxidization controls are considered to be technically feasible, but even if they were additional pollutants would be formed which have a more severe environmental impact, such as NO_X and chlorinated toxic compounds. BACT is determined to be no control with an emission limit equal to that for a comparable process.

The proposed CO BACT limit for the bleach plant is 1.69 lb/UODTP (unbleached oven-dried tons per day). This limit is based on testing conducted on bleach plants with similar bleaching sequences that are utilized at BCI. As indicated in Table 4-12, there are two kraft paper mills in the RBLC with CO emission levels below the proposed level on a lb/UODTP basis (Georgia Pacific in Port Hudson, LA and in Palatka, FL). Discussions with the Port Hudson environmental manager have indicated that the permitted levels were based on data taken from the same previously referenced NCASI technical bulletin and that the mill has not conducted stack testing of their bleach plants to verify the permitted levels, so these levels are unproven. According to the state permit engineer, the Georgia Pacific mill in Palatka, FL was originally permitted at a CO emission rate of 46 lb/hr (1.4 lb/UODTP) as listed in the RBLC; however, testing indicated that this level could not be achieved. The permit limit was therefore increased to 100 lb/hr (2.2 lb/UODTP), which is higher than the proposed BACT emission level for the Brunswick bleach plant. The only CO emission limit in the RBLC that is lower than the proposed value is untested.

Conclusion – CO Control

The Division has determined that no additional control technologies are needed to meet the requirements of BACT for Bleach Plant #4. The BACT emission limit for CO from Bleach Plant #4 has been established as 1.69 lb/UODTP. Because no CO emission controls are proposed and additional controls are not justified by BACT, no monitoring for CO emissions is needed. The facility will conduct a test to determine CO emissions upon startup of the new bleach plant.

Summary – CO Control Technology Review for Bleach Plant #4

To fulfill the PSD permitting requirements for CO, a BACT analysis was conducted for the new Bleach Plant #4. The BACT selection for Bleach Plant #4 is summarized below in Table 4-20. The emission limit selected is representative of proven PSD BACT determination levels published in the RBLC.

Table 4-20: BACT Summary for Bleach Plant #4 - CO

Pollutant	Control Technology	Proposed BACT Limit
CO	None	1.69 lb/UODTP

Bleach Plant #4 –VOC Emissions

Step 1: Identify all control technologies

A small amount of VOC emissions are emitted from the bleach plant vents. The purpose of the bleach plant is to chemically oxidize the organic compounds in the pulp. In so doing, a small volatile fraction is vented with the exhaust gas. Both caustic and pulping chemicals are added to the bleach plant scrubber in order to chemically adsorb Cl_2 and ClO_2. By maintaining an oxidation potential in the scrubber, any VOC compounds that are adsorbed as well are also oxidized. The only other potential add-on control is for the VOC emissions to be further controlled through oxidation technologies.

Step 2: Eliminate technically infeasible options

An oxidizer (which could include a RTO or catalytic oxidizer) could technically be utilized for the control of VOC emissions from the bleach plant. See the discussion of oxidization technologies in Step 2 for H_2S emissions from Bleach Plant #4 above.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

There are no technically and/or economically reasonable control technologies for VOC controls for bleach plants.

Step 4: Evaluating the Most Effective Controls and Documentation

There are no documented controls for VOC emissions for bleach plants.

Step 5: Selection of BACT

Table 4-13 of Application No. 16576 provides a summary of the VOC emission rates listed in the RBLC for bleach plants. Because there are no proven controls that could be applied to control VOC emissions without significant environmental and energy impact, the proposed BACT level is based on the reasonably expected emission rates for the bleach plant with no additional emission controls. These estimates are based on emission studies completed by NCASI (Technical Bulletin No. 760). These studies have found that the amount of VOC emissions vary significantly depending upon the sequence of chemicals used in the bleaching process.

No bleach plants have been identified that operate additional controls for VOC emissions. If oxidization controls were utilized, additional higher priority pollutants, such as NO_X emissions, would result. In addition, the combustion of the exhaust stream could result in other more harmful toxic compounds. The use of oxidation technology would also result in additional energy consumption.

The proposed VOC BACT limit for the bleach plant is 0.092 lb/ADTP. This limit is based on testing conducted on bleach plants with similar bleaching sequences that are utilized at BCI. In the case of VOC emissions, of the three bleach plants listed in the RBLC, only one was built. The permitting engineer for the constructed bleach plant indicated that the permit does not contain a VOC emission limit.

Conclusion – VOC Control

The Division has determined that no additional control technologies are needed to meet the requirements of BACT for Bleach Plant #4. The VOC BACT emission limit for Bleach Plant #4 has been established as 0.092 lb/ADTP. Monitoring of the oxidation/reduction potential of the scrubber liquor is proposed as the BACT requirement for VOC emissions to ensure that the scrubber is operated at an optimum level to destroy any absorbed organic compounds.

Summary – VOC Control Technology Review for Bleach Plant #4

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for the new Bleach Plant #4. The BACT selection for Bleach Plant #4 is summarized below in Table 4-21. No applicable emission limits were found in the RBLC regarding VOC emissions from the bleach plant.

Table 4-21: BACT Summary for Bleach Plant #4 - VOC

Pollutant	Control Technology	Proposed BACT Limit
VOC	None	0.092 lb/ADTP

Primary and Backup Incinerators

The Primary and Backup Incinerators are existing units. Primary emissions from the Incinerators are PM, NO_X, H_2SO_4, SO_2, and VOC.

The mill currently operates the incinerators for the combustion of the LVHC NCGs generated at the mill. This includes off-gases from the mill's digesters and evaporators as well as from the wastewater stripper. Both incinerators operate scrubbers (Source Codes: RIS2 and RIS1) for the control of SO_2 emissions generated from the combustion of TRS gases contained in the NCGs. The incinerators burn a liquid methanol stream, which is generated by the wastewater stripper and natural gas or No. 2 fuel oil (only the back-up unit burns fuel oil) for fuel. Though the backup incinerator only burns NCGs when the primary incinerator is unavailable, the unit continuously burns a liquid methanol stream so that it is at or near operating temperature when it is required to burn the NCG stream.

The mill does not plan any modifications to the incinerators as part of the proposed optimization project. The project does, however, include the installation of a new larger wastewater stripper, which will allow the mill to collect and treat additional wastewater streams. This larger stripper will provide the mill with greater assurances of maintaining compliance with the condensate collection and treatment portion of 40 CFR63 Subpart S. The increased loading to the stripper will result in an increase in the stripper off-gases (SOGs) and liquid methanol streams to the incinerator. The increase in pulp throughput from the optimization project is also expected to result in a proportional increase in the generation of NCGs.

The primary incinerator currently has limits for PM, SO_2, VOC, H_2SO_4 and NO_X, while the back-up incinerator has a SO_2 and NO_X limit. It is expected that the mill will be able to maintain compliance with the existing PM, VOC, H_2SO_4, and SO_2 emission limits, however, the increased loading to the incinerators is expected to result in an increase in NO_X emissions above their corresponding NO_X emission limit. The NO_X emissions from the incinerators are currently limited by Permit Condition 3.2.16 to 215.5 ton/yr from both units combined. It is expected that this limit will be exceeded after the increased utilization, so a permit increase in emissions is being sought. Since the existing limit was taken as a PSD avoidance limit, lifting it requires a BACT assessment. A BACT analysis has been prepared for NO_X emissions from the primary and backup incinerators in order to increase this emission limit.

Primary and Backup Incinerators –NO_X Emissions

Step 1: Identify all control technologies

The NO_X technologies evaluated for this BACT assessment include SCR and SNCR systems. The theory behind these technologies was discussed in detail in Recovery Boiler #5 BACT section. The primary fuel for both the primary and backup incinerators is liquid methanol. Natural gas is also burned in the units (the backup incinerator also burns No. 2 fuel oil), but methanol provides the primary fuel.

Step 2: Eliminate technically infeasible options

The use of either SCR or SNCR has been demonstrated on similar incinerator systems at chemical processing plants. SNCR technology has been demonstrated in boiler operations; however, it is uncertain how ammonia injection in this pulp mill NCG incinerator could impact its operation and if NO_X emissions would be reduced. Testing conducted by NCASI has shown that SOG streams contain ammonia, which is partially converted to NO_X in an oxidizer. The injection of ammonia in the oxidizers as is done with the SNCR could result in an increase rather than a decrease in NO_X emissions. Because this technology is unproven in this application, SNCR was eliminated as not being technically achievable.

SCR is a flue gas treatment and, though not proven on oxidizers similar to those in operation at BCI, the technology could potentially be applied. One significant hurdle to the use of SCR technology on these oxidizers would be that the off-gases entering the SCR must be in the 500˚F to 800˚F range in order for the catalyst to be effective. After exiting the scrubber, the incinerators' exhaust temperatures are roughly 170˚F. The gases would need to be reheated to at least 500˚F in order to be effectively treated using the SCR technology. This would require significant energy costs from increased natural gas usage and environmental costs (and cause an increase in NO_X and other products of combustion). Based on its unproven nature, SCR was not considered further in the BACT analysis.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

No emission controls for NO_X are in place for the oxidizers listed.

Step 4: Evaluating the Most Effective Controls and Documentation

There are no documented controls for NO_X emissions, and the use of SCR is not technically proven.

Step 5: Selection of BACT

Table 4-15 of Application No. 16576 provides a summary of the NO_X emission rates listed in the RBLC. The proposed BACT limit for each the primary and backup incinerators is 0.456 lb/ADTP. Based on the expected utilization of each unit, this will result in an annual emission rate of 250 ton/yr from the primary and back up incinerators. Typically, the backup incinerator is used infrequently to burn NCGs; however, the unit must continually burn liquid methanol fuel in order for it to maintain its temperature and be ready to be put into service at anytime. Its total annual emissions are not expected to exceed 100 tpy. This value is intended to allow for both the increase in loading of SOG loading and methanol from the new stripper as well as the proportional increase in loading due to the increase in pulping production.

Of the units listed in the RBLC, the Stone Container Corporation mill in Hodge, LA is the only mill identified as combusting LVHC NCGs and SOGs. This unit was permitted at 41.6 lb NO_X/hr, which based on the mill's production capacity of 2,200 ADTPD, is equivalent to 0.45 lb/ADTP. This value is roughly equivalent to the proposed BCI BACT limit of 0.456 lb NO_X/ADTP. The BCI incinerators differ from the Stone Container oxidizer in that they burn liquid methanol as a fuel, as well as NCGs and SOGs. The combustion of the liquid methanol contributes to roughly half the NO_X emission rate from the units; therefore, it would be expected that the unit would potentially have a higher NO_X emission rate than that permitted at the Stone Container Corporation mill. The proposed BACT emission limit does closely match the NO_X emission rate permitted for the only other unit in the RBLC, which burns both NCGs and SOGs.

Conclusion – NO_X Control

The Division has determined that no additional control technologies are needed to meet the requirements of BACT for the Incinerators. The BACT emission limit for each of the Primary and Backup Incinerators has been proposed as 0.456 lb/ADTP. The mill would propose to conduct stack testing of the units to demonstrate compliance with the proposed emission limit.

Summary – NO_X Control Technology Review for Primary and Backup Incinerators

To fulfill the PSD permitting requirements for NO_X, a BACT analysis was conducted for the Primary and Backup Incinerators. The BACT selection for the Primary and Backup Incinerators is summarized below in Table 4-22. The emission limit selected is representative of proven PSD BACT determination levels published in the RBLC.

Table 4-22: BACT Summary for Primary and Backup Incinerators - NO_X

Pollutant	Control Technology	Proposed BACT Limit
NO_X	None	0.456 lb/ADTP for each unit

Nos. 3, 4, and 5 Paper Machines

The Nos. 3, 4, and 5 Paper Machines are existing units. There are no associated air pollution control devices. The proposed project calls for the upgrade of each of the three paper machines. The paper machines are sources of VOCs emissions and potentially small amounts of PM emissions. The pulp supplied to the paper machines contains organic components that can be emitted to the atmosphere during the paper making process. In particular, the drying steps can subject the pulp to high temperatures, which can cause some of the organics to be emitted.

Nos. 3, 4, and 5 Paper Machines –VOC Emissions

Step 1: Identify all control technologies

VOC emissions could theoretically be controlled through oxidation technologies.

Step 2: Eliminate technically infeasible options

An oxidizer could technically be utilized for the control of VOC emissions from the paper machines, though such control technology has never been applied to paper machines.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

An oxidizer is the only technically feasible control technology.

Step 4: Evaluating the Most Effective Controls and Documentation

There are no documented controls for VOC emissions. Oxidation technology has been shown to be uneconomical. The use of an oxidizer would result in significant fuel requirements and would result in additional secondary emissions of pollutants including NO_X emissions. The most energy efficient oxidation technology that could be applied would be an RTO. An economic analysis for installing an RTO was completed to evaluate the potential costs involved. Costs are largely dependent upon the exhaust flow rates from a system, and because of the large size of a paper machines and the large volume of exhaust air, the costs would be significant. The EPA costs estimating spreadsheet for RTOs and estimated flow rates from the paper machine vents was used to estimate the costs of operating an RTO on the exhaust gases from the paper machines.

Table 4-16 (page 4-62) of Application No. 16576 provides the estimated reduction in VOC emissions from each paper machines, the estimated costs for an RTO on each machine, and the overall cost benefits ($/ton reduced) for installing the control equipment.

As indicated, the installation of an RTO on a paper machine far exceeds the levels that would be considered cost effective ($188,000/ton for all 3 paper machines). Therefore, the use of an RTO is not considered BACT because of the high costs, significant increase in energy consumption (natural gas and electricity usage by the RTO), and the significant increase in NO_X emissions that would result from the combustion of natural gas in the RTO.

Step 5: Selection of BACT

Table 4-17 of Application No. 16576 provides a summary of the VOC emission rates listed in the RBLC. The information known about the amount of VOCs emitted from linerboard machines is limited to stack testing conducted by NCASI. This testing has shown that paper machine VOC emissions are largely dependent upon the amount and type of feedstock and the use of VOC containing additives and cleaners. Testing by NCASI has shown an emission rate of 0.3 lb/ADTP for each paper machine based on similar paper machines utilizing bleached pulp. Because BCI utilizes bleached stock, much of the VOCs have been removed at either the brown stock washers or at the bleach plant. In the bleaching process, the majority of VOC are washed out of the pulp prior to sending it to the paper machines. BCI sends pulp through a final rinse with freshwater or whitewater that the bleach plant prior to being sent to the paper machines in order to minimize VOC content. The additives, cleaners, and biocides used by the mill on the paper machines contain negligible or no VOC content.

Conclusion – VOC Control

The Division has determined that no additional control technologies are needed to meet the requirements of BACT for the Paper Machines. BCI will minimize VOC emissions through good work practices, such as washing the pulp with freshwater or whitewater prior to entering the paper machines and the use of low-VOC containing additives and cleaners.

Summary – VOC Control Technology Review for Nos. 3, 4, and 5 Paper Machines

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for the Nos. 3, 4, and 5 Paper Machines. The BACT selection for the Nos. 3, 4, and 5 Paper Machines is summarized below in Table 4-23. No applicable emission limits were found in the RBLC regarding VOC emissions from the paper machines.

Table 4-23: BACT Summary for Nos. 3, 4, and 5 Paper Machines - VOC

Pollutant	Control Technology	Proposed BACT Limit
VOC	None	Good work practices – final rinse with freshwater or whitewater prior to entering paper machines

Nos. 3, 4, and 5 Paper Machines – PM/PM_{10} Emissions

Step 1: Identify all control technologies

The source of PM from the paper machine is not well known. No known controls have been applied to PM emissions from paper machines. As noted, these emission rates are for PM emissions from combustion processes that are part of the drying process and not from the paper production process.

Step 2: Eliminate technically infeasible options

No controls for PM emissions from paper machines have been applied. Because of the very low emission rate involved, the addition of PM controls is not considered practical. Using the estimated exhaust flow rate for the paper machines and the expected PM emission rate, the concentration of PM emissions in the flue gas is estimated to be 0.0005 gr/dscf. This very low concentration is too small for any known particulate control device to be effective and it is unlikely that additional controls could offer any substantial additional reduction in PM emissions.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

No PM controls are identified in the RBLC.

Step 4: Evaluating the Most Effective Controls and Documentation

There are no documented controls for PM emissions.

Step 5: Selection of BACT

Table 4-16 (page 4-63) of Application No. 16576 provides the RBLC search for PM emissions. The only PM emission rates included in the RBLC for paper machines are for natural gas fired dryers. BCI's paper machines utilize steam as a heat source, so these PM emission rates aren't included in the summary table. The PM emissions are at a very low concentration and it is not thought that additional controls would be justified. NCASI established an emission factor of 0.021 lb/ADTP for each paper machine based on sampling data.

Conclusion – PM/PM_{10} Control

The Division has determined that no additional control technologies are needed to meet the requirements of BACT for the Paper Machines. However, BCI will minimize PM/PM_{10} emissions by handling solid powered additives in an enclosure. Because there are no emission controls in place, no compliance monitoring for PM emissions from the paper machines are needed.

Summary – PM/PM_{10} Control Technology Review for Nos. 3, 4, and 5 Paper Machines

To fulfill the PSD permitting requirements for PM/PM_{10}, a BACT analysis was conducted for the Nos. 3, 4, and 5 Paper Machines. The BACT selection for the Nos. 3, 4, and 5 Paper Machines is summarized below in Table 4-24. No applicable emission limits were found in the RBLC regarding PM/PM_{10} emissions from the paper machines.

Table 4-24: BACT Summary for Nos. 3, 4, and 5 Paper Machines – PM/PM_{10}

Pollutant	Control Technology	Proposed BACT Limit
PM/PM_{10}	None	Good Work Practices – solid powered additives will be handled in an enclosure

Petroleum Coke Handling Operations

BCI will be installing the necessary equipment to grind petroleum coke on site for combustion in the new Lime Kiln #6. The new equipment associated with the handling and grinding of the petroleum coke includes a raw petroleum coke storage silo, a grinder, a steam fired air heater (with natural gas/ propane back-up) to provide hot air for the pneumatic transport of the ground coke, and ground petroleum coke storage silo. The primary pollutant of concern is PM from the transport, handling, and grinding of the petroleum coke. The natural gas/ propane fired duct burner in the air heater will also be a source of products of combustion (NO_X, CO, and VOC), which will also need to be evaluated by the BACT analysis. The mill grinding operation will consist of a duct heater to provide hot air for the grinding and transport of the petroleum coke. The heat for this system will come from indirect heat from steam, however, a natural gas/ propane back up duct burner will be included to ensure heat can still be applied to the system if steam is unavailable.

Petroleum Coke Handling Operations – PM/PM_{10} Emissions

Step 1: Identify all control technologies

The currently available PM controls include ESPs, WESPs, high efficiency wet scrubbers, and baghouses. The theory and operation of these control technologies was discussed in detail in the BACT Analysis for Recovery Boiler #5.

Step 2: Eliminate technically infeasible options

All of the above mentioned technologies would likely be technically feasible for control of PM emissions from the storage silos and grinder.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

A baghouse (bin vent) is considered to be the most effective control for a dry solid material such as petroleum coke. The baghouse would be expected to provide equal or greater control than an WESP, ESP, or scrubber, without the generation of a new waste stream as in the case of a scrubber or WESP.

Step 4: Evaluating the Most Effective Controls and Documentation

A baghouse (bin vent) is considered to be the most effective control for a dry solid material such as petroleum coke.

Step 5: Selection of BACT

Table 4-18 of Application No. 16576 presents the results from the RBLC search completed for PM emissions from petroleum coke handling operations. All but one of the units listed are in lb/hr or ton/yr emission rates, which cannot be compared to the proposed operation because the capacities are unknown. The coke handling operations for the Carmeuse lime plant in Maple Grove, OH is permitted at an emission rate of 0.01 gr/dscf. The proposed BACT for BCI is 0.01gr/dscf. The mill will operate baghouses on the raw pet coke bin and grinding process and a bin vent (filters similar to baghouses) on the pulverized coke storage silo to prevent dust from leaving the systems. This concentration limit matches the one concentration based limit in the RBLC and is expected to be achievable with the proposed high efficiency filters.

Conclusion – PM/PM_{10} Control

The Division has determined that no additional control technologies are needed to meet the requirements of BACT. The BACT emission limit for each of the Petroleum Coke Storage Silos has been established as 0.01 gr/dscf. BCI proposes to implement a visual inspection of the baghouses and bin vent to ensure that the units are operating correctly. This would consist of a once per day inspection to ensure that the system is collecting properly and a visible emission is not present. The facility will also monitor pressure drop on the baghouses once per shift.

Summary – PM/PM_{10} Control Technology Review for Petroleum Coke Handling Operations

To fulfill the PSD permitting requirements for PM/PM_{10}, a BACT analysis was conducted for the Petroleum Coke Handling Operations. The BACT selection for the Petroleum Coke Handling Operations is summarized below in Table 4-25. The emission limit selected is representative of previous PSD BACT determination levels published in the RBLC.

Table 4-25: BACT Summary for Petroleum Coke Handling Operations – PM/PM_{10}

Pollutant	Control Technology	Proposed BACT Limit
PM/PM_{10}	Baghouses and Bin Vent Filter – BIN1, BIN2, and BIN3	0.01 gr/dscf each

Petroleum Coke Grinder Duct Burner – VOC, CO, and NO_X Emissions

Step 1: Identify all control technologies

The technologies for the control of emissions are considered good combustion control to control CO, NO_X, and VOC emissions and low NO_X burners to maintain low NO_X emissions. The previously discussed NO_X controls (SCR and SNCR) were also considered for the duct burner. The controls considered for CO and VOC emissions were good combustion practices.

Step 2: Eliminate technically infeasible options

The back-up natural gas/propane duct burner is rated at 5 MMbtu/hr. Based on the small size of the burner the use of additional NO_X add on controls is considered economically impractical. Furthermore, the purpose of the duct burner is to heat the stream so that the pet coke can be effectively transported. The high concentration of petroleum coke in the exhaust stream would make the use of SCR technology impractical, and it is unknown how the ammonia could react with the petroleum coke. It is possible that some ammonia could be absorbed in the petroleum coke, which would result in increased NO_X formation in the kiln when burned. Furthermore, the natural gas/ propane system will only operate in a back-up mode, therefore, its emissions will be limited. Based on the small size of the unit, the back-up nature of the unit, and technical difficulties of applying add on controls the only control systems remaining for consideration are low NO_X burners and good combustion controls.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Good combustion control and the use of low NO_X burners are considered the remaining technologies for the back-up natural gas/propane duct burner.

Step 4: Evaluating the Most Effective Controls and Documentation

Good combustion control and the use of a low NO_X burner are considered the only remaining technologies for the duct burner.

Step 5: Selection of BACT

There was no information listed in the RBLC for the Duct Burner. Good combustion control and low NO_X burners are considered the only remaining technologies for the duct burner. The proposed BACT emission limits for the duct burner are 0.1 lb/MMBtu, 84 lb/mmscf, and 5.5 lb/mmscf for NO_X, CO, and VOCs respectively, based on AP-42 emission factors for natural gas combustion.

Conclusion – VOC, CO, and NO_X Control

The Division has determined that no additional control technologies are needed to meet the requirements of BACT for the Duct Burner. The BACT emission limit for the duct burner has been established as 0.1 lb/MMBtu, 84 lb/mmscf, and 5.5 lb/mmscf for NO_X, CO, and VOCs respectively. Because of the very low emissions rate from the unit, the small size of the unit (the unit is rated below the 10 MMBtu/hr natural gas Georgia construction permit exemption level), and because the primary steam heat transfer system will not generate any emissions, additional monitoring of the system is not being proposed.

Summary – VOC, CO, and NO_X Control Technology Review for Petroleum Coke Grinder Duct Burner

To fulfill the PSD permitting requirements for VOC, CO, and NO_X, a BACT analysis was conducted for the Petroleum Coke Handling Operations. The BACT selection for the Petroleum Coke Grinder Duct Burner is summarized below in Table 4-26. The emission limit selected is representative of small burner emissions, since no applicable information was found in the RBLC.

Table 4-26: BACT Summary for Petroleum Coke Grinder Duct Burner – VOC, CO, and NO_X

Pollutant	Control Technology	Proposed BACT Limit
NOX	None	0.1 lb/MMBtu
VOC	None	84 lb/mmscf
CO	None	5.5 lb/mmscf

5.0 TESTING AND MONITORING REQUIREMENTS

<u>Testing Requirements:</u>

Lime Kiln #6

- The facility will test for PM emissions once to show compliance with the PM limit. The facility will establish a minimum secondary power level for the new ESP that demonstrates compliance with the emission limit and that meets the requirements of 40 CFR 63 Subpart MM. The facility will then be required to conduct annual stack tests for PM.
- The facility will test for VOC emissions to show compliance with the VOC limit. The facility will operate the CO CEMS during the test to show compliance with both limits. It would then be assumed that compliance with the VOC limit would be maintained as long as compliance with the CO emission limit is maintained. The facility will then be required to conduct biennial VOC testing to show compliance.
- The facility will test for H_2S emissions once to show compliance with the new H_2S limit. The facility will operate the TRS CEMS during the test to demonstrate compliance with both limits. It would then be assumed that compliance with the H_2S limit would be maintained as long as compliance with the TRS emission limit is maintained.
- The facility will test for SO_2 emissions while firing the maximum amount of petroleum coke in order to show compliance with Georgia Rule (g) and the PSD Avoidance limit. Any parameters established to show compliance with this limit must also meet the requirements of 40 CFR 63 Subpart MM. The facility will then be required to conduct annual SO_2 testing to show compliance
- The facility will test for NO_X emissions while firing the maximum amount of petroleum coke once to show compliance with the lb/hour NO_X limit. Since the facility will be operating a NO_X CEMS, no annual testing is required.
- The facility will also establish operating parameters for the new scrubber (scrubbant recirculation rate and scrubbant supply pressure) that meet the requirements of 40 CFR 63 Subpart MM.

Recovery Boiler #5

- The facility will test for PM emissions once to show compliance with the new PM limit. The facility will continue to operate the existing ESP and will verify or reestablish the operating parameters of the ESP to achieve compliance with the new limit. The facility will continue to conduct biennial PM testing to show compliance.
- The facility will test for VOC emissions once to show compliance with the new VOC limit. The facility will operate the new CO CEMS during the test to show compliance with both limits. It would then be assumed that compliance with the VOC limit would be maintained as long as compliance with the CO emission limit is maintained. The facility will then be required to conduct biennial VOC testing to show compliance.
- The facility will test for H_2S and TRS emissions once to show compliance with the new H_2S limit. The facility will operate the TRS CEMS during the test to establish a H_2S/TRS ratio, which would be used to calculate the H_2S emissions.

Recovery Boiler #6

- The facility will test for PM emissions once to show compliance with the new PM limit. The facility will continue to operate the existing ESP and will verify or reestablish the operating parameters of the ESP to achieve compliance with the new limit. The facility will continue to conduct biennial PM testing to show compliance.
- The facility will test for VOC emissions once to show compliance with the new VOC limit. The facility will operate the new CO CEMS during the test to show compliance with both limits. It would then be assumed that compliance with the VOC limit would be maintained as long as compliance with the CO emission limit is maintained. The facility will then be required to conduct biennial VOC testing to show compliance.

- The facility will test for H_2S and TRS emissions once to show compliance with the new H_2S limit. The facility will operate the TRS CEMS during the test to establish a H_2S/TRS ratio, which would be used to calculate the H_2S emissions.

Lime Slaker #3

- The facility will test for PM emissions once to show compliance with the new PM limit. The facility will establish a minimum scrubber flow rate for the scrubber that demonstrates compliance.

Primary and Backup Incinerators

- The facility will test each unit for NO_X emissions to show compliance with the new NO_X limit. The facility will continue to conduct annual tests to show on-going compliance with the NO_X limit.
- The facility will retest the Primary unit to reestablish the minimum temperature need to show compliance with 40 CFR 63 Subpart S.
- The facility will continue to operate the existing scrubbers and will verify or reestablish the operating parameters of the scrubber to achieve compliance with the new limits.

Bleach Plant

- The facility will test the new bleach plant to show compliance with the new Cl_2, ClO_2, and CO limits and to establish operating parameters for oxidation/reduction potential of the recirculation flow and liquid-to-air ratio (gas scrubber liquid influent flow rate to gas scrubber vent gas inlet flow rate) for the new scrubber. The facility must also demonstrate compliance with the 40 CFR 63 Subpart S limit of 10 ppm or less total chlorinated HAP. Due to the low potential emissions of VOC, no testing will be required.

Smelt Tank #6

- The facility will establish operating parameters for the new scrubber that meets the requirements of 40 CFR 63 Subpart MM and show compliance with the PM, TRS, and SO_2 limits in Condition 3.2.10. The facility will establish scrubbant supply pressure, scrubbant flow rate and scrubbant pH.

Petroleum Coke Grinding Operations

- The facility will establish pressure drop for the new bin vents that shows compliance with the PM limit in Condition 3.2.25. Due to low potential emissions of NO_X, VOC, and CO from the pet coke duct burner, no testing will be required.

<u>Monitoring Requirements:</u>

Lime Kiln #6

The facility has proposed to install CEMS for TRS, oxygen, NO_X and CO in order to calculate and record each 12-hr (TRS) or 30-day (NO_X and CO) average corrected to 8% or 10% oxygen. Since the proposed emission limits for TRS and H_2S are the same, (8 ppm), demonstration of compliance with the TRS limit inherently provides compliance with the H_2S limit.

The facility will continuously monitor secondary current and voltage on the ESP. The power for each field is determined by multiplying the secondary current and secondary voltage. The total power for each precipitator is the sum of each field's power. Total power is used to provide information to track the operational status of the control device so as to provide a reasonable assurance of proper operation and maintenance of the ESP. By establishing the ESP parametric values during performance testing as required by the permit, maintaining the proper operating range will show compliance with the BACT limit of 0.010 gr/dscf for PM. Proper operation of the ESP can also provide reasonable assurance of compliance with Georgia Rules (b) and (e). Also, the facility has proposed to monitor the ESP's secondary current and secondary voltage in lieu of installing a COMS under 40 CFR 63 Subpart MM. This alternative operating scenario has been approved by APB on September 26, 2006 and is identical to the operating scenario for existing Lime Kiln #5.

The facility will continuously monitor the scrubbant recirculation rate and scrubbant supply pressure for the Lime Kiln #6 Scrubber to also provide a reasonable assurance of compliance with the PM limit, as well as meet the requirements of 40 CFR 63 Subpart MM. Monitoring these parameters, as well as pH, will provide a reasonable assurance of compliance with the Georgia Rule (g) SO_2 limit and SO_2 PSD Avoidance limit.

Recovery Boilers #5 and #6
The facility has proposed to install CEMS for NO_X and CO on each recovery boiler in order to calculate and record each 12-hr (NO_X) or 30-day (CO) average corrected to 8% oxygen.

The facility already continuously monitors secondary current and voltage on the ESP for each recovery boiler. The power for each field is determined by multiplying the secondary current and secondary voltage. The total power for each precipitator is the sum of each field's power. Total power is used to provide information to track the operational status of the control device so as to provide a reasonable assurance of proper operation and maintenance of the ESP. By establishing the ESP parametric values during performance testing as required by the permit, maintaining the proper operating range will show compliance with the BACT limit of 0.021 gr/dscf for PM. Proper operation of the ESP can also provide reasonable assurance of compliance with Georgia Rules (b) and (e). The facility will have to retest and reestablish the existing ESP parameters under 40 CFR 63 Subpart MM due to the increase in black liquor solids through the recovery boiler.

The facility has proposed to use the existing TRS CEMS to monitor H_2S emissions for each recovery boiler. The facility will establish a site-specific TRS/H_2S ratio in order to calculate H_2S emissions.

Lime Slaker #3
The facility will monitor flow rate to the Lime Slaker #3 scrubber. By establishing the parametric values during performance testing as required by the permit, maintaining the proper operating range will show compliance with the BACT limit for PM. Therefore the Division can also be reasonably assured of compliance with the Georgia Rules (b) and (e).

There is no control device for VOC from the lime slaker. However, due to the expected small amount of emissions of VOC, no additional monitoring is required. Additionally, the facility will be using only fresh process water in the lime make-up area in order to minimize VOC emissions. Since this is a piping change, no additional monitoring, reporting, or recordkeeping is necessary.

Primary and Backup Incinerators
The facility already monitors various parameters for the incinerators and associated scrubbers. By reestablishing the parametric values during performance testing as required by the permit, maintaining the proper operating range will show compliance with the permitted emissions limits. No additional monitoring is required. The facility will continue to conduct annual NO_X testing in order to provide on-going compliance with the emission limits contained in Condition 3.2.16.

Bleach Plant #4
In accordance with section 63.453(c) of the Cluster Rule, the pH or the oxidation/reduction potential of the gas scrubber effluent, the gas scrubber vent gas inlet flow rate, and the gas scrubber liquid influent flow rate must be continuously monitored. The facility monitors liquid-to-air ratio to address the gas scrubber vent gas inlet flow rate and the gas scrubber liquid influent flow monitoring required under 40 CFR 63 Subpart S.

In order to show compliance with the Georgia Air Toxics Guidelines, the Bleach Plant has continuous monitoring on scrubbant flow rate to the Bleach Plant scrubbers and the SVP-LITE ClO_2 generator scrubber. Additional parameters are monitored on an hourly basis that ensure that the scrubbers are operating properly. Proper operation of the associated control equipment provides reasonable assurance of compliance with these State Only Enforceable limits.

There are no control devices for VOC and CO from bleach plants. However, due to the expected small amount of emissions of VOC and CO, no additional monitoring is required.

Smelt Tank #6
The permit already contains sufficient monitoring for the smelt tank. No additional monitoring is required.

Petroleum Coke Grinding Operations
The two baghouses will be monitored for pressure drop, and daily visible emission checks will demonstrate compliance with the PM emission limit contained in Condition 3.2.25. By establishing the parametric values during performance testing as required by the permit, maintaining the proper operating range will show compliance with the BACT limit for PM. Therefore the Division can also be reasonably assured of compliance with the Georgia Rules (b) and (e). The facility will only use propane and natural gas in the duct burner, which are both inherently low in sulfur content; therefore the Division can also be reasonably assured of compliance with Georgia Rule (g). There are no control devices for VOC, NO_X, and CO from the duct burner. However, due to the expected small amount of emissions of VOC, NO_X, and CO, no additional monitoring is required.

Paper Machines #3, #4, and #5
There are no control devices for PM and VOC on the paper machines. The facility will be conducting a final rinse of the pulp prior to entering the paper machines with either freshwater or whitewater in order to minimize VOC emissions. Since this is a piping change, no additional monitoring, reporting, or recordkeeping is necessary. Also, any solid powered additives will be handled in an enclosure to minimize PM emissions.

Caustisizer Area
There are no control devices for VOC from the caustisizing equipment. However, due to the expected small amount of emissions of VOC, no additional monitoring is required. Additionally, the facility will be using only fresh process water in the caustisizer area in order to minimize VOC emissions. Since this is a piping change, no additional monitoring, reporting, or recordkeeping is necessary.

Evaporator Group and Batch Digesters
The off-gases from the evaporators and digesters are collected in the LVHC system and incinerated in the Primary or Backup Incinerators. No additional monitoring is required.

Brownstock Washer System
The off-gases from the evaporators are collected in the HVLC system and incinerated in Recovery Boilers #5 or #6. No additional monitoring is required.

Chip Thickness Screening System
This system is completed enclosed and is not subject to any rules and regulations. No additional monitoring is required.

CAM Applicability

The Primary and Backup Incinerators are subject to the requirements of compliance assurance monitoring (CAM) as specified in 40 CFR 64. CAM is only applicable to emission units that have potential emissions greater than the major source threshold, located at a major source, use a control device to control a pollutant emitted in an amount greater than the major source threshold for that pollutant, and have a specific emission standard for that pollutant. The Primary and Backup Incinerators use air pollution control equipment to control specific CAM emissions. Since this project constitutes a significant modification to the Permit, CAM had to be addressed. The incinerators are not subject to any post-11/15/90 NSPS or NESHAP and have potential pre-control emissions of at least 100% of the major source threshold. The Primary Incinerator has 2 pollutants, SO_2 and H_2SO_4, while the Backup Incinerator has only SO_2 emissions. For both pollutants and both incinerators, the facility has proposed to continuously monitor scrubbant pH and scrubbant recirculation flow rate. Both parameters are already required to be monitored by the Permit in Condition 5.2.2.b.

6.0 AMBIENT AIR QUALITY REVIEW

An air quality analysis is required to determine the ambient impacts associated with the construction and operation of the proposed mill optimization project. The main purpose of the air quality analysis is to demonstrate that emissions emitted from the proposed modifications, in conjunction with other applicable emissions from existing sources (including secondary emissions from growth associated with the new project), will not cause or contribute to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or PSD increment in a Class I or Class II area. NAAQS exist for NO_2, CO, $PM_{2.5}$, PM_{10}, SO_2, Ozone (O_3), and lead. PSD increments exist for SO_2, NO_2, and PM_{10}.

The proposed project at Brunswick triggers PSD review for PM/PM_{10}, VOC, NO_X, CO, and H_2S. An air quality analysis was conducted to demonstrate the facility's compliance with the NAAQS and PSD Increment standards for PM/PM_{10}, NO_X, CO, and H_2S. Although the project triggers PSD for VOC, there are no modeling requirements for VOC emissions; therefore, no modeling analysis was conducted for VOC. A screening analysis indicated that the project exceeded the PSD Significant Ambient Impact Levels (SAILs) for PM_{10} on a 24-hour and annual basis and for NO_X on an annual basis. Refined modeling for both pollutants was required. The results of the refined modeling analysis indicated that the project would not exceed either the NAAQS or PSD Increment consumption levels; therefore, the project is in compliance with air quality standards. An additional analysis was conducted to demonstrate compliance with the Georgia air toxics program. This section of the application discusses the air quality analysis requirements, methodologies, and results. Supporting documentation may be found in Sections 5.0 through 8.0 of Application No. 16576.

Modeling Requirements

The air quality modeling analysis was conducted in accordance with Appendix W of Title 40 of the Code of Federal Regulations (CFR) §51, *Guideline on Air Quality Models*, and Georgia EPD's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Revised).*

The proposed project will cause net emission increases of PM/PM_{10}, NO_X, CO, and H_2S that are greater than the applicable PSD Significant Emission Rates. Therefore, air dispersion modeling analyses are required to demonstrate compliance with the NAAQS and PSD Increment. VOC does not have established PSD modeling SAIL. Modeling is not required for VOC emissions; however, the project will likely have no impact on ozone attainment in the area based on data from the monitored levels of ozone and the level of emissions increases that will result from the proposed project. The southeast is generally NO_X limited with respect to ground level ozone formation.

Significance Analysis: Ambient Monitoring Requirements and Source Inventories

Initially, a Significance Analysis is conducted to determine if the PM/PM_{10}, VOC, NO_X, CO, and H_2S emissions increases at the Brunswick Mill would significantly impact the area surrounding the facility. Maximum ground-level concentrations are compared to the pollutant-specific U.S. EPA-established SAIL. The SAIL for the pollutants of concern are summarized in Table 6-1.

If a significant impact (i.e., an ambient impact above the SAIL) does not result, no further modeling analyses would be conducted for that pollutant for NAAQS or PSD Increment. If a significant impact does result, further refined modeling would be completed to demonstrate that the proposed project would not cause or contribute to a violation of the NAAQS or consume more than the available Class II Increment.

Under current U.S. EPA policies, the maximum impacts due to the emissions increases from a project are also assessed against monitoring *de minimis* levels to determine whether pre-construction monitoring should be considered. These monitoring *de minimis* levels are also listed in Table 6-1. If either the predicted modeled impact from an emission increase or the existing ambient concentration is less than the monitoring *de minimis* concentration, the permitting agency has the discretionary authority to exempt an applicant from pre-construction ambient monitoring. This evaluation is required for PM/PM_{10}, NO_X, CO, and H_2S.

If any off-site pollutant impacts calculated in the Significance Analysis exceed the SAIL, a Significant Impact Area (SIA) would be determined. The SIA encompasses a circle centered on the mill with a radius extending out to (1) the farthest location where the emissions increase of a pollutant from the project causes a significant ambient impact, or (2) a distance of 50 km, whichever is less. All sources within a distance of 50 km of the edge of a SIA are assumed to potentially contribute to ground-level concentrations within the SIA and would be evaluated for possible inclusion in the NAAQS and PSD Increment analyses.

NAAQS Analysis

The primary NAAQS are the maximum concentration ceilings, measured in terms of total concentration of pollutant in the atmosphere, which define the "levels of air quality which the U.S. EPA judges are necessary, with an adequate margin of safety, to protect the public health." Secondary NAAQS define the levels that "protect the public welfare from any known or anticipated adverse effects of a pollutant." The primary and secondary NAAQS, listed in Table 6-2 below, are equivalent for NO_2, PM_{10}, and SO_2; no secondary NAAQS have been developed for CO.

If the maximum pollutant impact calculated in the Significance Analysis exceeds the SAIL at an off-property receptor, a NAAQS analysis is required. The NAAQS analysis would include the potential emissions from all emission units at the Brunswick Mill, except for units that are generally exempt from permitting requirements and are normally operated only in emergency situations. The emissions modeled for this analysis would reflect the results of the BACT analysis for the modified emission unit. Facility emissions would then be combined with the allowable emissions of sources included in the regional source inventory. The resulting impacts, added to appropriate background concentrations, would be assessed against the applicable NAAQS to demonstrate compliance. For an annual average NAAQS analysis, the highest modeled concentration among five consecutive years of meteorological data would be assessed, while the highest second-high impact would be assessed for the short-term averaging periods.

PSD Increment Analysis

The PSD Increments were established to "prevent deterioration" of air quality in certain areas of the country where air quality was better than the NAAQS. To achieve this goal, U.S. EPA established PSD Increments for certain pollutants. The sum of the PSD Increment concentration and a baseline concentration defines a "reduced" ambient standard, either lower than or equal to the NAAQS that must be met in an attainment area. Significant deterioration is said to have occurred if the change in emissions occurring since the baseline date results in an off-property impact greater than the PSD Increment (i.e., the increased emissions "consume" more that the available PSD Increment).

U.S. EPA has established PSD Increments for NO_X, SO_2, and PM_{10}; no increments have been established for CO. The PSD Increments are further broken into Class I, II, and III Increments. BCI is located in a Class II area. The PSD Increments are listed in Table 6-3 below.

To demonstrate compliance with the PSD Increments, the increment-affecting emissions (i.e., all emissions increases or decreases after the appropriate baseline date) from the mill and those sources in the regional inventory would be modeled to demonstrate compliance with the PSD Class II increment for any pollutant greater than the SAIL in the Significance Analysis. For an annual average analysis, the highest incremental impact will be used. For a short-term average analysis, the highest second-high impact will be used.

The determination of whether an emissions change at a given source consumes or expands increment is based on the source classification (major or minor) and the time the change occurs in relation to baseline dates. The major source baseline date for NO_X is February 8, 1988, and the major source baseline for SO_2 and PM_{10} is January 6, 1975. Emission changes at major sources that occur after the major source baseline dates affect Increment. In contrast, emission changes at minor sources only affect Increment after the minor source baseline date, which is set at the time when the first PSD application is completed in a given area, usually arranged on a county-by-county basis. The minor source baseline dates have been set for PM_{10} and SO_2 as January 30, 1980, and for NO_2 as April 12, 1991.

Modeling Methodology

Two levels of air quality dispersion model sophistication exist: screening and refined dispersion modeling. Normally, screening modeling is performed to determine the need for refined modeling. When results from a screening model indicate potentially adverse impacts, a refined modeling analysis is performed. A refined modeling analysis can provide a more accurate estimate of a source's impact and requires more detailed and precise input data than does a screening model. Given the magnitude of emissions increases from the proposed project, refined modeling was relied upon to predict impacts.

A refined dispersion model requires several data inputs, including the quantity of emissions, meteorological history, and the initial conditions (e.g., velocity, flowrate, and temperature) of the stack exhaust to the atmosphere. Building structures that obstruct wind flow near emission points might cause stack discharges to become caught in the turbulent wakes of these structures, leading to downwash of the plumes. In addition, wind blowing around a building creates zones of turbulence that are greater than if the building were absent. These effects of building downwash inhibit dispersion and generally cause higher ground level pollutant concentrations. Therefore, building configurations near emission sources are also a data input into the model.

The land type near the mill needed to be classified as either urban or rural so that appropriate dispersion parameters could be used within the name of dispersion analysis model modeling analysis. Two land classification procedures, one based on land-use criteria and the other based on population density, can be used to determine the appropriate application of either urban or rural dispersion coefficients in a modeling analysis. Of the two, the land-use procedure is preferred by U.S. EPA. The models were run using the regulatory default option and rural environment. The rural environment was confirmed by using the Auer Method, which determines the character of the modeling area. Table 5-2 of Application No. 16576 shows how the Auer Method was used to determine that the land use surrounding BCI is rural.

The future maximum allowable emission rates from each piece of affected process equipment was entered into each model as a positive emission rate, while actual emission rates (averaged over 2004/2005) were input as a negative emission rate. Table 5-3 of Application No. 16576 summarizes the emission rates and modeling parameters that were used for the on-site modeled emission sources in the Screen Model runs.

Meteorological Data

Hourly pre-processed meteorological data from the Savannah, GA National Weather Surface (NWS) surface station and the Waycross, GA NWS upper air station for the period 1982-86 were used to evaluate the proposed emission rates for conformance with the *Georgia Guideline for Ambient impact Assessment of Toxic Air Pollutant Emissions*. The data appear to have been downloaded from the EPD website, as the modeling review employed the website data, resulting in similar concentrations.

Hourly pre-processed meteorological data from the Savannah, GA NWS surface station and the Charleston, SC NWS upper air station for the period 1990-94 were ultimately used to evaluate the proposed emission rates for conformance with PSD air quality standards in Class II areas (November, 2006). This data was also used to evaluate Class I PSD Increment concentrations in the Wolf Island Class I Area since it is within 50 km of the site (November, 2006). The original application was submitted January, 2006 using Jacksonville/Jacksonville meteorological data over the period 1995-1999. The latter data was found to be inadequately processed by the AERMET processor, resulting in 'missing data'-generated artificial calms. Neither the surface data, nor the upper air data were filled-in to inhibit the extra calms. The Savannah/Charleston data was found to be much more complete, and to require much less data replacement.

The CALMET meteorological processor 12-km gridded output files (2001-2003) developed by Earthtech for VISTAS Regional Haze BART analyses were used to assess PSD Class I Increments in the Okeefenokee Class I area.

Source Data
Stack emissions parameters, emission rates, and boundary and gridded model receptors were provided by BCIand the emissions data have been subjected to EPD engineering review. PM_{10}, NO_2, and CO were predicted to show significant emissions increases. Tables indicating the emission parameters for the respective sources are located in Tables 5-3, 5-10, 5-11, 5-14, 5-15, 5-16, and 5-17 and Air Toxics-related Table 6-1 of Application No. 16576. Typographical errors transcribing the data in the tables to the AERMOD model input files in October, 2006 required re-assessment of the Significant Impact distances for PM_{10} and NO_2. Re-modeling (November, 2006) expanded the October, 2006 Significant Impact distance from 4.38 to 5.0 km for NO_2 and contracted the October, 2006 Significant Impact distance from 7.57 to 7.5 km for PM_{10}.

Project-related carbon monoxide concentrations were all lower than either 1-hr or 8-hr of the applicable Significance levels, so no further modeled evaluation of carbon monoxide concentrations was conducted. H_2S emissions were also modeled and found to exceed the significant monitoring concentration but, since no federal air quality standards exist for that contaminant, no further modeling of those emissions was necessary under PSD regulations.

Models Used
The AERMOD model (version 04300) was used to evaluate conformance with NAAQS, and Class I (at Wolf Island) and II Area PSD Increments. In order to evaluate aerodynamic building downwash effects on criteria pollutant concentrations, it was necessary to implement the Building Profile Input Program (BPIP, version 04274). The AERMOD model was used to conservatively evaluate the potentially Significant Impacts of NO_2 and PM_{10} in the Wolf Island Class I area, as well as in the Class II area surrounding the facility. The PM_{10} and NO_2 maximum Class I and II area concentrations were found to be higher than the EPA proposed Class I and II Significance Levels using the AERMOD model. A cumulative PM_{10} and NO_2 PSD Increment assessment was subsequently conducted to indicate conformance with these standards over the less-than 50 km distance to the Wolf Island Class I area.

The CALPUFF model (version 5.754) was used to assess Class I area significant impacts at the Okeefenokee Class I area. The impacts of NO_2 were found to be less than the significant concentration, so no further modeling of that contaminant was necessary. Twenty-four-hour averaged PM_{10} impacts were found to exceed the respective significant concentration. The CALPUFF model was run again to assess Class I PSD PM10 Increment consumption.

Receptors

Gridded and boundary model receptors in the Class I area were assigned terrain elevations using appropriate Digital Elevation Model (DEM) data files at a scale of 1:24,000 (7.5 minute USGS quadrangle files) processed by the AERMAP (version 03400) DEM utility. The boundary receptors were located at intervals of less than 100 meters along the property line. The 100-meter spaced gridded receptor network extends approximately 2 km from the site boundary in all directions. The Class II model receptors from 2 km to 6 km were located at 500-meter intervals, and from 6 km to 10 km, at 1,000-meter intervals. Class I Area receptors were extracted from the National Park Service/US Fish and Wildlife Class I Area Receptor database. Terrain elevations were downloaded for these receptors along with their horizontal UTM coordinates.

Offsite Source Inventory

Offsite emissions inventories of PM_{10} and NO_2 were developed by BCI based on the three allowable emissions spreadsheets compiled by EPD, and selected review of the EPD website and permit files (as well as emission inventory information provided by the Florida Department of Environmental Protection for sources located within the model screening area in Florida). No sources were eliminated from the NAAQS or Increment models.

Class I Areas

Federal Class I areas are regions of special national or regional value from a natural, scenic, recreational, or historic perspective. Class I areas are afforded the highest degree of protection among the types of areas classified under the PSD regulations. EPA has established policies and procedures that generally restrict consideration of impacts of a PSD source on Class I Increments to facilities that are located near a federal Class I area. Historically, a distance of 100 km has been used to define "near", but more recently, a distance of 200 kilometers has been used for all facilities that do not combust coal.

The two Class I areas within approximately 200 kilometers of BCI are the Wolf Island Wilderness Area, located approximately 26 kilometers northeast of the facility; and the Okefenokee Swamp Wilderness Area, located approximately 64 kilometers southwest of the facility. The U.S. Fish and Wildlife Service is the designated FLM responsible for oversight of all three of these Class I areas.

Class II Visibility Issues

BCI attempted to model the emissions with the VISCREEN model. Neither Level I or Level II types of VISCREEN modeling indicated that the emissions would be imperceptible under worst-case emissions.

BCI modeled the entire Mill's visibility-affecting emissions from the #5 Smelt Tank stack using the air flow volume of only that source with the PLUVUE refined visible impacts model. Other PLUVUE model parameters were maintained constant as expressed in the example model input file. The Glynnco Airport, 10 km from the Mill, was entered as the worst-case Class II area sensitive receptor. Modeling conducted under stability Class F with 1 m/s wind speed indicated the plume would be below Class II criteria of visible plume perception. In other words, under worst-case meteorological conditions, both the Delta E and the contrast of the modeled plume were lower than the corresponding visual plume screening threshold values.

Significant Monitoring Concentrations

Project emissions of PM_{10}, H_2S, and NO_2 caused maximum concentrations above than their respective monitoring *de minimis* concentrations. EPD will rely on the use of existing ambient monitoring data provided by the nearby EPD monitoring stations in Brunswick for typical ambient concentrations of PM_{10} and $PM_{2.5}$. Background ambient concentrations of NO_2 are also reasonably available from the GA EPD monitoring network. These should provide conservative estimates of the ambient concentrations in the project area. BCI operates a TRS monitor on site, which should provide reasonable estimates of the background concentrations of H_2S. For these reasons, no pre-construction ambient monitoring requirements apply for these pollutants. The modeled concentration of CO was not found to exceed the *de minimis* concentration for that contaminant.

Ozone Impacts Analysis

The federal rules under 40 CFR 52.21(m) describe the PSD review requirements for ambient air quality analyses. These requirements include pre-application and post-application analyses. The pre-application analysis considers the current state of the ambient air conditions for ozone (O_3). EPD operates an ambient air quality ozone monitor at the Risley Middle School a short distance east of BCI. The mill is located in an area considered to be minimally affected by the impact of other sources associated with human activities. For these conditions, US EPA guidance recommends that monitoring data from a 'regional' site may be used as representative data. To determine if existing data is appropriate, US EPA guidance recommends three criteria: monitor location, data quality, and currentness of the data.

For the first criteria regarding O_3, the Risley School monitoring site is located approximately 1 mile East of BCI. GA EPD believes that the O_3 monitor located at the Risley School includes representative data of the Koch Mill's operation due to its proximity to the manufacturing site.

For the second criteria, GA EPD operates the monitor, collects reliable data, and calibrates the monitor regularly.

Lastly, for the third criteria, the Risley School monitoring location includes the most recent data available from which is calendar year 2005. The 8-hour average 4th highest maximum collected during the 2005 calendar year was 0.064 ppm; in 2004, it was 0.073 ppm; in 2003, it was 0.069 ppm; in 2002, it was 0.076 ppm; and in 2001, it was 0.070 ppm. These results in 3-year average design values of 0.072 ppm for 2001-2003, 0.073 ppm for 2002-2004, and 0.069 ppm for 2003-2005. All of these values are well below the 8-hour standard for O_3 of 0.085 ppm.

GA EPD believes that all the above data satisfies the data quality requirements of EPA. Thus, to meet the regional site criteria, GA EPD selected the ambient data from the Risley Middle School site in Brunswick, Glynn County to determine the pre-application air quality.

Modeling Results

The screen modeling for PM_{10}, NO_X, CO, and H_2S was used to determine if the emission increases resulted in concentrations that exceed the SAILs. If SAILs for any of these pollutants were exceeded, then refined modeling is required. If the significant monitoring concentrations for any of these pollutants are exceeded, pre-construction monitoring is required for the facility.

As shown below in Table 6-1, the screen modeling results for PM_{10} exceed the SAILs for both 24-hour and annual averaging periods, NO_X for the annual averaging period, and H_2S for the 1-hour averaging period. Refined modeling must be completed for these pollutants. Additionally, the significant monitoring concentrations were exceeded and pre-construction monitoring must be addressed for both $PM_{10,}$ $NO_{X,}$ and H_2S. The modeled emissions did not exceed SAILs for CO on either a 1-hour or 8-hour averaging period. No further modeling is required for CO. Pre-construction monitoring is not required for CO.

Table 6-1: Significance Analysis Results – Comparison to SAILs and Monitoring Concentration

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Maximum Impact (ug/m^3)	SAIL (ug/m^3)	Sign. Monitor'g Concentration (ug/m^3)	Significant?
NO_2	Annual	1991	450230	3448756	22.18	1	14	**Yes**
PM_{10}	24-hour	1994	450230	3448756	77.36	5	10	**Yes**
	Annual	1991	450230	3448756	16.09	1	--	**Yes**
CO	1-hour	1992	451300	3448700	842.7	2000	--	No
	8-hour	1993	451400	3448600	154.4	500	575	No
H_2S	1-hour	1993	450237.59	3448632.5	5.10	0.2	---	**Yes**

*Data for worst year provided only.

Monitoring Data Availability

PM_{10} NO_X, and H_2S screen modeling showed exceedances of the significant monitoring levels, which requires pre-construction monitoring. BCI operates TRS monitors on-site, which provide monitoring for H_2S as well. EPD operates PM monitors close to the mill and are considered representative of background emissions. NO_X monitors are located in Jacksonville, FL, which is also considered representative of background emissions. Based on the above, additional pre-construction monitoring is not considered warranted.

Since the project also results in a potential emissions increase of VOC greater than 100 tons per year, PSD air modeling guidelines require an evaluation to determine if pre-construction monitoring of VOC is required. EPD operates a ground-level ozone monitor at Risley Middle School, 2.5 km directly east of BCI. This monitor currently shows compliance with the ozone standard. Due to the close proximity of this monitor, BCI believes that no additional pre-construction monitoring is warranted. The air quality in Brunswick has never been in violation of the ozone standard due partly to the relatively low emission sources in the area, as well as its coastal location, which is not conductive to temperature inversions that contribute to ozone formation.

Significant Impact Area

For any off-site pollutant impact calculated in the Significance Analysis that exceeds the SAIL, a Significant Impact Area (SIA) must be determined. The SIA was determined to be the circular area with a radius of the distance from the center of the facility to the furthest point predicted by the screening model to exceed the applicable SAIL. Refined modeling is required for all receptors within the SIA. An SIA is determined for each averaging period. For PM_{10}, the data for 1991 resulted in the largest SIA, which extends to approximately 7.5 km for the 24-hour averaging period, and 2.86 km for the annual averaging period. For NO_X, 1991 provided the worst case, which is 5 km.

All sources of the pollutants in question within the SIA plus an additional 50 kilometers are assumed to potentially contribute to ground-level concentrations and must be evaluated for possible inclusion in the NAAQS and Increment Analysis. In order to determine what off-site sources would need to be modeled, a list of PM_{10} and NO_X emitting sources in SE Georgia and NE Florida were acquired for their respective state environmental departments. The SIA extends into Florida, so off-site sources in both Georgia and Florida were considered in the refined modeling. The impact of these sources on the models is largely determined by the emission rates and the distance between the emission source and BCI. All sources within 57.5 km of BCI as identified by EPD were included in the refined modeling runs.

Refined modeling for PM_{10} and NO_X was performed to demonstrate compliance with the PSD Increment and NAAQS standards, listed in Tables 6-2 and 6-3 below. The background ambient concentration was obtained for use in determining compliance with the NAAQS standard for each pollutant. This background concentration must be added to the NAAQS modeling results before a comparison to the standards could be done. The same meteorological data used for the Screen modeling was used for the NAAQS modeling. Per EPA guidelines, the receptor grid used for the NAAQS modeling included all receptors from the screen modeling receptor set that fell within each pollutant's respective SIA for the averaging period being modeled. For PM_{10}, all off-site emission sources that fell within a 57.5 km radius of the mill were included in the 24-hour and annual NAAQS and PSD Increment modeling. For NO_X, all off-site sources that fell within a 55 km radius of the mill were included in the annual NAAQS and PSD Increment modeling.

NAAQS Analysis

The "highest second-high" NAAQS concentration was used for PM_{10} on the 24-hour averaging period. The highest second-high concentration is the highest of the second high result from each of the 5 years of meteorological data that was modeled. For the annual standard for PM_{10} and NO_X, each year of meteorological data was modeled and the highest value from all 5 models was compared to the annual standard. The NAAQS modeling will include only the future maximum potential emissions of the sources affected by the Mill Optimization project, as well as both on-site and off-site sources that are within or neat the SIA that contributes to the standard. The NAAQS modeling included off-site sources identified in the EPA AIRS Emissions Inventory for Georgia and the PSD Increment spreadsheets since several sources in the PSD Increment spreadsheets were not listed in the Emissions Inventory. The 57.60 km radius for PM_{10} included several sources in Florida, while the 54.40 km radius for NO_X did not. Tables 5-9 and 5-10 of Application No. 16576 show the NAAQS modeled stack parameters for both on-site and off-site sources.

The results of the NAAQS analysis are shown in Table 6-2. When the total impact at all significant receptors within the SIA are below the corresponding NAAQS, compliance is demonstrated.

Table 6-2: NAAQS Analysis Results

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Maximum Impact (ug/m^3)	Background (ug/m^3)	Total Impact (ug/m^3)	NAAQS (ug/m^3)	Exceed NAAQS?
NO_2	Annual	1991	450230	3448756	38.1	14	52.1	100	No
PM_{10}	24-hour	1991	450230	3448756	103	38	141	150	No
	Annual	1991	450230	3448756	25.2	20	45.2	50	No

*Data for worst year provided only.

Increment Analysis

In addition to NAAQS modeling, PSD Increment modeling was completed. The goal of the PSD Increment modeling analysis is to determine the increase in ground-level concentration of PM_{10} and NO_X since the established PM_{10} baseline of 1975 and NO_X baseline of 1988, and determine if the increase exceed the allowable PSD Increments for either pollutant. Tables 5-13 through 5-15 of Application No. 16576 show the Increment Consumer/Expander status of each pollutant-emitting source located at BCI, as well as the modeling parameters. The PSD Increment model also includes off-site emission sources which are Increment Consumers or Expanders. Table 5-16 provides the modeling data for each off-site Increment Consuming/Expanding sources of PM_{10} and NO_X, which includes several sources in Florida for PM_{10}. The modeled impacts from the NAAQS run were evaluated to determine whether compliance with the Increment was demonstrated. The results are presented in Table 6-3.

Table 6-3: Class I Increment Analysis Results

Pollutant	Averaging Period	Year	Location	UTM East (km)	UTM North (km)	Maximum Impact (ug/m^3)	Increment (ug/m^3)	Exceed Increment?
NO_2	Annual	1991	Wolf Island	471054	3463167	0.34	2.5	No
PM_{10}	24-hour	1992	Wolf Island	471054	3463167	6.90	8	No
		2003	Okeefenokee	390204	3390729	2.12		
	Annual	1992	Wolf Island	468692	3468715	0.64	4	No
		2003	Okeefenokee	390411	3411048	0.195		

*Data for worst year provided only

The modeling was performed with the EPA AERMOD model for Wolf Island and CalPuff for Okeefenokee. Meteorological data for AERMET files was from 1990-1994, while CALMET 4-km files were from 2001-2003. Surface data was pulled from AERMET Savannah, MM5 thru VISTAS. Upper air data was pulled from AERMET Charleston, MM5 thru VISTAS. NO_2 did not exceed the Class I significance level at Okeefenokee, so it was not subject to cumulative Increment modeling.

Table 6-4: Class II Increment Analysis Results

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Maximum Impact (ug/m^3)	Increment (ug/m^3)	Exceed Increment?
NO_2	Annual	1991	450239	3448756	21.5	25	No
PM_{10}	24-hour	1994	452500	3451000	17.65	30	No
	Annual	1990	447200	3442000	1.96	17	No

*Data for worst year provided only

The modeling was performed with the EPA AERMOD model, with meteorological data from 1990-1994, surface data from Savannah, and upper air data from Charleston.

Table 6-5: Significance Analysis Results – Comparison to Monitoring *De Minimis* Levels

Pollutant	Averaging Period	Year*	UTM East (km)	UTM North (km)	Monitoring De Minimis Level (ug/m^3)	Modeled Maximum Impact (ug/m^3)	Significant?
NO_2	Annual	1991	450230	3448756	14	22.18	**Yes**
PM_{10}	24-hour	1994	450230	3448756	10	77.36	**Yes**
H_2S	1-hour	1993	450238	3448633	0.2	5.10	**Yes**
CO	8-hour	1993	451400	3448600	575	154.4	No

Data for worst year provided only

The modeling was performed with the EPA AERMOD model, with meteorological data from 1990-1994, surface data from Savannah, and upper air data from Charleston.

The impacts for NO_X, CO, H_2S, and PM_{10} quantified in Table 6-1 of the Class I Significance Analysis are compared to the Monitoring *de minimis* concentrations, shown above, to determine if ambient monitoring requirements need to be considered as part of this permit action. BCI operates TRS monitors on-site, which provide monitoring for H_2S as well. EPD operates PM monitors close to the mill and are considered representative of background emissions. NO_X monitors are located in Jacksonville, FL, which is also considered representative of background emissions. Based on the above, additional pre-construction monitoring is not considered warranted.

As noted previously, the VOC *de minimis* concentration is mass-based (100 tpy) rather than ambient concentration-based (ppm or $\mu g/m^3$). Projected VOC emissions increases resulting from the proposed modification exceed 100 tpy; however, the current Georgia EPD ozone monitoring network (which includes monitors in list monitor(s) closest to facility) will provide sufficient ozone data such that no pre-construction or post-construction ozone monitoring is necessary.

Modeling Summary

The criteria pollutant modeling results are presented in Application No. 16576 on the CD titled “Mill Optimization Permit Application “ Revised Modeling Section.” All modeled concentrations were found to comply with their respective NAAQS and Class I and II PSD Increments.

Visibility

Class I Visibility Analysis

After speaking with the PSD coordinator with the US National Park Service, a visibility impairment analysis was completed per the Federal Land Managers Air Quality Related Values Workgroup (FLAG) Phase I document – December 2000 for Wolf Island and Okefenokee Swamp. If no impairments on these two areas were identified, then it could be assumed that other Class I area are not negatively impacted by the project.

The visibility analysis was completed utilizing the PM_{10} and NO_X emissions increase from the project to estimate visibility impacts on the Okefenokee Swamp using the CALPUFF Model (version 5.7, level 030402), since this model is appropriate for impacts on areas greater than 50 km away. This model was used in a light mode (i.e., using the ISC meteorological data instead of site-specific data). If the results of this modeling are below the acceptable screening criteria (24-hour βextinction of 5%) then no additional modeling for Class I visibility will be required for the Okefenokee Swamp. When the project emissions are modeled, the maximum modeled result is a βextinction of 3.49% for the 1996 set of meteorological data. The results from all modeled years are presented in Table 7-2 of Application No. 16576. The FLM requested that the most recent meteorological data available should be used for the CALPUFF modeling. The most recent set of data for the Jacksonville, FL meteorological station that was the most readily available was the 1995-1999 period. Since this modeled result is less than the screening criteria set in the FLAG document, no further analysis is necessary.

Wolf Island is located 26 km away from the mill, so CALPUFF is not appropriate for this area. The Pluvue II model was used for the visibility impacts of the Mill Optimization project on Wolf Island. The Pluvue model accounts for the dispersion of the pollutants due to stack height and plume rise due to stack temperature and velocity. The Pluvue II model is a single source model, so an evaluation was completed in order to determine the source with the worst-case dispersion. The worst-case stack parameters were determined by calculating an M-factor for each stack using the procedures outlines in the "USEPA screening procedures for estimating the air quality impact of stationary sources – 1992." Table 8-1 of Application No. 16576 provides a summary of the stack parameters for each stack that emits either PM_{10} or NO_X. The M-factor takes into account emission rate, stack diameter, exhaust velocity, exhaust temperature, and stack height to determine the stack with the worst-case dispersion. Based on the above-referenced EPA document, the stack with the lowest M-factor is considered to have the worst-case dispersion characteristics. The ash transfer cyclone has the lowest M-factor. A Pluvue II model was completed for this stack. A copy of the model run is contained in Exhibit C of Application No. 16576. The model was run at worst-case wind conditions (F1) and therefore represents a worst-case impact on Wolf Island. The model predicts a ΔE of 0.99 at 26 km (compared to the screening level of 2.0) and a plume contrast of -0.015 (compared to a screening level of 0.05). This represents a very conservative worst-case assessment as it assumes all emission exhaust out a stack that is a very small source of the mill's total emissions. This analysis demonstrates that the Mill Optimization Project will have no significant impact on visibility at Wolf Island.

Class II Visibility

The project's impact on visibility in the Class II Area was also evaluated by completing a VISCREEN analysis for the closest sensitive Class II area (Glynco Jetport – figure 7-1 of Application No. 16576). This modeling followed the draft EPD Class II Area Visible Plume Assessment Guidance. There are three airports in the vicinity of BCI, but in order to assess the worst-case impact, the closeset airport was evaluated. Per EPD guidance, the evaluation was completed for the mill's potential to emit, outlined in Table 8-1 of Application No. 16576. The initial modeling was completed using the VISCREEN modeling following the procedures outlined in the Level I and Level II evaluation. The modeling results exceeded both the model screening levels, so a Level III analysis was completed using the Pluvue II model.

Just like the above Class I Area analysis, an evaluation was completed in order to determine the source with the worst-case dispersion, with the ash transfer cyclone having the lowest M-factor. A Pluvue II model was completed for this stack. The model was run at worst-case wind conditions (F1) and therefore represents a worst-case impact at the Jetport. The model predicts a ΔE of 4.5 (compared to the screening level of 2.0) and a plume contrast of -0.053 at 10 km (compared to a screening level of 0.05). Using the worst-case stack parameters therefore results in an impact that exceeds the model screening level.

In order to determine the visibility impacts for a more realistic worst-case stack, it was decided to model all the mill's emissions out of the first stack, which represents more than 1% of the mill's emissions. The first stack to exceed 1% of the total emission contribution is the No. 5 Smelt Dissolving Tank. The Pluvuee II model of the No. 5 Smelt Dissolving Tank with the mill's potential to emit results in a ΔE of 1.69 and a plume contrast of –0.017. Using these "realistic" worst-case stack parameters result in an impact that is below the screening level. The results of this model are still conservative because they are based on a modeled source that emits only 1% of the entire mill emissions – the majority of the emissions are emitted out the boilers and recovery furnaces with significantly better dispersion characteristics.

Georgia Toxic Air Pollutant Modeling Analysis

Georgia EPD regulates the emissions of toxic air pollutant (TAP) emissions through a program covered by the provisions of *Georgia Rules for Air Quality Control*, 391-3-1-.02(2)(a)3.(ii). A TAP is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. Procedures governing the Georgia EPD's review of TAP emissions as part of air permit reviews are contained in the agency's "*Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Revised)*." The *Guideline* implies that a pollutant is identified as a toxic air pollutant if any of the following toxicity determined values have been established for that pollutant. The priority is as follows:

- U.S. EPA Integrated Risk Information System (IRIS) reference concentration (RfC) or unit risk
- Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL)
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV)
- National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (REL)
- Lethal Dose –50% (LD_{50}) Standards

Selection of Toxic Air Pollutants for Modeling

For projects with quantifiable increases in TAP emissions, an air dispersion modeling analysis is generally performed to demonstrate that off-property impacts are less than the established Acceptable Ambient Concentration (AAC) values. The TAP evaluated are restricted to those that may increase due to the proposed project. Thus, the TAP analysis would generally be an assessment of off-property impacts due to facility-wide emissions of any TAP emitted by a facility. The first step was to calculate the potential emissions of all TAP from the mill after completion of the project. The calculations are based on EPA AP-42 emission factors for wood waste, natural gas, and fuel oil (residual and distillate combustion; EPA analysis of bark boilers burning TDF; and from sampling conducted at pulp and paper mills by NCASI. Table 6-1 in Application No. 16576 summarizes the total emission rates for the source of TAP at the mill. Exhibit E of Application No. 16576 contains the calculations used to determine the emission rates.

For each TAP identified for further analysis, both the short-term and long-term AAC were calculated following the procedures given in Georgia EPD's *Guideline*. Figure 8-3 of Georgia EPD's *Guideline* contains a flow chart of the process for determining long-term and short-term ambient thresholds. BCI referenced the resources previously detailed to determine the long-term (i.e., annual average) and short-term AAC (i.e., 24-hour or 15-minute). The AACs were verified by the EPD.

Determination of Toxic Air Pollutant Impact and Initial Screening Analysis

The Georgia EPD *Guideline* recommends a tiered approach to model TAP impacts, beginning with screening analyses using SCREEN3, followed by refined modeling, if necessary, with ISCST3 or ISCLT3. For the refined modeling completed, the infrastructure setup for the SIA analyses was relied upon with appropriate sources added for the TAP modeling. Note that per the Georgia EPD's *Guideline*, downwash was not considered in the TAP assessment. Each source of pollutants was modeled assuming an emission rate of 1 g/s. Generally, an initial screening analysis is performed in which the total TAP emission rate is modeled from the stack with the lowest effective release height to obtain the maximum ground level concentration (MGLC). Table 6-2 of Application No. 16576 shows the results of this modeling.

Secondary Screening Analysis Technique

For those pollutants that do not pass the initial screening modeling, Georgia TAP Modeling Guidelines recommend additional screening prior to using ISCST3 refined modeling. The second screening technique involves modeling the particular pollutants from each appropriate stack and adding the impact results from each of the stacks. The total impact is then compared to the AAC. That is, a unit emission rate of 1 g/s was modeled from each stack (or representative stack). MGLC impacts from the unit emission rate were scaled using the actual emissions of a particular TAP from a particular stack for each of the modeled stacks using the equation shown below. The impacts from each stack for a particular TAP were then added to reach a total impact, which is then compared to the AAC for that pollutant.

For those impacts that were smaller than the appropriate AAC, no significant impact is anticipated, and further modeling was not necessary. For those pollutants that indicated a significant impact is possible, refined modeling was performed to further evaluate the potential for significant impacts. The majority of the TAP screen out and do not require additional refined modeling.

The worst stack (1B Causticizer) was used to determine the worst-case ambient air concentration for each pollutant. The 1-hour concentration for the actual emission rate from each toxic was determined by a direct ratio of emission rates. The 1-hour MGLC from the SCREEN3 model was adjusted to an annual, 24-hour continuous, or short-term (15-minute) concentration using correction factors. These annual and short-term MGLC's were then compared to the derived AACs and short-term limits. The results of this analysis are summarized in Table 6-3 of Application No. 16576. Several listed compounds were above the AAC, which were further modeled as detailed below.

Refined Modeling Methodology

For those pollutants indicating a possible significant impact during the secondary screening, a refined modeling analysis was performed using ISCST3. The methodology was the same as presented for the PSD modeling analysis except that downwash was excluded from the TAP analysis, per the Georgia EPD *Guideline*. The maximum impacts of all pollutants are below the applicable AAC. See Table 6-4 of Application No. 16576 for further details.

Air Toxics Modeling Summary

The results of air toxics modeling are presented on the attached spreadsheet and show conformance with the respective GA EPD Acceptable Ambient Concentrations. This modeling was conducted using the Industrial Source Short-Term Model (version 02035) and did not incorporate the influence of Building downwash, per the GA EPD air toxics guidance.

7.0 ADDITIONAL IMPACT ANALYSES

PSD requires an analysis of impairment to visibility, soils, and vegetation that will occur as a result of a modification to the facility and an analysis of the air quality impact projected for the area as a result of the general commercial, residential, and other growth associated with the proposed project.

Soils and Vegetation

The effect of a proposed project's emissions on local soils and vegetation is often addressed through comparison of modeled impacts to the secondary NAAQS. The secondary NAAQS were established to protect general public welfare and the environment. Impacts below the secondary NAAQS are assumed to indicate a lack of adverse impacts on soils and vegetation. As discussed in Part 6.0 of this determination, the modeled ambient impacts associated with the proposed project are below the SAILs. No negative impacts on soils and vegetation are anticipated to result from the implementation of the proposed project since ground level concentrations of PM_{10} and NO_X are not expected to increase by a significant degree.

Growth

The purpose of a growth analysis is to predict how much new growth is likely to occur as a result of the project and the resulting air quality impacts from this growth. No adverse impacts on growth are anticipated from the project since any workforce growth and associated residential and commercial growth that would be associated with the proposed project (expected to be minimal) would not cause a quantifiable impact on the air quality of the area surrounding the facility.

Visibility

Visibility impairment is any perceptible change in visibility (visual range, contrast, atmospheric color, etc.) from that which would have existed under natural conditions. Poor visibility is caused when fine solid or liquid particles, usually in the form of volatile organics, nitrogen oxides, or sulfur oxides, absorb or scatter light. This light scattering or absorption actually reduces the amount of light received from viewed objects and scatters ambient light in the line of sight. This scattered ambient light appears as haze.

Another form of visibility impairment in the form of plume blight occurs when particles and light-absorbing gases are confined to a single elevated haze layer or coherent plume. Plume blight, a white, gray, or brown plume clearly visible against a background sky or other dark object, usually can be traced to a single source such as a smoke stack.

The Brunswick Mill presented visibility impact analyses as discussed in Section 6.0 of this document. The results of these analyses showed that the proposed project should have no perceptible impact on visibility within the Class I areas of interest.

8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 2631-127-0003-V-04-6. The following includes an explanation for all PSD-related new and modified Permit Conditions. Please see associated PSD Permit and Title V Significant Modification Application Review for an explanation of all other permit modifications.

Section 1.0: Facility Description

Section 1.3 contains a brief description of the project.

Section 2.0: Requirements Pertaining to the Entire Facility

No conditions in Section 2.0 are being added, deleted or modified as part of this permit action.

Section 3.0: Requirements for Emission Units

Permit Condition 3.2.8 was modified to include the new BACT limits for Recovery Boiler #5.

- 3.2.8.b was removed. The requirements are now contained in Permit Condition 3.4.14.
- 3.2.8.c was removed. The requirements are now contained in New Permit Condition 3.4.23.
- 3.2.8.d was modified to lower the PM emission limit from 0.044 gr/dscf to 0.021 gr/dscf, corrected to 8% oxygen once the modifications outlined in this application are complete. This BACT limit subsumes the existing 40 CFR 63 Subpart MM limit.
- 3.2.8.e was added to provide a new BACT limit for NO_X emissions of 100 ppm by volume, corrected to 8% oxygen once the modifications outlined in this application are complete.
- 3.2.8.f was added to provide a new BACT limit for CO emissions of 300 ppm by volume, corrected to 8% oxygen once the modifications outlined in this application are complete.
- 3.2.8.g was added to provide a new BACT limit for VOC emissions of 0.04 lb/MMBtu once the modifications outlined in this application are complete.
- 3.2.8.h was added to provide a new BACT limit for H_2S emissions of 4 ppm by volume, corrected to 8% oxygen once the modifications outlined in this application are complete.

Permit Condition 3.2.9 was modified to include the new BACT limits for Recovery Boiler #6 and to include some additional references.

- 3.2.9.a was modified to lower the PM emission limit from 0.044 gr/dscf to 0.021 gr/dscf, corrected to 8% oxygen once the modifications outlined in this application are complete. This BACT limit subsumes the existing 40 CFR 60 Subpart BB and 40 CFR 63 Subpart MM limit.
- 3.2.9.f was modified to lower the NO_X emission limit from 180 ppm by volume to 100 ppm by volume, corrected to 8% oxygen once the modifications outlined in this application are complete. This BACT limit subsumes the existing BACT limit.
- 3.2.9.i was added to provide a new BACT limit for CO emissions of 300 ppm by volume, corrected to 8% oxygen once the modifications outlined in this application are complete.
- 3.2.9.j was added to provide a new BACT limit for VOC emissions of 0.04 lb/MMBtu once the modifications outlined in this application are complete.
- 3.2.9.k was added to provide a new BACT limit for H_2S emissions of 4 ppm by volume, corrected to 8% oxygen once the modifications outlined in this application are complete.

Permit Condition 3.2.16 was modified to change the existing PSD avoidance limit for NO_X from the Primary and Backup Incinerators once the modifications outlined in this application are complete. The facility performed a BACT analysis in order to change this limit. This limit is increased from 215.5 tons per 12-month period to 0.456 lb/ADTP (approximately 250 tpy), with a limitation of 100 tpy from the Backup incinerator.

New Permit Condition 3.2.22 outlines the BACT limit of 0.07 lb/ton CaO for PM emissions for the new Lime Slaker.

New Permit Condition 3.2.23 outlines the BACT work practices for the new causticizer-area equipment. Only fresh water will be used in the area in order to minimize VOC emissions.

New Permit Condition 3.2.24 outlines the BACT work practices for the Paper Machines. The facility will conduct a final rinse for the pulp prior to entering the paper machines with either fresh water or whitewater, and will use no-VOC containing or negligible-VOC content additives. Also, the facility will handle any solid powered additives in an enclosure to minimize PM emissions.

New Permit Condition 3.2.25 outlines the BACT limits for the Petroleum Coke Grinding Operations.

- 3.2.25.a includes the BACT limit of 0.01 gr/dscf for PM emissions from the storage silos.
- 3.2.25.b includes the BACT limit of 0.1 lb/MMBtu for NO_X emissions from the grinder duct burner.
- 3.2.25.c includes the BACT limit of 84 lb/mmscf for CO emissions from the grinder duct burner.
- 3.2.25.d includes the BACT limit of 5.5 lb/mmscf for VOC emissions from the grinder duct burner.

Permit Condition 3.2.12 was modified to include new limits for Cl_2 and ClO_2 for the new Bleach Plant Scrubber BPS4.

New Permit Condition 3.2.26 outlines the BACT limits for Bleach Plant #4.

- 3.2.26.a includes the BACT limit of 1.69 lb/UODTP for CO emissions.
- 3.2.26.b includes the BACT limit of 0.092 lb/ADTP for VOC emissions.

New Permit Condition 3.2.27 was added to include the new Lime Kiln #6 emission limits.

- 3.2.27.a includes the BACT and 40 CFR 63 Subpart MM limit of 0.01 gr/dscf @ 10% oxygen for PM emissions. It subsumes the 40 CFR 60 Subpart BB limit.
- 3.2.27.c includes the BACT limits for NO_X emissions while firing petroleum coke - 250 ppm by volume, corrected to 10% oxygen and 145 lb/hr. It has been determined that ppm and lb/hr do not necessarily correlate.
- 3.2.27.d includes the BACT limit for NO_X emissions of 150 ppm by volume, corrected to 10% oxygen while firing fuels other than petroleum coke.
- 3.2.27.e includes the new BACT limit for CO emissions of 1.12 lb/ton of CaO produced in the lime kiln.
- 3.2.27.f includes the new BACT limit for VOC emissions of 25 ppm by volume, corrected to 10% oxygen.
- 3.2.27.g includes the new BACT limit for H_2S emissions of 8 ppm by volume, corrected to 10% oxygen.

Permit Condition 3.3.1 was modified to include Lime Kiln #6 in this general requirement for 40 CFR 60 Subpart BB.

Permit Condition 3.3.26 was modified to include Lime Kiln #6 in this general requirement for 40 CFR 63 Subpart MM.

Permit Condition 3.3.11 was modified to include new equipment in this requirement for 40 CFR 63 Subpart S. PG01 and R495 were added as equipment that are included in the LVHC System. Also, the 40 CFR 60 Subpart BB reference was modified to be more specific.

Permit Condition 3.3.30 was modified to remove the past date of April 17, 2006, and to include new equipment. PG30 was added as equipment that is included in the HVLC system.

New Permit Condition 3.3.38 was added to require the facility to control emissions from the knotters, screens, and deckers systems. This is a 40 CFR 63 Subpart S requirements for new affected sources. The facility had previously proved that the existing equipment fell under the exemptions provided by 40 CFR 63.443(a)(1)(ii) and (iv); however, per 40 CFR 63.443(a)(2), any new equipment is required to be controlled.

Permit Condition 3.4.14 was modified to include Georgia Rule (e) requirements for Recovery Boiler #5. These requirements were previously contained in Permit Condition 3.2.8.

New Permit Condition 3.4.23 was added to provide Georgia Rule (b) requirements for Recovery Boilers #5 and #6 (when not firing BLS). These requirements were previously contained in Permit Condition 3.2.8.

New Permit Condition 3.4.24 was added to provide Georgia Rule (b) requirements for new Lime Kiln #6.

New Permit Condition 3.4.25 was added to provide Georgia Rule (e) requirements for new Lime Kiln #6.

New Permit Condition 3.4.26 was added to provide Georgia Rule (g) requirements for new Lime Kiln #6.

New Permit Condition 3.4.27 limits the sulfur content in the fuel fired in Lime Kiln #6 to 3% by weight. However, Permit Condition 3.4.28 allows the facility to use a higher sulfur content fuel (i.e., petroleum coke) if a performance test required by Permit Condition 4.2.18.d shows compliance with the limits in Permit Condition 3.4.26.

New Permit Conditions 3.4.29, 3.4.30, and 3.4.31 were added to include the Georgia Rules (b), (e), and (g) requirements for the Petroleum Coke Grinding Equipment Group.

New Permit New Permit Conditions 3.4.32 and 3.4.33 were added to include the Georgia Rule (n) requirements for the Woodyard Area.

Section 4.0: Requirements for Testing

Permit Condition 4.1.3.cc was modified to include new Lime Kiln #6.

Permit Condition 4.2.1 and 4.2.2 were modified as following:

- Biennial testing for NO_X was removed for Recovery Boiler #6 since the facility will be installing a NO_X CEMS.
- Yearly testing for NO_X from the Backup NCG Incinerator was added.
- Yearly testing for PM and SO_2 and biennial testing for VOC from Lime Kiln #6 was added.
- Biennial testing for VOC from Recovery Boilers #5 and #6 was added.
- Yearly testing for NO_X from the Primary NCG Incinerator was added.
- The "*" under Condition 4.2.1 was removed. The facility will no longer use emission factors to determine NO_X emissions from the Primary Incinerator. The facility will instead use the results of the testing as the actual emissions.

New Permit Conditions 4.2.15 through 4.2.17 were added to outline the performance testing and methods to establish monitoring parameters under 40 CFR 63 Subpart MM for Lime Kiln #6. Condition 4.2.15 states that operating ranges may be replaced or changed in subsequent performance tests. Condition 4.2.16 requires the facility to determine the average value of each parameter monitored during a performance test. Condition 4.2.17 requires the facility to determine the black liquor solids firing rate and calcium oxide production during the performance tests

New Permit Condition 4.2.18 requires Lime Kiln #6 to be tested for the following:

- The facility will test for PM emissions once to show compliance with the PM limit. The facility will establish a minimum secondary power level for the new ESP to demonstrate compliance with 40 CFR 63 Subpart MM.
- The facility will test for VOC emissions once to show compliance with the VOC limit. The facility will operate the CO CEMS during the test to show compliance with both limits. It would then be assumed that compliance with the VOC limit would be maintained as long as compliance with the CO emission limit is maintained.
- The facility will test for H_2S and TRS emissions once to show compliance with the new H_2S limit. The facility will operate the TRS CEMS during the test to prove compliance with the H_2S emission limit, since the two limits are the same.
- The facility will test for SO_2 while firing the maximum amount of petroleum coke to show compliance with the Georgian Rule (g) limit. Also, the facility will establish operating parameters for the new scrubber for 40 CFR 63 Subpart MM, in addition to pH.
- The facility will test for NO_X while firing the maximum amount of petroleum coke once to show compliance with the lb/hour limit.

New Permit Conditions 4.2.19 and 4.2.20 requires Recovery Boilers #5 and #6 to be tested for the following:

- The facility will test for PM emissions once to show compliance with the new PM limit, as well as reestablish any operating parameters to demonstrate compliance with 40 CFR 63 Subpart MM. The facility will continue to operate the existing ESP and do not expect to have to change the current operating parameters of the ESP to achieve compliance with the new limit.
- The facility will test for VOC emissions once to show compliance with the new VOC limit. The facility will operate the new CO CEMS during the test to show compliance with both limits. It would then be assumed that compliance with the VOC limit would be maintained as long as compliance with the CO emission limit is maintained.
- The facility will test for H_2S and TRS emissions once to show compliance with the new H_2S limit. The facility will operate the TRS CEMS during the test to establish a H_2S/TRS ratio, which would be used to calculate the H_2S emissions.

New Permit Condition 4.2.21 requires the facility to test Lime Slaker #3 for PM and to establish a scrubber flow rate.

New Permit Condition 4.2.22 requires the facility to test the Primary and Backup Incinerators for the following:

- The facility will test for NO_X and establish the NO_X emissions rate used to determine emissions.
- The facility will conduct another initial performance test under 40 CFR 63 Subpart S in order to verify or reestablish the minimum operating temperature of the Primary incinerator.
- The facility will conduct a test under 40 CFR 63 Subpart S for SO_2 emissions in order to verify or reestablish the pH and recirculation rate for the Primary and Backup incinerator scrubbers

New Permit Condition 4.2.23 requires the facility to establish oxidation/reduction potential of the recirculation flow and liquid-to-air ratio rate for the new Bleach Plant #4 Scrubber, as well as meet the bleaching requirements of 40 CFR 63 Subpart S.

New Permit Condition 4.2.24 requires the facility to test the new Smelt Tank #6 scrubber to verify or reestablish the operating parameters under 40 CFR 63 Subpart MM as well as pH.

New Permit Condition 4.2.25 requires the facility to test the new steam stripper to establish process wastewater column feed temperature and total steam-to-condensate ratio for the requirements of 40 CFR 63 Subpart S.

New Permit Condition 4.2.26 requires the facility to test for PM emissions from the Petroleum Coke Grinding Operations and to establish pressure drop parameters for the baghouses.

Section 5.0: Requirements for Monitoring

Permit Conditions 5.2.1.c and 5.2.1.e were modified to include NO_X and CO CEMS to be installed on Recovery Boilers #5 and #6 once the modifications outlined in this application are complete.

New Permit Condition 5.2.1.g requires the facility to operate TRS, NO_X, CO, and oxygen CEMS on Lime Kiln #6. The facility has proposed the use of the CEMS in order to prove compliance with several of the BACT limits in Permit Condition 3.2.27.

New Permit Condition 5.2.2.f was added to include specific 40 CFR 63 Subpart MM continuous monitoring for the Lime Kiln #6 Scrubber. The facility must monitor scrubbant recirculation rate (flow rate) for 40 CFR 63 Subpart MM and as an alterative monitoring plan pursuant to 40 CFR 60 Subpart BB (in lieu of pressure drop). The facility must monitor scrubbant supply pressure for 40 CFR 60 Subpart BB and as an alterative monitoring plan pursuant to 40 CFR 63 Subpart MM (in lieu of pressure drop). The facility must also monitor secondary current and secondary voltage for the Lime Kiln #5 ESP as an alterative monitoring plan pursuant to 40 CFR 63 Subpart MM (in lieu of a continuous opacity monitor). The facility must also monitor pH as monitoring to prove compliance with the SO_2 limit.

Permit Condition 5.2.3.f was modified to include the new Bleach Plant scrubber parameter monitoring – liquid-to-air ratio and oxidation/reduction potential of the recirculation flow.

New Permit Condition 5.2.3.i was added to require the monitoring of CaO production in Lime Kiln #6 daily. This is required by 40 CFR 63 Subpart MM.

New Permit Condition 5.2.3.j was added to require monitoring of the baghouses associated with the Petroleum Coke Operations.

New Permit Condition 5.2.3.k was added to require monitoring of Lime Slaker #3 Scrubber flow rate.

New Permit Condition 5.2.3.l. was added to require monitoring of new Steam Stripper #2 – process wastewater feed rate, steam feed rate, process wastewater column feed temperature, and total steam-to-condensate ratio.

New Permit Condition 5.2.7 requires the facility to monitor visual emissions of the equipment in the Petroleum Coke Grinding Operations once per day of operation.

New Permit Condition 5.2.8 through 5.2.11 outline the CAM requirements for the Primary and Backup Incinerators.

Section 6.0: Other Recordkeeping and Reporting Requirements

New Permit Conditions 6.1.7.a.i.(F) and 6.1.7.a.i.(G) were added to include excess emission reporting for new BACT limits for NO_X and CO for Recovery Boilers #5 and #6.

Permit Condition 6.1.7.a.iv(A) was modified to reference the new temperature that will be established during testing for the Primary Incinerator

New Permit Condition 6.1.7.a.iv(E) includes the new Steam Stripper #2 excess emissions definitions.

New Permit Condition 6.1.7.a.vi outlines the excess emissions reporting for new Lime Kiln #6.

New Permit Condition 6.1.7.b.iii(D) was added to list the exceedence for H_2S emissions from Recovery Boilers #5 and #6.

New Permit Conditions 6.1.7.b.v(H) through 6.1.7.b.v(J) outline the 40 CFR 63 Subpart MM exceedances for new Lime Kiln #6.

New Permit Conditions 6.1.7.b.vi was added to include exceedences for the Primary and Backup Incinerator NO_X limits once the modifications outlined in this application are complete.

New Permit Condition 6.1.7.b.vii was added to list the exceedence for H_2S and the lb/hour NO_X emissions from new Lime Kiln #6.

New Permit Conditions 6.1.7.c.vi(K) and 6.1.7.c.vi(L) were added to include excursions for the new Bleach Plant scrubber - liquid-to-air ratio and oxidation/reduction potential of the recirculation flow.

New Permit Condition 6.1.7.c.viii was added to include an excursion for the new Lime Slaker scrubber flow rate.

New Permit Condition 6.1.7.c.ix was added to include an excursion for pressure drop and for adverse conditions discovered during inspections for the new Petroleum Coke Grinding Operations.

New Permit Condition 6.1.7.c.x was added to include excursion value for pH on the new Lime Kiln #6 scrubber.

Permit Condition 6.1.7.d.iii was modified to include the methods by which the facility will calculate NO_X emissions from the Primary and Backup Incinerators after the modifications are made.

Permit Conditions 6.2.23, 6.2.24, and 6.2.27 were modified to include the new Lime Kiln #6. These are specific 40 CFR 63 Subpart MM requirements.

New Permit Condition 6.2.33 includes the methods by which the facility must calculate H_2S emissions for Recovery Boilers #5 and #6.

New Permit Condition 6.2.35 requires the facility to submit for Division approval the method by which the facility will convert ppm to lb/hour in order to demonstrate compliance with the limit in Condition 3.2.27.c.ii

New Permit Condition 6.2.36 requires the facility to submit for Division approval the method by which the facility will demonstrate compliance with the emission limits and work practices contained in Conditions 3.2.22 through 3.2.26. This equipment is difficult, if not impossible, to test and the associated emission limits are insignificant.

New Permit Condition 6.2.37 requires the facility to maintain records of all actions taken to reduce fugitive dust in the woodyard area.

Section 7.0: Other Specific Requirements

New Permit Conditions 7.14.1 and 7.14.2 outlines the new equipment and equipment to be decommissioned upon completion of the Mill Optimization Project.

APPENDIX A

Draft Title V Operating Permit Amendment
2631-127-0003-V-04-6
Brunswick Cellulose, Inc.
Brunswick (Glynn County), Georgia

APPENDIX B

Brunswick Cellulose, Inc. PSD Permit Application and Supporting Data

Contents Include:

1. PSD Permit Application No. 16576, dated January 18, 2006

APPENDIX C

EPD'S PSD Dispersion Modeling and Air Toxics Assessment Review