Prevention of Significant Air Quality Deterioration Review
Of Georgia-Pacific Corporation dba Fort James Operating Company
Savannah River Mill
Located in Effingham County, Georgia

PRELIMINARY DETERMINATION
SIP Permit Application No. 15491
Title V Permit Application No. 15491
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State of Georgia
Department of Natural Resources
Environmental Protection Division
Air Protection Branch

Stationary Source Permitting Program (SSPP)
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SUMMARY

The Environmental Protection Division (EPD) has reviewed the Fort James Operating Company, Inc. – Savannah River Mill (Mill) combined application for a permit for the construction and operation of paper machine modifications (Mill Process Improvement Project) and for a retroactive PSD review for emissions from the paper machines, pulp processing area, and bleaching systems at the facility located in Rincon, Effingham County, Georgia.

The Mill Process Improvement Project involves modifications that will increase production at the paper machines. The major modification is the replacement of the hood section of the Yankee dryers for Paper Machine Nos. 17 and 18 and the installation of new, low-NO_x, natural gas-fired burners. Some of the minor projects include modifications to allow for on reel slitting capability, machine calendaring, sheet handling upgrades, spray boom additive applicators, upgrades to the water jet slitting system, wire and felt cleaning systems, head box modifications, vacuum system improvements, fiber supply flexibility modifications, shaft pulling modifications, online scanner upgrades, process control/monitoring upgrades, fine screen additions, and roll handling upgrades. For this project, PSD review is triggered for particulate matter (PM/PM_{10}), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and sulfuric acid mist (SAM).

The retroactive PSD application was submitted to correct previously underestimated PM/PM_{10} and VOC emissions for the paper machines, pulp processing area, and bleaching systems based on recent knowledge of newer, more accurate emission factors for VOC emissions and recent stack testing data for PM emissions.

The Mill is located in Rincon, Effingham County, Georgia. Effingham County has been designated by the US EPA as in attainment or unclassifiable for all criteria pollutants. The Mill is presently classified as a major stationary source under the PSD regulations.

The EPD review of the data submitted by the Mill related to the retroactive PSD application and the PSD application to increase the actual production rate for the paper machines indicates compliance with all applicable state and federal air quality regulations.

It is the preliminary determination of the EPD that the permitting action provides for the application of Best Available Control Technology (BACT) for the control of PM/PM_{10}, SO_2, NO_X, CO, and VOC emissions from the paper machines, pulp processing area, and bleaching systems as required by federal Prevention of Significant Deterioration (PSD) regulation 40 CFR 52.21(j).

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, either in the area surrounding the facility or in the three nearby Class I areas provided that the Mill take restrictions to reduce the impact of emissions on the surrounding area. Such restrictions reduce potential emission from fuel burning equipment through the use of lower sulfur fuel and through the addition of new short-term SO_2 and NO_X emission limits for the boilers, combustion turbines, and waste heat recovery boilers. It has further been determined that the proposal will not cause 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 the Savannah River Mill for the requested modifications. Various conditions will be made a part of the permit to ensure and confirm compliance with all applicable air quality regulations. A copy of the draft permit amendment is included in Appendix A of this document.

1.0 INTRODUCTION

On July 15, 2004, Fort James Operating Company, Inc.'s Savannah River Mill submitted a retroactive PSD application for PM/PM_{10} and VOC emissions from the paper machines, pulp processing area, and the bleaching systems at the Mill. On January 25, 2005, the Mill submitted a combined PSD permit application for (1) the retroactive review presented in the July 2004 application and (2) a PSD application for a Mill Process Improvement project for the paper machines. Each section of the January 2005 application is discussed below.

Retroactive PSD Application

The original permit application for construction of the Savannah River Mill was submitted on January 14, 1985. The Mill was classified as a major stationary source under 40 CFR 52.21. In total, 10 pollutants were subject to PSD review. These included PM/PM_{10}, SO_2, NO_x, CO, VOC, SAM, lead (Pb), mercury (Hg), beryllium (Be), and fluorides. The original application included the installation of four pulverized coal-fired boilers, two combustion turbines with waste heat recovery boilers, two refuse incinerators, a pulp processing system, three bleaching systems, (Bleaching System Nos. 1-3), four paper machines (Paper Machine Nos. 16-19), and miscellaneous process equipment to support the Mill's operations.

To address the original application, VOC and PM/PM_{10} emission calculations have been revised for the four paper machines, pulp processing area, and three bleaching systems. VOC emissions data for these types of sources was not available until the National Council for Air and Stream Improvement, Inc. (NCASI) published emission factors for deinking and paper recycling mills in 1997. The initial BACT analysis conducted for the four paper machines only addressed emissions from dryer section burners and did not address VOC emissions generated from the use of various VOC-containing chemical additives and solvent cleaning activities or PM/PM_{10} emissions from the papermaking process. Additionally, the BACT analysis did not consider the use of chemical additives or solvent cleaners used in the pulp processing area or bleaching systems. The BACT analysis submitted for the first retroactive PSD portion (for the originally permitted four paper machines, pulp processing area, and three bleaching systems) considers all sources of PM/PM_{10} and VOC emissions from the paper machines, the pulp processing area, and the bleaching systems, including the use of chemical additives and cleaning solvents, as well as emissions from fuel combustion in the paper machine burners.

A summary of the VOC and PM/PM_{10} emission increases for the original four paper machines, the pulp processing area, and the original three bleaching systems, as a result of the retroactive PSD analysis, compared to the potential emission rates contained in the original permit application to construct the Mill is shown in Table 1.

Table 1: Summary of Emission Increases for Original Permit Application to Construct Mill vs. Potential Emissions in Retroactive PSD Application

Pollutant	Potential Emissions for Original Permit, 1985 (tpy)	Revised Potential Emissions for Retroactive PSD, 2005 (tpy)	PSD Significant Levels (tpy)	Subject to PSD Review?
PM/PM_{10}	112.0	52.6	15/25	Yes
VOC	6.0	197.8	40	Yes

In October 1996, the mill submitted an application to the EPD to construct a fifth paper machine (Paper Machine No. 20) and a fourth bleaching system (Bleaching System No. 4). The VOC and PM/PM_{10} emission estimates used in the 1996 application were based on the best information available to the Mill at the time, which included stack testing data performed on similar types of paper machines and bleaching systems at a sister facility in Oklahoma, US EPA AP-42 emission factors for combustion in the dryer burners, and the use of material balance calculations for solvent cleaning activities. The Mill did not submit a BACT analysis for this project since total VOC emissions were estimated to be less than the PSD significant level of 40 tons per year and PM/PM_{10} emissions were estimated to be less than 15 tons per year.

Based on more recent calculations, which incorporate a very conservative mass-balance approach regarding VOC emissions from the use of chemical additives on paper machines and bleaching systems, PSD review is triggered for the October 1996 project for VOC emissions. Therefore, a BACT analysis has also been prepared for this equipment and made part of the retroactive PSD application. The BACT analysis reviews VOC control technologies for both the papermaking process portion of the paper machine and the burners in the Yankee dryer section of the paper machine. Using the updated calculations incorporated as part of the retroactive PSD application, PM/PM_{10} emissions are still less than the PSD applicability threshold of 15 tons per year for the October 1996 project. For this reason, a BACT analysis that considers PM emissions for the 1996 project is not required and has not been included as part of the retroactive PSD application.

A summary of the VOC and PM/PM_{10} emission increases for the fifth paper machine, the pulp processing area, and the fourth bleaching systems, as a result of the retroactive PSD analysis, compared to the potential emission rates contained in the October 1996 permit application is shown in Table 2.

Table 2: Summary of Emission Increases for October 1996 Original Permit Application vs. Potential Emissions in Retroactive PSD Application

Pollutant	Potential Emissions 1996 Permit Application (tpy)	Revised Potential Emissions for Retroactive PSD, 2005 (tpy)	PSD Significant Levels (tpy)	Subject to PSD Review?
PM/PM_{10}	0.7	11.6	15/25	No
VOC	38.5	52.7	40	Yes

Mill Process Improvement PSD Application

The major modifications to be implemented include replacement of the hood section of the Yankee dryers for Paper Machine Nos. 17 and 18 and the installation of new, low-NO_x, natural gas-fired burners. Some of the minor projects include modifications to allow for on reel slitting capability, machine calendaring, sheet handling upgrades, spray boom additive applicators, upgrades to the water jet slitting system, wire and felt cleaning systems, head box modifications, vacuum system improvements, fiber supply flexibility modifications, shaft pulling modifications, online scanner upgrades, process control/monitoring upgrades, fine screen additions, and roll handling upgrades. As a result of the proposed major modifications, a summary of the emission increases for the entire mill, based on a comparison of the "past actual" versus "future potential" emission rates for all of the emission sources at the Mill, is shown in Table 3.

Table 3: Summary of Emission Increases for Mill Process Improvement PSD Application

Pollutant	Potential Emissions Increase (tpy)	PSD Significant Levels (tpy)	Subject to PSD Review
PM/PM_{10}	252.3	15/25	Yes
SO_2	1827.6	40	Yes
NO_X	2494.2	40	Yes
CO	4554.1	100	Yes
VOC	174.0	40	Yes
Pb	0.06	0.6	No
SAM	8.5	7	Yes

Based on the information contained in Table 3, the Mill's proposed modification as specified per Georgia Air Quality Application No. 15491 is classified as a major modification under PSD because potential emissions of PM/PM_{10}, SO_2, NO_x, CO, VOC, and SAM exceed their respective PSD significance levels. Through its new source review procedure, EPD has evaluated the Mill's proposal for compliance with State and Federal requirements. EPD's findings have been presented in this Preliminary Determination document.

2.0 PROCESS DESCRIPTION

The Mill is a recycle deinking and bleaching paper mill. Pulp is manufactured from various grades of wastepaper and is processed through one of five paper machines to produce commercial and retail grades of tissue, paper toweling, and napkins. The Mill also is capable of using purchased virgin pulp in lieu of some or all of the wastepaper to make its products. The Mill's maximum pulp processing capacity is approximately 675,250 air-dried tons (ADT) per year (1,850 ADT per day or 77.1 ADT per hour) while its maximum production capacity for manufacturing tissue, towel, and napkins is about 709,560 ADT per year (1,944 ADT per day or 81 ADT per hour). These maximum rates will not change as a result of the Mill Process Improvement modifications.

Fluidized-Bed Boilers
The Mill has three primary power boilers. Each of the boilers has a heat input rating of 422 MMBtu/hr and is equipped with a baghouse and limestone injection to control PM, SO_2, and acid gas emissions. Each boiler has a turbine generator set that can produce up to 45 megawatts of electrical power for the Mill. Circulating Fluidized Boiler No. 3 was installed 1987 and is permitted to burn pet coke, coal, No. 2 fuel oil, wood/bark, tire-derived fuel, and peat. Fluidized Boiler No. 4 was installed in 1991 and is permitted to burn pet coke, coal, No. 2 fuel oil, wood/bark, peat, and natural gas. Circulating Fluidized Boiler No. 5 was installed in 1995 and is permitted to burn pet coke, coal, No. 2 fuel oil, tire-derived fuel, peat, and natural gas. The facility operates equipment to transport and store the fly ash associated with boiler use.

Fuel Feed Systems for Boilers
The Mill maintains several different outdoor storage piles of coal, pet coke, and limestone. These materials are delivered by railcar or by truck and are processed through a granulator and/or dried prior to use. The facility operates baghouses to control emissions associated with the storage, processing, and transport of these materials.

Combustion Turbines and Waste Heat Boilers
The Mill operates two combustion turbines to supplement the demand for steam and electrical power. Electrical power can also be sold to the local utility grid system. Each of the turbines has a waste heat recovery boiler. The turbines were installed in 1987, are rated at 316.63 MMBtu/hr, and burn natural gas or No. 2 fuel oil. Each turbine generates a maximum of 27 megawatts of electrical power. The waste heat recovery boilers are rated at 190.6 MMBtu/hr each. Natural gas and/or No. 2 fuel oil-fired burners supply 85.9 MMBtu/hr of the total heat input and the remainder comes from the heat generated by the combustion turbine. The waste heat recovery boilers produce steam for Mill operations and cannot be operated independently of the combustion turbines.

Chlor-Alkali Plant
The Chlor-Alkali Plant is operated to make sodium hypochlorite solution for use in the bleaching systems, high consistency pulpers, converting pulpers, and wastewater treatment system. The plant processes 28% sodium hydroxide and a sodium chloride brine solution through an ion exchange electrolyzer to generate 30% sodium hydroxide, chlorine gas, hydrogen gas, and depleted brine solution. The depleted brine solution is treated with hydrochloric acid and sent to a brine dechlorinator to remove any residual chlorine gas. A wet scrubber is used to control chlorine emissions from the brine dechlorinator.

The chlorine gas from the electrolyzer is mixed with caustic from the brine dechlorinator scrubber into an absorber, or hypo reactor, to generate a 10% solution of sodium hypochlorite. The bleach plant scrubber treats residual, unreacted chlorine gas. The sodium hypochlorite solution is pumped into three storage tanks.

Pulp and Paper Manufacturing (Pulp Processing Area, Bleaching System, and Paper Machines)
The pulp processing area pulps, deinks, cleans, and bleaches wastepaper to a specific level of brightness. The breakdown of wastepaper occurs in pulpers in which wastepaper is combined with chemicals, water, and then cooked with steam, making the pulp into a slurry (referred to as "stock"). The process separates the clay and other coatings from the wastepaper fibers (with screens) and chemically deinks the stock using caustic soda and detergents. The washed stock is then sent through screens to remove plastic, latex, sand, clay, and other materials. Water is then removed from the stock and it is bleached in one of four bleaching systems. Three of the bleaching systems use sodium hypochlorite as the primary bleaching agent while the fourth bleaching system uses hydrogen peroxide and sodium hydrosulfite as the primary bleaching agents.

Pulp stock from the pulp processing area may either be bleached first or sent directly to the five paper machines to manufacture commercial and retail-grade napkins, paper towels and tissue products. Various chemical additives are used when processing the pulp stock to give the finished product different properties, such as the use of wet strength resin for paper toweling to make the product strong when wet, or release agents that help prevent the product from sticking to the Yankee Dryer roll. Chemical cleaning agents are used on the wire support screen to remove the build-up of "stickies" that form over time from the use of chemical additives.

Each of the paper machines has a dryer section to dry the product before it is placed on the wind-up reel. Paper Machine Nos. 16 and 17 each have two, natural gas-fired burners with a total heat input of 64.0 MMBtu/hr. Paper Machine Nos. 18 and 19 each have two natural gas-fired burners with a total heat input of 50.0 MMBtu/hr. Paper Machine No. 20 has two burners that are permitted to burn either natural gas or No. 2 fuel oil with a total heat input rating of 60.0 MMBtu/hr. Paper Machine Nos. 16 and 17 also have after-dryers that use steam for heating the paper product. The after-dryers are needed for paper machines that manufacture paper toweling in order to obtain the correct moisture content in the final product.

Converting Department
Finished product from the paper machines is sent to the converting area of the Mill where the parent rolls are cut, re-wound, and/or printed on one of five flexographic printers or on the napkin printer. The finished product is packaged and prepared for off-site shipment via railcar or truck.

Wastewater Treatment Plant
Wastewater is generated in the pulp processing area and by the paper machines. All of the wastewater is sent to the Mill's wastewater treatment plant.

Scrap Wooden Pallet and Core Grinder
The Mill contracts with a vendor to operate its scrap wooden pallet and paper core grinder. Scrap wooden pallets and scrap parent roll cores are picked up and delivered via truck to the grinding area. The ground-up material is then fed into the boilers as a supplemental fuel. Ground up paper core material is taken to the pulp processing area where it is repulped.

Parts Washers
The Mill has a total of eight solvent-containing parts washers for equipment cleaning.

Paved Roads
The movement of raw material delivery trucks, as well as product trucks and other vehicles traveling along the Mill's paved roads generates fugitive particulate matter emissions.

3.0 REVIEW OF APPLICABLE RULES AND REGULATIONS

State Rules

Georgia Rule 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 thereunder. 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 (PSD)], and Section 391-3-1-.02(7) of the Georgia Rules (i.e., PSD).

Georgia Rule (b) limits the opacity of visible emissions to less than 40 percent. This rule applies to all of the paper machines. Rule (b) is also applicable to fuel burning equipment and the dry material handling operations. This rule is generally subsumed by more stringent opacity limits under 40 CFR Part 52.21, 40 CFR Part 60, and/or 40 CFR Part 63.

Georgia Rule (e) limits particulate matter emissions per the following equation for new (installed after July 2, 1968) process equipment:

> $E = 4.1(P)^{0.67}$, where E = Emission rate in pounds per hour and P = Process input rate in tons per hour, for process input weight rates up to and including 30 tons per hour.

Rule (e) applies to paper machines and the dry material handling operations. The rule may be subsumed by a more stringent limit under 40 CFR Part 52.21, 40 CFR Part 60, and/or 40 CFR Part 63.

Georgia Rule (d) [391-3-1-.02(2)(d)] contains requirements for fuel burning equipment. Emissions that may be regulated under Georgia Rule (d) include PM, opacity, and NO_X.

The boilers and combustion turbines are subject to NO_X limits of 0.2 to 0.7 lb/MMBtu depending on the type(s) of fuel being burned and a particulate matter limit of 0.10 lb/MMBtu. The waste heat boilers are subject to a particulate matter limit of $0.5(10/R)^{0.5}$ lb/MMBtu where R is equal to the heat input for the unit. Finally, all of the units are subject to an opacity limit of not more than 20 percent except for one six-minute period per hour of not more than 27 percent. Rule (d) limits may be subsumed by more stringent limits under 40 CFR Part 52.21, 40 CFR Part 60, and/or 40 CFR Part 63.

Georgia Rule (g) [391-3-1-.02(2)(g)] applies to all fuel-burning sources. Paragraph 1 limits the emission of SO_2 from new fuel burning sources based on the type of fuel burned in the source. Paragraph 2 of the rule limits the percentage of sulfur, by weight, in the fossil fuel burned to 3.0 percent for fuel-burning sources with a maximum heat input equal to or greater than 100 MMBtu/hr. Smaller units are limited to 2.5 percent sulfur by weight. This rule applies to the boilers, combustion turbines, and fuel burning equipment on the paper machines. Rule (g) limits may be subsumed by more stringent limits under 40 CFR Part 52.21, 40 CFR Part 60, and/or 40 CFR Part 63.

Federal Rule - PSD

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 potential 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.

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 and 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. The first core requirement is that the determination follow a "top-down" 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.

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. 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 an 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 to 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 document 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: Identify all control technologies
Step 2: Eliminate technically infeasible options
Step 3: Rank remaining control technologies by control effectiveness
Step 4: Evaluate most effective controls and document results
Step 5: Select BACT

Federal Rules – 40 CFR 60 Subparts D, Db, Y, GG, and OOO

The New Source Performance Standards (NSPS) contained in 40 CFR Part 60 that apply to the Mill are listed below.

The facility is subject to 40 CFR 60 Subpart D – Standards of Performance for Fossil Fuel-Fired Steam Generators for Which Construction is Commenced after August 17, 1971 for the Boiler No. 3 for the emission of SO_2. The limit is 1.2 lb/MMBtu and may be subsumed by a more stringent limit under 40 CFR Part 52.21.

The facility is subject to 40 CFR 60 Subpart Db – Standards of Performance for New Stationary Industrial-Commercial-Institutional Steam Generating Units for Boiler Nos. 3, 4 and 5. The three boilers are subject to particulate matter limits of 0.5 lb/MMBtu and NO_X limits of 0.6 lb/MMBtu. Boiler Nos. 4 and 5 are subject to a 90 percent reduction requirement for SO_2 and limits of 0.8 to 1.2 lb/MMBtu depending on fuel type. The limits may be subsumed by more stringent limits under 40 CFR Part 52.21.

The facility is subject to 40 CFR 60 Subpart Y – Standards of Performance for Coal Preparation Plants for the coal preparation operations. The subpart contains particulate matter and/or opacity limits for thermal dryers, transfer systems, and loading systems.

The facility is subject to 40 CFR 60 Subpart GG – Standards of Performance for Stationary Gas Turbines for Combustion Turbine Nos. 1 and 2. The subpart contains a NO_X limit based on heat capacity of the unit the amount of fuel bound nitrogen.

The facility is subject to 40 CFR 60 Subpart OOO – Standards of Performance for Nonmetallic Mineral Processing Plants for the material handling operations. The subpart contains particulate matter and/or opacity limits for screening operations, bucket elevators, belt conveyors, crushers, and exhaust stacks.

Federal Rule – 40 CFR 63 Subparts S, KK, JJJJ, YYYY, and DDDDD

The National Emission Standards for Hazardous Air Pollutants (NESHAPs) contained in 40 CFR Part 63 that apply to the Mill are listed below.

> The facility is subject to 40 CFR 63 Subpart S – National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production for the paper machines. There are no specific emissions standards that paper machines must meet.
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> The facility is subject to 40 CFR 63 Subpart KK – National Emission Standards for Hazardous Air Pollutants for Source Category: Printing and Publishing Industry for the operation of Flexographic Printer Nos. 1 – 3, 5, and 6. The limit imposed under the subpart is 400 kg per month of HAP usage.
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> The facility is subject to 40 CFR 63 Subpart JJJJ – National Emission Standards for Hazardous Air Pollutants: Paper and Other Web Coating for the use of glue in the Converting Department. The subpart limits the HAP or VOC content of coatings such as glue.
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> The facility is subject to 40 CFR 63 Subpart YYYY – National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines for Combustion Turbine Nos. 1 and 2. There are no specific emission standards that the combustion turbines must meet.
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> The facility is subject to 40 CFR 63 Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Industrial/Commercial/Institutional Boilers and Process Heaters for Boiler Nos. 3, 4 and 5 and the waste heat boilers with a compliance date of September 13, 2007. The subpart contains limits for particulate matter or total selected metals, hydrochloric acid, mercury, and carbon monoxide.

State and Federal – Startup and Shutdown and Excess Emissions

Excess emission provisions for startup, shutdown, maintenance, and malfunction are provided in Georgia Rule 391-3-1-.02(2)(a)7. Excess emissions from the units associated with the proposed modification will most likely result from a malfunction of the associated control equipment. The facility must minimize emissions during periods of startup, shutdown, and malfunction.

Federal Rule – 40 CFR 64- Compliance Assurance Monitoring (CAM)

40 CFR 64 applies to pollutant specific emission units (PSEUs) as defined in the subpart. PSEUs are units for which there exists an emission standard for which there is a Part 64 control device and where the pre-control potential emission rate is equal to or greater than 100 percent of the major source threshold. The frequency of data collection under Part 64 depends on whether the controlled potential to emit exceeds 100 tons per year, in which case it is considered to be a large PSEU. CAM requires a plan to be submitted for significant modifications to large PSEUs. Those emission units not specified as large units require a plan at permit renewal.

The retroactive PSD permit application addresses revisions for VOC and PM emissions from the Mill's five paper machines and VOC emissions from the Mill's bleaching systems. No controls are currently in place for VOC emissions for these sources, nor are additional controls proposed as a result of the BACT analyses conducted for the application.

A wet scrubber is used for both the No. 19 and 20 Paper Machines to control fugitive particulate matter emissions. Neither of these paper machines is considered a "large PSEU" under the CAM rules because the controlled PM/PM_{10} emission rate for each paper machine is well under the threshold of 100 tons per year. For these reasons, a CAM Plan is not required as part of the retroactive PSD permit application.

Similarly, for the reasons mentioned above, a CAM Plan is not required for the two modified paper machines at the Mill as a result of the PSD application to increase actual production for the five paper machines. Additionally, the two scrubbers in the Converting Department that control Trim Line emissions both have controlled PM/PM_{10} emission rates well under the threshold of 100 tons per year. There are no controls used for sources emitting VOC emissions in the Converting Department. Therefore, a CAM Plan is not required for the Converting Department.

4.0 RETROACTIVE CONTROL TECHNOLOGY REVIEW

The Mill prepared five retroactive BACT analyses. A list of each of the analyses (numbered from 1 to 5) and the pollutants reviewed as part of analyses are provided below:

(1) Paper Machine Nos. 16-19 Process Sections: PM/PM_{10} and VOC;
(2) Bleaching System Nos. 1-3: VOC;
(3) Paper Machine No. 20 Process Section: VOC;
(4) Paper Machine No. 20 Dryer Burners: VOC; and
(5) Bleaching System No. 4: VOC.

(1) - PAPER MACHINE NOS. 16-19 - PROCESS SECTION

Paper machines are primarily made up of two major unit operations: (1) a "forming section" where water is continuously withdrawn from the pulp via vacuum pumps as it moves down the machine upon a wire screen supported on large rollers and (2) a "drying section" where the paper is dried to the desired final moisture content in a large sheet metal enclosure, referred to as a "hood", with the heat supplied by natural gas fired burners.

In the forming section, chemicals that contain varying percentages of VOC are added to improve the quality of the paper and paper machine performance. Just ahead of the drying section, VOC-containing release agents are added to the paper so it can be easily removed from the large drying cylinders and wound up on wind-up reels. Additionally, VOC-containing cleaning solvents are used, as necessary, to clean impurities from the wire support screen. As a result, VOC emissions are emitted, mainly as fugitive emissions, from both sections of the paper machine. Total annual VOC emissions depend on the type of paper being produced and the chemical additives necessary to maintain product quality and performance.

PM is also generated by the paper machine operation, primarily from the drying section, as the paper is dried to its final moisture content, removed from the large drying cylinder, and wound up on the wind-up reel. A majority of the PM generated by the paper machine operation is emitted as fugitive emissions, similar to the generation of VOC emissions. Paper products that require lower moisture contents will result in the generation of higher quantities of fugitive dust. Paper machines that make lower moisture products may use wet scrubbers to minimize dust exposure for process operators. The natural gas-fired burners in the drying section of the paper machine generate the typical products of combustion, including PM, SO_2, NO_X, CO, and VOC. The pollutants generated from the products of combustion are all emitted through the drying hood stack exhaust. Total annual PM emissions depend on the type of paper being produced and the size of the burners in the drying section.

The BACT analysis reviews technologies and associated costs for the control of PM/PM_{10} emissions from the paper machine process (excluding the burners), as well as VOC emissions generated through the addition of VOC-containing chemical additives. Only one of the four paper machines, No. 16, was reviewed because all four machines operate in a similar fashion. Paper Machine No. 16 has the highest potential production rate of the four paper machines.

Particulate Matter (PM/PM_{10})

Paper machines generate fugitive PM [including both total suspended particulate matter and particulate matter less than 10 microns in aerodynamic diameter (PM_{10})] emissions from processing the pulp beginning at the stock preparation section of the machine through the wire section, the felt section, the Yankee dryer/after-dryer section, and from the accumulation of the finished product on the wind-up reel. Both point source and fugitive PM/PM_{10} emissions are generated by the paper machine from the process operations.

Step 1: Identify all Control Technologies

The Mill considered baghouses, wet scrubbers, wet ESPs, and cyclones in reviewing the BACT alternatives to control emissions of PM/PM_{10} from the paper machines.

Step 2: Eliminate Technically Infeasible Options

Baghouse
The use of a baghouse is technically feasible provided that the control is used on the combined airflow from the dry end emission points of the paper machine and roof vents. A baghouse could not be used on the wet end of a paper machine due to the high moisture content of the exhaust gases. High moisture levels cannot be tolerated by a baghouse.

Wet Scrubber, ESP, or Cyclone
A wet scrubber, ESP, or cyclone could also be used to control PM/PM_{10} emissions from the same dry end exhaust points of the paper machine and from the roof vents. The wet end of the paper machine does not generate significant quantities of PM/PM_{10} emissions.

Step 3: Rank Remaining Control Technologies by Control Effectiveness

Table 4 below summarizes the ranking for the controls available to reduce PM/PM_{10} emissions:

Table 4: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Baghouse	99.9%
2	ESP	99%
3	Wet Scrubber	90%-99%
4	Cyclone	90%

Step 4: Evaluate Most Effective Controls and Document Results

Baghouse
The Mill determined the cost to utilize a baghouse for controlling PM emission from all of the paper machine exhaust stacks and the roof vents by estimating the cost for tying all of the exhaust points and roof vents into one common header and directing the air flow into a baghouse sized for 700,700 acfm. The annualized cost for a pulse-jet baghouse was determined to be $2.4 MM. The cost effectiveness is $134,000 per ton of PM/PM_{10} removed based on a reduction of 17.88 tpy. The cost effectiveness results for the other three machines would be approximately the same or higher because the paper machines have approximately the same number of exhaust points/roof vents and the potential PM/PM_{10} emission rate from the other paper machines would be about the same or less than for Paper Machine No. 16.

The Mill also conducted an analysis of dry end emissions only (Yankee wet end and dry end hood exhaust stacks). It was assumed that all of the process PM/PM_{10} emissions are directed through the one exhaust point. This analysis yielded a cost effectiveness is $32,540 per ton PM/PM_{10} removed. These calculations include the cost of tying the two exhaust stacks together into one common header. Again, results for the other three paper machines would be similar. The use of a baghouse is not cost effective.

ESP

The Mill conducted an economic analysis for the use of an ESP to control PM emissions from the Paper Machine No. 16 Yankee Dryer exhaust stacks. Using an EPA equipment cost factor of $12.70/acfm and a total exhaust rate of 281,600 acfm, the estimated ESP equipment cost is $3,576,320. The Mill used this cost factor because it is listed for ESPs rated up to 35,000 acfm and 80% removal efficiency. There was no cost data listed for units as large as the 281,600 acfm unit as would be needed for this project. Cost estimates for dry ESPs used on Recovery Boilers in some of Georgia-Pacific's pulp and paper mills are in the range of $15-30/acfm (installed cost). Costs for wet ESPs are known to be higher than the costs for dry ESPs, however, the Mill used the lower cost value of $12.70/acfm because it is assumed that there would be economies of scale savings (in terms of dollars per acfm) if a unit sized for 281,600 acfm was utilized. The cost to tie the two Yankee Dryer process exhaust stacks together into one piece of ductwork that would direct the total flow through an ESP must also be added as part of the installation costs. This cost is estimated to be equal to $100,000. The annualized cost to install and operate the ESP was determined to be $1.6 MM using EPA's cost control spreadsheet. The cost effectiveness is determined to be $217,050 per ton PM/PM_{10} removed. The results would be similar for the other three paper machines. The use of an ESP is not cost effective.

Wet Scrubber

The Mill used EPA's Cost Control spreadsheet for a venturi scrubber to determine the cost effectiveness of such a device. It was assumed that just the wet-end and dry-end Yankee dryer exhaust stacks are controlled by the wet scrubber. Previous calculations in this analysis have already shown it is not cost effective to consider both the process exhaust stacks and the roof vents due to the large volume of air that must be controlled and the added cost to tie together all of the exhaust stacks into one common piece of ductwork to direct the exhaust stream into a control device. Using the cost estimated above for tying the two Yankee dryer exhaust stacks together into one common duct was $100,000. The annualized cost to install and operate a venturi scrubber was determined to be $695,000. The cost effectiveness is $92,430 per ton PM/PM_{10} removed. Similar results would be obtained for the other three paper machines. The use of a wet scrubber is not cost effective.

Cyclone

The Mill used EPA's Cost Control spreadsheet for a mechanical dust collector to determine the cost effectiveness of a cyclone. Using the cost estimated above for tying the two Yankee Dryer exhaust stacks together into one common duct was $100,000. The annualized cost to install and operate a cyclone was determined to be $217,222. The cost effectiveness is $13,491 per ton PM/PM_{10} removed. Similar results would be obtained for the other three paper machines. The use of a cyclone is not cost effective.

Table 5 summarizes the top-down BACT Impact Analysis results for PM/PM_{10} emissions from the paper machines. The average cost effectiveness values for the various technologies are all above the value that would be considered economically feasible.

Table 5: Top-Down PM/PM_{10} BACT Impact Summary

Control Alternative	Emissions (tpy)		Economic Impacts			Other Impacts	
	PTE	Reduction	Total Capital Investment ($)	Total Annualized Cost ($/yr)	Cost Effectiveness ($/ton)	Toxic Impact?	Env. Impacts?
Baghouse (all stacks)	17.9	17.88	10.6 MM	2.4 MM	134,000	No	No
Baghouse (dry end stacks)	17.9	17.88	1.05 MM	582,000	32,500	No	No
Wet ESP	7.6	7.52	8.04 MM	1.6 MM	217,000	No	No
Wet Scrubber	7.6	7.52	790,000	695,000	92,400	No	No
Cyclone	17.9	16.1	980,429	217,212	13,491	No	No

<u>Step 5: Select BACT</u>

Table 6: Summary of PM/PM_{10} Paper Machine BACT Determinations from RBLC

Company	Date	Equipment	Emission Rate	Control Tech.	Product
Georgia – Pacific, WI	2004	Paper Machine No. 9	0.245 lb/ADT	Wet scrubber and good operating practices	Tissue/toweling
Georgia- Pacific, WI	2003	Paper Machine No. 10	0.24 lb/ADT	Good operating practices	Tissue/toweling
Proctor & Gamble, MO	1998	4 Tissue machines Dry end section and Former section	95% reduction dry end 90% reduction former end	Venturi scrubber-95% Cyclone-90%	Tissue/toweling
Georgia-Pacific, AR	1997	Paper Machine No. 8 Dust System	0.0035 grains/dscf	Wet scrubber	Tissue/toweling

Table 6 summarizes BACT limits for paper machines making products similar to those at the Savannah River Mill. The No. 10 Paper Machine at GP's Green Bay Mill is similar to Paper Machine No. 16 at the Savannah River Mill because both machines are wet crepe machines make similar products. The No. 9 Paper Machine at GP's Green Bay Mill and the No. 8 Paper Machines at GP's Crossett, Arkansas Mill are dry crepe paper machines that generate significantly more PM that a wet crepe paper machine like Paper Machine No. 16 at the Savannah River Mill.

The database indicates that other mills have scrubbers and/or cyclone associated with the paper machines. However, the previous section of this determination has shown that controls for the Savannah River Mill are not cost effective. The Mill believes that these control units are present primarily to reduce wet mists, minimize the risk of fire, and to minimize operator exposure to dust. These are the reasons that the Savannah Mill currently operates scrubbing equipment on some portions of the paper process (Paper Machine Nos. 19 and 20).

Based on the discussions above, the Mill believes that the most effective BACT for PM/PM_{10} should be good operating practices. Good operating practices for the paper machines include such measures as cleaning the paper machine and paper machine area every shift of operation with air and/or water hoses. Since a large portion of the product made on Paper Machine No. 16 is printed in the converting operation, dust must be minimized from the paper machine to help maintain the quality of the printing operation. The Mill takes this into account in the types of wire fabrics that are used on the "wet end" of the machine and also in how the Mill dries the product on the paper machine in order to minimize dust generation.

The Mill has proposed a limit of 0.19 lb PM/PM_{10} per ton product for the No. 16 Paper Machine based on an emission rate of 4.1 lb PM/PM_{10} per hour and a production rate of 21.3 tons product per hour. Limits of 0.18, 0.19, and 0.10 lb PM/PM_{10} per ton of product have been proposed for Paper Machine No. 17 (wet crepe), 18 (dry crepe), and 19 (dry crepe), respectively. These limits take into account the production rates of the machines and the dryer burner modifications that will occur for Paper Machine Nos. 17 and 18. The emission rate for Paper Machine No. 19 is low because the Mill installed a scrubber on the dry end of the machine to reduce operator exposure to fugitive dusts. The scrubber does not eliminate all fugitive emissions generated by the machine. The proposed limits are lower than the limits approved from Paper Machine Nos. 9 and 10 in Table 6 above. In addition, the cost analysis data shows that the inlet loading to a control device for the Savannah River Mill machines would be lower than the scrubber outlet rate limit for the Paper Machine No. 8 Dust System also listed in Table 6 above.

Conclusion – PM/PM_{10} Control

The Division has determined the Mill's proposal to use good operating practices to minimize PM/PM_{10} emissions constitutes BACT. The BACT emission limit has been established as 0.19 lb PM/PM_{10}, 0.18 lb PM/PM_{10}, 0.19 lb PM/PM_{10}, and 0.10 lb PM/PM_{10} per air-dried ton of product for Paper Machines 16 through 19, respectively. Compliance with the PM limit must be demonstrated through limiting and monitoring paper production totals for each machine.

Summary – Control Technology Review for PM/PM_{10} from Paper Machine Nos. 16 – 19

To fulfill the PSD permitting requirements for PM/PM_{10}, a BACT analysis was conducted for Paper Machine Nos. 16 through 19. The BACT selections for the Paper Machines are summarized in Table 7. The emission limits selected are lower than the most recent PSD BACT determination levels published in the RBLC database for similar machines.

Table 7: Summary of PM/PM_{10} BACT Determinations for Paper Machine Nos. 16-19

Paper Machine No.	Emission Unit ID	BACT Limit
16	PM01	Good operating practices Emission rate = 0.19 lb PM/PM $_{10}$/ADT or 17.9 tons PM/PM $_{10}$/yr
17	PM02	Good operating practices Emission rate = 0.18 lb PM/PM $_{10}$/ADT or 16.8 tons PM/PM $_{10}$/yr
18	PM03	Good operating practices Emission rate = 0.19 lb PM/PM $_{10}$/ADT or 10.7 tons PM/PM $_{10}$/yr
19	PM04	Good operating practices Emission rate = 0.10 lb PM/PM $_{10}$/ADT or 5.6 tons PM/PM $_{10}$/yr

Volatile Organic Compounds (VOC)

VOC emissions are generated from the process operations of the paper machine due to the addition of VOC-containing chemical additives that are added to the pulp at the "wet-end" of the paper machine. VOC emissions are also generated through the use of VOC-containing solvents used to clean the wire fabric that supports the paper stock on the paper machine. For conservatism the Mill assumed that all of the VOC-containing portions of the chemical additives are released to the atmosphere.

Step 1: Identify all Control Technologies

In reviewing the BACT alternatives to control emissions of VOC from the paper machine, the Mill considered carbon adsorption, biofiltration, thermal oxidation, and the use of low VOC-containing chemicals or water-borne chemical additives.

Step 2: Eliminate Technically Infeasible Options

Carbon Adsorption

Adsorption of VOC onto an activated carbon bed from the paper manufacturing process would be impeded by the PM/PM_{10} content of the gas stream. The PM/PM_{10} would clog the pores of the activated carbon and greatly reduce the VOC removal efficiency. However, if the PM/PM_{10} were first removed from the gas stream, carbon adsorption would be technically feasible.

Biofiltration

The Mill found that although biofiltration is an innovative technology and is offered from a few vendors, its use would require additional testing and evaluation to determine if it is suitable for use in the paper making industry. The Mill's search of EPA's BACT/LAER Clearinghouse (post-1994) and EPA's "New Source Early Notification/Under Review Determinations" indicated no application of biofiltration for VOC control on paper making machines.

The Mill located literature describing a number of biofiltration applications. These applications were for units handling much lower exhaust air flows than what is present for the No. 16 Paper Machine's combined exhaust flow rate of 700,770 acfm. The largest commercial application for a biofiltration unit in the U.S. today is a 66,000 acfm unit. This particular unit has a footprint of 75 feet by 50 feet. Scaling up to a size to cover the total flow from Paper Machine No. 16 and the room vents would result in a footprint greater than 400 feet by 50 feet. This is a size larger than Paper Machine No. 16 itself and it would be impractical to install next to the paper machine since the length of this footprint is longer than the building that houses it (228 feet by 50 feet). Even if an attempt was made to only control a portion of the VOC emissions from the paper machine where most of the VOC would be emitted, such as the dry end of the paper machine, the biofiltration unit would still be over 4 times larger than the 66,000 acfm unit. Based on this information, it is not technically feasible to use biofiltration for Paper Machine Nos. 16-19.

Recuperative or Regenerative Thermal Oxidizer

A recuperative or regenerative thermal oxidizer is technically feasible for controlling VOC emissions from the paper machine stack exhausts and room vents. These types of oxidizers may also be effective in eliminating most, if not all, of the PM/PM_{10} generated by the paper machine process.

Use of Water-Borne or Low VOC-Containing Chemical Additives
The use of water-borne chemicals or low VOC-containing chemicals in place of currently used VOC-containing chemicals is a method that will reduce VOC emissions when applied properly. However, it must be considered that not all water-borne or low VOC-containing chemicals can perform as effectively as those chemicals with a higher VOC content. The Mill must be able to meet customer specifications when considering the use of an additive.

Step 3: Rank Remaining Control Technologies by Control Effectiveness

Table 8 below summarizes the ranking for the controls available to reduce VOC emissions:

Table 8: Ranking of Control Technology

Control Technology Ranking	Control Technology	Efficiency
1	Recuperative or Regenerative Thermal Oxidizer	95%-99%
2	Carbon Adsorption with PM removal	90%+
3	Use of low-VOC Containing Chemicals or Water-Borne Chemicals	Varies

Step 4: Evaluate Most Effective Controls and Document Results

Recuperative/Regenerative Thermal Oxidizer
The Mill used EPA's Cost Control spreadsheets determine the cost effectiveness for VOC control for both a recuperative and regenerative thermal oxidizer. The cost control calculations assume that the oxidizer is sized to handle all of the airflow from the paper machine process exhaust stacks only, for a total airflow of 375,770 acfm. Previous calculations in this BACT analysis have already shown it is not cost effective to consider any attempt to control both the process exhaust stacks and the roof vents due to the large volume of air that must be controlled and the added cost to tie together all of the exhaust stacks into one common piece of ductwork to direct the exhaust stream into a control device (there is still considerable expense involved in tying together all of the process exhaust stacks).

The annualized cost to install and operate the recuperative thermal oxidizer is $3.9 MM. The VOC potential emissions from the process exhaust stacks are conservatively assumed to include all of the VOC content from the chemical additives and cleaners used for the paper machine, or 59.7 ton/yr. Assuming a 99% reduction in the VOC emission rate, the cost effectiveness is $66,635 per ton VOC removed. If it is assumed that the oxidizer is also removing the PM/PM_{10} process emissions at a rate of 99%, then the cost effectiveness is $59,131 per ton of pollutants removed. The annualized cost to install and operate the regenerative thermal oxidizer is $3.75 MM. Using the same potential VOC and PM/PM_{10} emission rates used for the recuperative thermal oxidizer, the cost effectiveness is $56,277 per ton pollutants removed.

The Mill performed a separate, targeted cost analysis only for the dry end exhaust point of the paper machine. In this case, a recuperative thermal oxidizer is only sized for 281,600 acfm of airflow (from the Yankee Dryer vent). It is then conservatively assumed that 62% of the total VOC emitted from the paper machine are emitted from this portion of the paper machine. The cost effectiveness to operate a recuperative thermal oxidizer under this scenario $41,198 per ton of PM/PM_{10} and VOC removed.

The analyses show that it is not cost effective to use a thermal oxidizer to control the exhaust flow from the paper machine process exhaust stacks or the emissions from the "dry end" of the paper machine. It should also be noted that the cost effectiveness values are lower than actual because it is assumed that all VOC compounds used on the machine is routed to the control device. The same conclusion would be reached for Paper Machine Nos. 17-19.

Carbon Adsorption

The Mill used EPA's Cost Control spreadsheet for a carbon adsorption unit to determine the cost effectiveness for the control of VOC emissions. In order to use this technology, most of the PM/PM_{10} must first be removed from the exhaust stream. The annualized cost to control PM/PM_{10} with a wet scrubber is added to the annualiz ed cost to control VOC emissions in order to derive an overall annualized cost for both control technologies. The potential VOC emissions from the process exhaust stacks are assumed to be equal to 59.7 ton/yr. The potential PM/PM_{10} emissions from the same process exhaust stacks are 7.6 tons/yr. The carbon adsorption system is assumed to achieve 90% VOC control efficiency. Therefore, the amount of VOC removed is equal to 53.7 tons/yr. The wet scrubber is assumed to achieve 99% PM/PM_{10} control efficiency. Therefore, the amount of PM/PM_{10} removed is equal to 7.52 tons/yr. The annualized cost for both devices was determined to be $1.94 MM. The overall cost effectiveness for using both technologies is equal to $31,780 per ton pollutant removed. The use of carbon adsorption is not cost effective in this control scenario. The same conclusion would be reached for Paper Machine Nos. 17-19.

The Mill also performed a separate, targeted cost analysis only on the dry end exhaust points of Paper Machine No. 16. It is assumed that 62% of the VOC emissions are generated from this portion of the paper machine. In this case, the carbon adsorption system is only sized for 281,600 acfm of airflow (from the wet end and dry end Yankee dryer exhaust stacks). The PM/PM_{10} emissions would also need to be removed, although there would only be a total of 7.52 tons per year of PM/PM_{10} emissions. The total annualized cost for this scenario is equal to $1.7 MM. The overall the cost effectiveness for reducing both VOC and PM/PM_{10} emissions is equal to $41,654 per ton. The use of carbon adsorption is not cost effective in this control scenario. The same conclusion would be reached for Paper Machine Nos. 17-19.

Use of Water-Borne or Low VOC-Containing Chemical Additives

The Savannah River Mill does not have the ability to use a single VOC-concentration of wet strength resin for all of its products. The Mill does have a New Substance Review program in place to review all chemicals for environmental effects. Before any new subs tance can be purchased at the Mill, the Mill's Environmental Department must make an assessment of the VOC content and decide if there should be an alternative substance used that has a lower VOC content. This program helps to assure that the Mill can use the lowest VOC-containing materials available in the marketplace, yet maintain product quality.

For example, the Mill has stated that in the past a paper machine cleaning solvent that had a VOC content of 100%. Today, the Mill is using a cleaning solvent that has a VOC content of about 13%. Another example has been the conversion of some of the wet strength resin used in the paper machines from a VOC content of 3.4% to 1.5%. Wet strength resins account for a large portion of the VOC generated in the paper machines due to the large quantities of resin used (not due to its VOC concentration). A third example is the conversion of the use of VOC-containing inks used in the Mill's printing operations to water-based printing inks, or printing inks with low VOC content.

Table 9 summarizes the top-down BACT Impact Analysis results for VOC emissions from the paper machines. As can be seen in Table 9, the average cost effectiveness values for the various (add-on) technologies are all above the value that would be considered economically feasible.

Table 9: Top-Down VOC BACT Impact Summary

Control Alternative	Emissions (tpy)		Economic Impacts			Other Impacts	
	PTE	Reduction	Total Capital Investment ($)	Total Annualized Cost ($/yr)	Cost Effect. ($/ton)	Toxic Impact?	Env. Impacts?
Recuperative TO (all stacks)	59.7 VOC 7.6 PM/PM_{10}	59.1 VOC 7.52 PM/PM_{10}	11.7 MM	3.9 MM	66,635	No	No
Recuperative TO (dry end stacks)	37 VOC 7.6 PM/PM_{10}	36.6 VOC 7.52 PM/PM_{10}	7.45 MM	1.8 MM	41,200	No	No
Regenerative TO (all stacks)	59.7 VOC 7.6 PM/PM_{10}	59.1 VOC 7.52 PM/PM_{10}	11.0 MM	3.75 MM	56,277	No	No
Carbon Adsorption w/wet scrubber (all stacks)	59.7 VOC 7.6 PM/PM_{10}	53.7 VOC 7.52 PM/PM_{10}	7.9 MM	1.94 MM	31,780	No	No
Carbon Adsorption w/wet scrubber (dry end stacks)	37 VOC 7.6 PM/PM_{10}	33.3 VOC 7.52 PM/PM_{10}	6.7 MM	1.7 MM	41,650	No	No

Step 5: Select BACT

Table 10 is a summary of the BACT determinations for VOC emissions from paper machines as listed in the RBLC. The list includes only those machines that manufacture similar products to those produced at the Savannah River Mill.

Table 10: Summary of VOC Paper Machine BACT Determinations from RBLC

Company	State	Date	Equipment	Emission Rate	Control Technology
Georgia-Pacific	WI	2004	Paper Machine No. 9	2.7 lb/ton	None
Georgia-Pacific	WI	2003	Paper Machine No. 10	2.9 lb/ton	None
Proctor & Gamble	MO	1998	Paper Making Additives (through-air dryer)	2% of additives	Low VOC-content additives consistent with product quality and equipment operation
Georgia-Pacific	AR	1997	Tissue Machine No. 8 (dry crepe)	0.046 lb/ton	None

In lieu of a specific VOC limit on a pound per ton basis, the facility proposes that the Mill's New Substance Review program be considered BACT. The Mill will utilize a lower VOC-containing chemical whenever one is available as a substitute for the chemicals being used, as long as the substitute chemical will not change or degrade product quality. In those instances where necessary, the Mill will run trial tests with the substitute chemical to ensure that product quality is not changed or degraded before incorporating the use of the substitute chemical. This program will continue to be monitored and enforced by the Mill's Environmental Department. This would allow the Mill to maintain flexibility while promoting the use of lower emitting additives. It should be noted that Table 10 shows that a previous BACT analysis considered product quality when evaluating VOC emissions.

The Mill has requested that the new VOC emission limits for Paper Machine Nos. 16-19 be combined with the new VOC limit for Paper Machine No. 20, which will allow the Mill to combine the VOC record keeping function for all paper machines. Therefore, the Mill has proposed a VOC limit for all chemical additives and solvents of 191.2 tpy for Paper Machine Nos. 16-19 and 15.1 tpy for Paper Machine No. 20 for a combined total of 206.3 tpy. To demonstrate compliance with the VOC limit, the Mill will maintain a detailed VOC usage inventory and paper machine production records, on a rolling 12-month basis. Based on the maximum production of the paper machines and the 206.3 tpy VOC limit, the average limit is 0.58 lb VOC per ADT product. This is lower than the most recent BACT determinations found in the RBLC database.

Conclusion – VOC Control

The Division has determined that the Mill's proposal to use the New Substance Review program to minimize VOC emissions constitutes BACT. The BACT emission limit has been established as 206.3 tons of VOC for all five paper machines. Compliance with the VOC limit must be demonstrated through monitoring VOC-containing material usage and paper production.

Summary – Control Technology Review for VOC from Paper Machine Nos. 16 – 19

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for Paper Machine Nos. 16 through 19. The BACT selections for the Paper Machines are summarized in Table 11. The average emission limit selected is lower than the most recent BACT determination levels published in the RBLC database for a similar machine.

Table 11: Summary of VOC BACT Determination for Paper Machine Nos. 16-20

Paper Machine No.	Emission Unit ID	BACT Limit
16 – 19	PM01-PM04	New Substance Review Program; Emission rate = 191.2 tpy
20	PM05	New Substance Review Program; Emission rate = 15.1 tpy
16 – 20	PM01-PM05	New Substance Review Program; Emission rate = 206.3 tpy

(2) – BLEACHING SYSTEM NOS. 1-3 – VOC

The Savannah River Mill uses hypochlorite and hydrosulfite in Bleaching System Nos. 1-3. The Mill is not aware of any type of pollution controls used in recycle pulp bleach plants except for the Chlor-Alkali plants that are used to manufacture the hypochlorite solution. Chlor-Alkali plants, including the one at the Savannah River Mill, usually have caustic scrubbers to control residual amounts of chlorine that are generated by the manufacturing process. A caustic scrubber is also used to control emissions from the hypochlorite storage tanks. The other bleaching chemicals used at the Savannah River Mill, such as hydrosulfite and oxygen, are purchased in bulk and stored in onsite storage tanks. There are no air pollution controls used for these storage tanks.

Step 1: Identify all Control Technologies

The Mill conducted searches of the RBLC to identify control technologies for the control of VOC emissions from bleaching processes. Search terms included 30.002 - Kraft Pulp Mills, 30.004 - Pulp & Paper Production Other than Kraft, "bleach", "hypochlorite", "hydrosulfite", "de-inking", "peroxide", "chlor-alkali", and "recycle pulp." The only facility that matched any of these terms for a recycle pulp mill was for the Consolidated Paper Company's Mill located in Stevens Point, Wisconsin. The BACT entry listed was for a modification of the hydrogen peroxide pulp bleaching system in 1999. BACT for the modification was "no control" with a methanol limit of 4.1 tons per year. There were no BACT entries for recycle paper mills found before this date. Therefore, there does not appear to be any technologies in use to reduce VOC emissions from bleaching systems. Possible control technologies examined by the Mill included recuperative thermal oxidation, carbon adsorption, conversion to non-chlorine bleaching chemicals, and biofiltration.

Step 2: Eliminate Technically Infeasible Options

Recuperative Thermal Oxidation, Carbon Adsorption, and Conversion to Non-Chlorine Bleaching Chemicals
The recuperative thermal oxidation, carbon adsorption, and conversion to non-chlorine bleaching chemicals are all technically feasible.

Biofiltration
The Mill consulted Bioreaction Company concerning the use of biofiltration with the bleaching systems. The Mill found that chloroform, which comprises approximately 70 percent of the total VOC emitted from the bleach systems, would either inhibit or poison the biological population of the unit. Biofiltration is technically infeasible for use with the bleaching systems.

Chlor-Alkali Plant

The Chlor-Alkali plant at the Savannah River Mill has a brine dechlorinator caustic scrubber and a hypochlorite reactor/bleach tank caustic scrubber to control residual chlorine emissions from the process and from the hypochlorite storage tanks. There are insignificant VOC emissions generated from the operation of the Chlor-Alkali plant.

Step 3: Rank Remaining Control Technologies by Control Effectiveness

Table 12 below summarizes the ranking for the controls available to reduce VOC emissions:

Table 12: Ranking of VOC Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Recuperative Thermal Oxidation (95% Heat Recovery)	99%
2	Carbon Adsorption	90%
3	Conversion to Non-Chlorine Bleaching Chemicals	N/a

Step 4: Evaluate Most Effective Controls and Document Results

Recuperative Thermal Oxidizer
The Mill used EPA's Cost Control spreadsheets to determine the cost effectiveness of a recuperative thermal oxidizer for control of VOC emissions from Bleaching System No. 1. The cost calculations include the cost to tie all of the stacks exhausts from the Bleaching System into one common piece of ductwork that can be directed into the oxidizer and an average exhaust temperature of 100 degrees Fahrenheit from the combined exhaust stacks. The cost for combining all of the exhaust stacks into one common piece of ductwork is based on prorating the combined flow rate of approximately 115,000 acfm and cost estimates for a BACT analysis that was performed at GP's Green Bay, WI Mill in 2003. The cost estimate from the Green Bay Mill was $2.4 MM for a combined flow rate from paper machine exhaust stacks of 534,140 acfm. Prorating this cost and flow rate for the Bleaching System results in a cost estimate of $516,718.

The VOC emission rate from Bleaching System No. 1 is 16.05 tons per year. Using this data in EPA's Cost Control spreadsheet, and assuming 95% heat rec overy, yields a total annualized cost of $1,183,963. Assuming 99% removal of VOC, or a reduction of 15.9 tons per year, the cost effectiveness is equal to $74,463 per ton of VOC removed. Similar results would be found for Bleaching System Nos. 2 and 3 because these systems have equal or lower emission rates than Bleaching System No. 1. The use of a recuperative thermal oxidizer is not cost effective in controlling VOC emissions from bleaching systems.

Carbon Adsorption
The Mill used EPA's Cost Control spreadsheets to determine the cost effectiveness of a carbon adsorption system for control of VOC emissions from Bleaching System No. 1. The cost calculations include the cost to tie all of the stacks exhausts from the bleaching system into one common piece of ductwork that can be directed into the carbon adsorption system and an average exhaust temperature of 100 degrees Fahrenheit from the combined exhaust stacks.

The VOC emission rate from Bleaching System No. 1 is 16.05 tons per year. Using this data in EPA's Cost Control spreadsheet, and assuming a 90% removal rate, yields a total annualized cost of $476,455. With 90% removal of VOC, or a reduction of 14.4 tons per year, the cost effectiveness is equal to $33,087 per ton of VOC removed. Similar results would be found for Bleaching System Nos. 2 and 3 because these systems have equal or lower emission rates than Bleaching System No. 1. The use of a carbon adsorption system is not cost effective in controlling VOC emissions from bleaching systems.

Conversion to Non-Chlorine Bleaching Chemicals
The Mill used EPA cost factors and an installed cost of $15 million as estimated by a Mill engineering analysis to determine the cost effectives of conversion to non-chlorine bleaching chemicals in Bleaching System No. 1. For capital recovery, the Mill used a 7% interest rate and a 20-year life of the equipment. The 20-year life is longer than the 10-year life that is used in the other cost effectiveness calculations performed as part of the BACT analyses. The reason for using a longer life for depreciation is because the equipment installed for chemical conversion is not pollution control equipment; rather, it is process equipment that would normally have a longer depreciation schedule than pollution control equipment would have.

The cost effectiveness is equal to $153,409 per ton of VOC removed based on the assumption that all VOC (16.05 tons per year) are eliminated. The actual cost effectiveness will be higher because the non-chlorine chemical conversion will not eliminate 100% of the VOC emissions from the process. Some VOC are generated from the recycled pulp that is processed in the bleaching system. Similar results would be found for Bleaching System Nos. 2 and 3 because these systems have equal or lower emission rates than Bleaching System No. 1. The conversion to non-chlorine bleaching chemicals is not cost effective in controlling VOC emissions from bleaching systems.

Table 13 summarizes the top-down BACT Impact Analysis results for VOC emissions from the bleaching systems. As can be seen in Table 13, the average cost effectiveness values for the various technologies are all above the value that would be considered economically feasible.

Table 13: Top-Down VOC BACT Impact Summary

Control Alternative	Emissions (tpy)		Economic Impacts			Other Impacts	
	PTE	Reduction	Total Capital Investment ($)	Total Annualized Cost ($/yr)	Cost Effect. ($/ton)	Toxic Impact?	Env. Impacts?
Recuperative Thermal Oxidizer	16.05	15.9	3.3 MM	1.2 MM	74,463	No	No
Carbon Adsorption	16.05	14.4	2.7 MM	476,455	33,087	No	No
Conversion to Non-Chlorine Bleaching Chemicals	16.05	16.05	15 MM	2.5 MM	153,409	No	No

Step 5: Select BACT

Based on the cost analysis, the Mill has proposed that BACT for Bleaching System Nos. 1-3 be no control with a VOC limit of 35.85 tons per year. The Mill will demonstrate compliance with this annual limit by maintaining documentation on a rolling 12-month basis. The documentation will include records of monthly bleached pulp production for the bleaching systems and VOC emissions calculated by multiplying bleached pulp production in the units of oven-dried tons per month times the NCASI emission factors used in the PSD application. The Mill has requested the Division to combine the VOC limits for all four bleaching systems into one overall VOC limit of 69.2 ton/yr (based on 41.7 ton/yr for Bleaching System Nos. 1-3 and 27.5 ton/yr for Bleaching System No. 4). As stated previously, no RBLC emission rate information was located for similar processing units. The proposed permit limit will also include the related pulp processing area emissions of 28.1 tons per year for a total of 97.3 tons per year.

The Mill has proposed that BACT for the Chlor-Alkali Plant should be the use of caustic scrubbers for the hypochlorite reactor/bleach tanks and the brine dechlorinator. Both scrubbers have permit limits-42 ppmv for the brine dechlorinator scrubber and 10 ppmv for the hypochlorite reactor/storage tank scrubber. Records of chlorine emissions from the two scrubbers are maintained on a continuous basis as part of the existing permit requirements.

Conclusion – VOC Control

The Division has determined that the Mill's proposal to limit VOC emission from the bleaching systems to 69.2 tpy constitutes BACT. Compliance with the VOC limit must be demonstrated through record keeping requirements. The VOC limit is combined with the limit for the

Summary – Control Technology Review for VOC from Bleaching Systems No. 1 –3

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for Bleaching System Nos. 1-3. The BACT selections for the systems are summarized in Table 14. No comparable emission limits were located in the RBLC database.

Table 14: Summary of VOC BACT Determinations for Bleaching Systems Nos. 1-4

Bleaching System No.	Emission Unit ID	BACT Limit
1-3	FP04-FP06	No Controls; Emission Rate = 41.7 tpy
4	FP08	No Controls; Emission Rate = 27.5 tpy
1-4	FP04-FP06, FP08	No Controls; Emission Rate = 69.2 tpy

The permit contains a combined limit of 97.3 tpy VOC for the bleaching systems and the pulp processing area.

(3) – PAPER MACHINE NO. 20 – PROCESS SECTION (VOC)

The No. 20 Paper Machine operates in a similar manner as previously described for the Nos. 16-19 Paper Machines.

Step 1: Identify all Control Technologies

The VOC control technologies for Paper Machine No. 20 are the same as those identified for Paper Machine Nos. 16-19.

Step 2: Eliminate Technically Infeasible Options

All of the technologies identified all technically feasible for use in reducing VOC emissions for Paper Machine No. 20 as they were for Paper Machine Nos. 16-19.

Step 3: Rank Remaining Control Technologies by Control Effectiveness

The ranking of the available control technologies for reducing VOC emissions from Paper Machine No. 20 are the same as the ranking used for Paper Machine Nos. 16-19.

Step 4: Evaluate Most Effective Controls and Document Results

Recuperative or Regenerative Thermal Oxidizer
The Mill conducted the same cost analysis that was performed for Paper Machine Nos. 16-19. The cost effectiveness for VOC and PM/PM_{10} emissions were determined to be $131,000 per ton pollutant and $121,000 per ton pollutant for a recuperative thermal oxidizer and a regenerative thermal oxidizer, respectively. The analysis for the control of emission from the dry end exhaust points only yields a cost effectiveness of $80,000 per ton pollutant. It is economically infeasible to use a recuperative or regenerative thermal oxidizer to control only VOC by themselves or both VOC and PM/PM_{10} emissions from the Paper Machine No. 20.

Carbon Adsorption
The Mill conducted the same cost analysis that was performed for Paper Machine Nos. 16-19. The cost effectiveness for VOC and PM/PM_{10} emissions were determined to be $111,393 per ton pollutant. The analysis for the control of emission from the dry end exhaust points only yields a cost effectiveness of $61,297 per ton pollutant. It is economically infeasible to use a carbon adsorption system to control VOC and PM/PM_{10} emissions from the Paper Machine No. 20.

Use of Water-Borne or Low VOC-Containing Chemical Additives
Please see discussion for Paper Machine Nos. 16 - 19.

Table 15 summarizes the top-down BACT Impact Analysis results for VOC emissions from the paper machine. The average cost effectiveness values for the various (add-on) technologies are all above the value that would be considered economically feasible.

Table 15: Top-Down VOC BACT Impact Summary

Control Alternative	Emissions (tpy)		Economic Impacts			Other Impacts	
	PTE	Reduction	Total Capital Investment ($)	Total Annualized Cost ($/yr)	Cost Effect. ($/ton)	Toxic Impact?	Env. Impacts ?
Recuperative TO - VOC only-process stacks only	15.1 VOC	14.95 VOC	11.97 MM	3.5 MM	232,000	No	No
Recuperative TO - VOC and PM/PM_{10}-process stacks only	15.1 VOC 11.6 PM/PM_{10}	14.95 VOC 11.5 PM/PM_{10}	11.97 MM	3.5 MM	130,800	No	No
Recuperative TO - VOC and PM/PM_{10}-dry end stacks only	9.4 VOC 11.6 PM/PM_{10}	9.3 VOC 11.5 PM/PM_{10}	6.3 MM	1.66 MM	80,000	No	No
Regenerative TO - VOC and PM/PM_{10}-process stacks only	15.1 VOC 11.6 PM/PM_{10}	14.95 VOC 11.5 PM/PM_{10}	9.4 MM	3.2 MM	120,600	No	No
Carbon Adsorption w/wet scrubber- VOC and PM/PM_{10}-process stacks only	15.1 VOC 11.6 PM/PM_{10}	13.6 VOC 11.5 PM/PM_{10}	12.5 MM	2.8 MM	111,400	No	No
Carbon Adsorption w/wet scrubber- VOC and PM/PM_{10}-dry end stacks only	9.4 VOC 11.6 PM/PM_{10}	9.3 VOC 11.5 PM/PM_{10}	4.2 MM	1.3 MM	61,300	No	No

Step 5: Select BACT

Please see discussion for Paper Machine Nos. 16 - 19.

Conclusion – VOC Control

Please see discussion for Paper Machine Nos. 16 - 19.

Summary – Control Technology Review for VOC from Paper Machine No. 20

Please see discussion for Paper Machine Nos. 16 - 19.

(4) – PAPER MACHINE NO. 20 DRYER BURNERS - VOC

The burners inside of the Yankee dryer hood for Paper Machine No. 20 supply supplemental heat in addition to the steam that is used to dry the paper running through the Yankee dryer. There are two burners used in the Yankee dryer, one on the wet (inlet) side of the Yankee dryer and another burner on the dry (outlet) side of the Yankee dryer. The burners use natural gas as fuel. When combustion equipment is operated properly, VOC emissions are minimized. Good combustion practices include operator practices, maintenance practices, and maintaining proper combustion fuel/air ratios in the burner.

Step 1: Identify all Control Technologies

The Mill identified technologies utilized for minimizing VOC emissions on paper machine dryer burners as no control, good combustion practices, and/or the use of natural gas a clean fuel. The Mill did not consider other control technologies such as the use of an oxidation catalyst when burning natural gas due to the very low emissions generated. The estimated VOC emission rate from natural gas-fired burners rated at 60 MMBtu/hr heat input, using emission factors from AP-42 (5.5 lb VOC/MMscf with a 20% contingency = 6.6 lbs VOC/MMscf) and a heat content of natural gas of 1,000 Btu/ft^3 is 0.40 pounds per hour or 1.75 tons per year.

Step 2: Eliminate Technically Infeasible Options

All options are feasible.

Step 3: Rank Remaining Control Technologies by Control Effectiveness

Table 16 below ranks the feasible control technologies.

Table 16: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Good Combustion Practices (Use of Natural Gas)	N/a

Step 4: Evaluate Most Effective Controls and Document Results

The entries listed in Table 17 from the RBLC indicate no control, good combustion practices, and the use of natural gas as a clean fuel as the control technologies.

Table 17: Summary of VOC Paper Machine Dryer Burner BACT Determinations from RBLC

Facility	Year	Equipment	Burner (MMBtu/hr)	Emission Rate (lb/MMBtu)	Controls
Weyerhaeuser, OK	2004	Paper Machine	Unknown	No limit	Good Operating Practices
Georgia-Pacific, LA	2002	Paper Machine No. 6	90.0	0.045	Good Combustion Practices
Georgia-Pacific, LA	2002	Paper Machine No. 6	50.0	0.045	Good Combustion Practices
Georgia-Pacific, LA	2002	Paper Machine No. 6	21.0	0.0192	Good Combustion Practices
Stora-Enso NA, WI	2002	Paper Machine No. P51	34.4	No limit	Good Combustion Practices Use of Natural Gas
Georgia-Pacific, AR	2001	Paper Machine No. 9	90.0	0.045	No Control
Georgia-Pacific, AR	2001	Paper Machine No. 9	50.0	0.045	No Control
Georgia-Pacific, AR	2001	Paper Machine No. 9	21.0	0.019	No Control
Donahue Ind., TX	2000	Paper Machine No. 8	Unknown	37.21 lb/hr	No Control
Georgia-Pacific, AR	1997	Paper Machine No. 5	21.0	0.0564	No Control
Georgia-Pacific, AR	1997	Paper Machine No. 6	58.4	0.0192	No Control
Georgia-Pacific, AR	1997	Paper Machine No. 8	50.0	0.0192	No Control

Step 5: Select BACT

The Mill proposes that good combustion practices and the use of natural gas for its Paper Machine No. 20 dryer burners constitute BACT. The Mill also proposes a VOC permit limit for the paper machine burners of 0.40 lbs/hr which is based on the latest AP-42 emission factor of 5.5 lbs VOC per $MMft^3$ gas burned multiplied by a safety factor of 1.2 times a natural gas firing rate of 0.06 $MMft^3$ per hour. This converts to an emission factor of 0.0067 lb/MMBtu, which is lower than all of the entries listed in Table 17.

Conclusion – VOC Control

The Division has determined that the Mill's proposal to use the good combustion practices and natural gas to minimize emissions from the dryer burners of Paper Machine No. 20 constitutes BACT. The BACT limit has been established as 0.0067 lb/MMBtu.

Summary – Control Technology Review for VOC from Paper Machine No. 20 Dryer Burners

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for the dryer burners for Paper Machine No. 20. The BACT selection is summarized in Table 18. The emission limit selected is lower than previous PSD BACT determination levels published in the RBLC database for similar equipment.

Table 18: Summary of VOC BACT Determinations for Dryer Burners from Paper Machine No. 20

Paper Machine No.	Emission Unit ID	Dryer Burner BACT Limit
20	PM05	Good Combustion Practices (Use of Natural Gas) 0.0067 lb/MMBtu VOC

(5) – BLEACHING SYSTEM NO. 4 – VOC

See the description for Bleaching Systems Nos. 1-3.

Step 1: Identify all Control Technologies

The VOC control technologies for Bleaching System No. 4 are the same as those identified for Bleaching System Nos. 1 3.

Step 2: Eliminate Technically Infeasible Options

The feasibility analysis for Bleaching System No. 4 is the same as the analysis conducted from Bleaching System Nos. 1 – 3.

Step 3: Rank Remaining Control Technologies by Control Effectiveness- VOC Emissions

The ranking of the available control technologies for reducing VOC emissions from Bleaching System No. 4 is the same as the ranking used for Bleaching System Nos. 1-3.

Step 4: Evaluate Most Effective Controls and Document Results

The cost analysis for Bleaching Systems Nos. 1-3 demonstrated that it is not cost effective to control VOC emissions from the bleaching systems.

Step 5: Select BACT-VOC Emissions

Please see discussion for Bleaching System Nos. 1-3.

Conclusion – VOC Control

Please see discussion for Bleaching System Nos. 1-3.

Summary – Control Technology Review for VOC from Bleaching System No. 4

Please see discussion for Bleaching System Nos. 1-3.

5.0 MILL PROCESS IMPROVEMENT CONTROL TECHNOLOGY REVIEW

The Mill prepared two BACT analyses for the mill process improvement PSD project. A list of the analyses (numbered 6 and 7) and the pollutants reviewed as part of BACT are provided below:

(6) Paper Machine Nos. 17-18 Dryer Burners: PM/PM_{10}, SO_2, NO_x, CO, VOC; and
(7) Converting Department: PM/PM_{10} and VOC.

6) – PAPER MACHINE NOS. 17 and 18 DRYER BURNERS

The Mill prepared a BACT analysis for Paper Machine Nos. 17 and 18 because the Savannah River Mill is proposing to replace the dryer hoods and burners for each of these paper machines with hoods that recirculate the hot air instead of using the hot air just "once through" and then discharging it to the atmosphere. The maximum heat input for each paper machine will not exceed 70 MMBtu/hr. The new hoods will provide each of the two paper machines with the ability to increase production by drying paper at a higher rate. However, these projects will not require any change in the potential production rates for either paper machine.

The following analyses have been conducted for the "dryer sides" of Paper Machine Nos. 17 and 18. While there are a number of other minor changes that may be implemented for Paper Machine Nos. 17 and 18 (as well as the other three paper machines at the Mill), to improve production efficiency, the BACT analyses previously conducted for all five paper machines at the Mill that were part of the Retroactive PSD Permit Application address emissions increases due to these changes.

Paper Machine Nos. 17 and 18 produce tissue, napkin, and paper towel products. These conventional paper machines utilize Yankee dryers to complete the drying process for tissue, towel, and napkin manufacturing. Yankee dryers are a specific kind of dryer that combines large steam cylinders with an air hood that contains two natural gas-fired burners. The continuous sheet of paper leaves the forming section of the paper machine where water has been drained from the formed sheet to approximately 50% moisture. The sheet then goes through the Yankee drying section where it actually sticks to the hot surface of the Yankee steam cylinder. The sheet must then be scraped off with a doctor blade. This removal of the sheet by the doctor blade causes the sheet to "crepe" off, giving the sheet a bulk texture that makes the sheet softer and more absorbent. A dry crepe process doctors the sheet off the Yankee after the sheet is fully dry. A wet crepe process doctors the sheet off while it is still slightly moist (10-15% moisture) and then further dries the sheet in a steam-heated after dryer that follows the Yankee Dryer. The wet creping sheet better retains its bulkiness and absorbent characteristics. The Paper Machine No. 17 is a wet crepe paper machine while Paper Machine No. 18 is a dry crepe paper machine. It should be noted that the analysis focuses on Paper Machine No. 18.

Particulate Matter (PM/PM_{10})

Step 1: Identify all Control Technologies

The Mill identified clean fuels or natural gas as the only control for minimizing PM/PM_{10} emissions from dryer burners. The Mill did not consider other control technologies such as the use of a wet scrubber or baghouse due to the very low emissions generated while burning natural gas.

Step 2: Eliminate Technically Infeasible Options

Clean fuel and the use of natural gas are technically feasible for the dryer burners on Paper Machine No. 18.

Step 3: Rank Remaining Control Technologies by Control Efficiency

Table 19: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Clean Fuels / Natural Gas	N/a

Step 4: Control Effectiveness Evaluation

Clean fuel / natural gas usage is the only control option. Table 20 summarizes limits found in the RBLC for PM/PM_{10} emission from paper machines dryer burners.

Table 20: Summary of PM/PM_{10} Paper Machine Dryer Burner BACT Determinations from RBLC

Facility	Date	Equipment	Burner (MMBtu/hr)	Emission Rate (lb/MMBtu)	Controls
Georgia-Pacific, LA	2002	Paper Machine # 6	90.0	0.024	Clean Fuel
Georgia-Pacific, LA	2002	Paper Machine # 6	50.0	0.0216	Clean Fuel
Georgia-Pacific, LA	2002	Paper Machine # 6	21.0	0.0157	Clean Fuel
Stora-Enso, WI	2002	Paper Machine No. P51	34.4	0.023	Use of natural gas
Bowater, SC	2001	No. 3 Paper Machine	Unk	0.0164	No control / No. 6 fuel oil
Georgia-Pacific, AR	2001	Paper Machine No. 9	90.0	0.0217	Use of Natural Gas
Georgia-Pacific, AR	2001	Paper Machine No. 9	50.0	0.0217	Use of Natural Gas
Georgia-Pacific, AR	2001	Paper Machine No. 9	21.0	0.0164	Use of Natural Gas
Stora-Enso, WI	2000	Paper Machine No. 16	11.7	0.004	Use of natural gas
Inter Lake Paper, WI	2000	# 95 Paper Machine and Coater	18.23	0.055 (1.0 lb/hr_	Use of natural gas
Inter Lake Paper, WI	2000	# 96, # 97 Paper Machines and Coaters	60.0, 116.6	0.017, 0.0086 (1.0 lb/hr)	Use of natural gas
Georgia-Pacific, AR	1997	Paper Machine # 5	21.0	0.0164	Clean Fuel
Georgia-Pacific, AR	1997	Paper Machine # 6	58.4	0.0164	Clean Fuel
Georgia-Pacific, AR	1997	Paper Machine # 8	50.0	0.0164	Clean Fuel

Step 5: Select BACT

The Mill has established BACT for PM/PM_{10} emissions based on the use of Maxon Crossfire low NO_X burners (see the NO_X BACT determination for further information). The Mill has proposed BACT to be the use of natural gas as a clean fuel and an emission limit of 0.005 lb/MMBtu heat input, which is equivalent to Maxon's emission factor guarantee for the Crossfire "low-NO_x" burner. This emission limit is lower than the values established in the most recent RBLC database entries.

Conclusion – PM/PM_{10} Control

The Division has determined that the Mill's proposal to use the natural gas to minimize PM/PM_{10} emissions from the dryer burners of Paper Machine Nos. 17 and 18 is BACT. The BACT limit has been established as 0.005 lb/MMBtu.

Summary – Control Technology Review for PM/PM_{10} from Paper Machine Nos. 17 and 18 Dryer Burners

To fulfill the PSD permitting requirements for PM/PM_{10}, a BACT analysis was conducted for the dryer burners for Paper Machine Nos. 17 and 18. The BACT selection is summarized in Table 21. The emission limit selected is lower than the most recent BACT determination levels published in the RBLC database for similar equipment.

Table 21: Summary of PM/PM_{10} BACT Determinations for Dryer Burners from Paper Machine Nos. 17 and 18

Paper Machine No.	Emission Unit ID	Dryer Burner BACT Limit
17	PM02	Use of Natural Gas; 0.005 lb/MMBtu PM/PM_{10}
18	PM03	Use of Natural Gas; 0.005 lb/MMBtu PM/PM_{10}

Sulfur Dioxide (SO_2)

Step 1: Identify all Control Technologies

The Mill identified clean fuels or natural gas as the only control for minimizing SO_2 emissions. No pollution control device would work effectively at the very low SO_2 emission rates produced by burning natural gas.

Step 2: Eliminate Technically Infeasible Options

Clean fuel and the use of natural gas are technically feasible for the dryer burners on Paper Machine No. 18.

Step 3: Rank Remaining Control Technologies by Control Efficiency

Table 22: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Clean Fuels / Natural Gas	N/a

Step 4: Control Effectiveness Evaluation

Clean fuel / natural gas usage is the only control option. Table 23 summarizes limits found in the RBLC for SO_2 emissions from paper machines dryer burners.

Table 23: Summary of SO_2 Paper Machine Dryer Burner BACT Determinations from RBLC

Facility	Date	Equipment	Burner (MMBtu/hr)	Emission Rate (lb/MMBtu)	Controls
Stora-Enso, WI	2003	Paper Machine No. 26 w/coater	40.0	No numeric limit	Use of natural gas
Stora-Enso, WI	2003	Paper Machine No. P64 w/coater & IR Dryers	Unk	No numeric limit	Use of natural gas
Stora-Enso, WI	2003	Paper Machine No. 16 w/coater	Unk	No numeric limit	Natural gas-fired IR burners
Georgia-Pacific, LA	2002	Paper Machine # 6	90.0	0.0007	Use of natural gas
Georgia-Pacific, LA	2002	Paper Machine # 6	50.0	0.0007	Use of natural gas
Georgia-Pacific, LA	2002	Paper Machine # 6	21.0	0.0007	Use of natural gas
Stora-Enso, WI	2002	Paper Machine No. P51	34.4	No numeric limit	Use of natural gas
Stora-Enso, WI	2000	Paper Machine No. 16	11.7	0.0018	Use of natural gas
Inter Lake Paper, WI	2000	# 95 Paper Machine and Coater	18.2	No numeric limit	Use of natural gas
Inter Lake Paper, WI	2000	# 96, # 97 Paper Machines and Coaters	60.0, 116.6	No numeric limit	Use of natural gas
Georgia-Pacific, AR	1997	Paper Machine # 5	21.0	0.0007	Clean Fuel
Georgia-Pacific, AR	1997	Paper Machine # 6	58.4	0.0007	Clean Fuel

Step 5: Select BACT

The Mill has established BACT for SO_2 emissions based on the use of Maxon Crossfire low NO_X burners (see the NO_X BACT determination for further information). The Mill has proposed BACT to be the use of natural gas as a clean fuel and an emission limit of 0.0007 lb/MMBtu, which is equivalent to the AP-42 emission factor of 0.6 lb/$MMft^3$ gas burned, plus a 20% contingency factor. This value is equal to the lowest values contained in Table 23.

Conclusion – SO_2 Control

The Division has determined that the Mill's proposal to use the natural gas to minimize SO_2 emissions from the dryer burners of Paper Machine Nos. 17 and 18 is BACT. The BACT limit has been established as 0.0007 lb/MMBtu.

Summary – Control Technology Review for SO_2 from Paper Machine Nos. 17 and 18 Dryer Burners

To fulfill the PSD permitting requirements for SO_2, a BACT analysis was conducted for the dryer burners for Paper Machine Nos. 17 and 18. The BACT selection is summarized in Table 24. The emission limit selected is equal to the lowest value found in the RBLC database for similar equipment.

Table 24: Summary of SO_2 BACT Determinations for Dryer Burners from Paper Machine No. 17 and 18

Paper Machine No.	Emission Unit ID	Dryer Burner BACT Limit
17	PM02	Use of Natural Gas; 0.0007 lb/MMBtu SO_2
18	PM03	Use of Natural Gas; 0.0007 lb/MMBtu SO_2

Volatile Organic Compounds (VOC)

Step 1: Identify all Control Technologies

The Mill identified good combustion practices as the main control for minimizing VOC emissions. When combustion equipment is operated properly, by maintaining the correct combustion chamber temperature and oxygen content, VOC emissions are minimized. Good combustion practices include operator practices, maintenance practices, and maintaining proper combustion fuel/air ratios in the burner. No control device would be effective due to the low emission rate produced by burning natural gas.

Step 2: Eliminate Technically Infeasible Options

Good operating practices and combustion control are technically feasible for the dryer burners on Paper Machine No. 18.

Step 3: Rank Remaining Control Technologies by Control Efficiency

Table 25: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Good Combustion Practices	N/a

Step 4: Control Effectiveness Evaluation

Clean fuel / natural gas usage is the only control option. Table 26 summarizes limits found in the RBLC for VOC emissions from paper machines dryer burners.

Table 26: Summary of VOC Paper Machine Dryer Burner BACT Determinations from RBLC

Facility	Date	Equipment	Burner (MMBtu/hr)	Emission Rate (lb/MMBtu)	Controls
Weyerhaeuser, OK	2004	Paper Machine	Unknown	No limit	Good Operating Practices
Georgia-Pacific, LA	2002	Paper Machine No. 6	90.0	0.045	Good Combustion Practices
Georgia-Pacific, LA	2002	Paper Machine No. 6	50.0	0.045	Good Combustion Practices
Georgia-Pacific, LA	2002	Paper Machine No. 6	21.0	0.0192	Good Combustion Practices
Stora-Enso NA, WI	2002	Paper Machine No. P51	34.4	No limit	Good Combustion Practices Use of Natural Gas
Georgia-Pacific, AR	2001	Paper Machine No. 9	90.0	0.045	No Control
Georgia-Pacific, AR	2001	Paper Machine No. 9	50.0	0.045	No Control
Georgia-Pacific, AR	2001	Paper Machine No. 9	21.0	0.019	No Control
Donahue Ind., TX	2000	Paper Machine No. 8	Unknown	37.21 lb/hr	No Control
Georgia-Pacific, AR	1997	Paper Machine No. 5	21.0	0.0564	No Control
Georgia-Pacific, AR	1997	Paper Machine No. 6	58.4	0.0192	No Control
Georgia-Pacific, AR	1997	Paper Machine No. 8	50.0	0.0192	No Control

Step 5: Select BACT

The Mill has established BACT for VOC emissions based on the use of Maxon Crossfire low NO_X burners (see the NO_X BACT determination for further information). The Mill has proposed BACT to be combustion control through the use of good combustion practices and a permit limit of 0.006 lb/MMBtu heat input for the burner, which is equivalent to Maxon's emission factor guarantee for the Crossfire "low-NO_x" burner. This value is lower than the range of comparable values contained in Table 26.

Conclusion – VOC Control

The Division has determined that the Mill's proposal to use the good combustion practices to minimize VOC emissions from the dryer burners of Paper Machine Nos. 17 and 18 is BACT. The BACT limit has been established as 0.006 lb/MMBtu.

Summary – Control Technology Review for VOC from Paper Machine Nos. 17 and 18 Dryer Burners

To fulfill the PSD permitting requirements for VOC, a BACT analysis was conducted for the dryer burners for Paper Machine Nos. 17 and 18. The BACT selection is summarized in Table 27. The emission limit selected is lower than the lowest comparable value found in the RBLC database for similar equipment.

Table 27: Summary of VOC BACT Determinations for Dryer Burners from Paper Machine No. 17 and 18

Paper Machine No.	Emission Unit ID	Dryer Burner BACT Limit
17	PM02	Good Combustion Practices; 0.006 lb/MMBtu VOC
18	PM03	Good Combustion Practices; 0.006 lb/MMBtu VOC

Carbon Monoxide (CO)

Step 1: Identify all Control Technologies

The Mill identified good combustion practices, combustion control, and use of natural gas as the main control technologies for minimizing CO emissions. The use of good combustion practices assures that CO emissions from a burner are kept to a minimum by following generally accepted practices that will minimize the formation of CO in the combustion process. Such practices would include proper operation of the burner to ensure the correct ratio of fuel/air is maintained on a continuous basis, routine monitoring of the burner to ensure the controls are working properly, and documented operating and maintenance procedures for the burner.

The CO emission rate from a natural gas-fired burner depends on the efficiency of the burner and whether or not nitrogen oxide controls have been designed into the burner (e.g., low-NO_x or ultra low-NO_x burners). When gas-fired burners incorporate low-NO_x (or ultra low-NO_x) burner technology as part of the design, CO emissions may be higher than they would otherwise be without the use of low-NO_x (or ultra low-NO_x) burner technology. This occurs because low-NO_x burners require the use of low excess oxygen in the first stage of the burner compared to a conventional burner. Reducing the oxygen content in the first stage of the burner will tend to increase CO emissions due to less efficient combustion in this stage of the burner. The current burners in Paper Machine No. 18 are Maxon LV-85 Line Burners, which have a CO emission rate of approximately 0.35 lb/MMBtu. These burners are conventional burners that do not incorporate low-NO_x burner design.

Step 2: Eliminate Technically Infeasible Options

Good operating practices and use of natural gas are technically feasible for the dryer burners on Paper Machine No. 18.

Step 3: Rank Remaining Control Technologies by Control Efficiency

Table 28: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Good Combustion Practices (Use of Natural Gas)	N/a

Step 4: Control Effectiveness Evaluation

Good combustion practices and use of natural gas are the only control options; therefore an economic analysis is not required. Table 29 summarizes limits found in the RBLC for CO emissions from paper machines dryer burners.

Table 29: Summary of CO Paper Machine Dryer Burner BACT Determinations from RBLC

Facility	Date	Equipment	Burner (MMBtu/hr)	Emission Rate (lb/MMBtu)	Controls
First Quality Tissue, PA	2004	Paper Machine Nos. 1 and 2	Unknown	32.3 lb/hr	No Control
Stora-Enso NA, WI	2003	Paper Machine No. 26 w/coater	40.0	No numeric limit	Good Combustion Practices Use of Natural Gas
Stora-Enso NA, WI	2003	Paper Machine No. 16 w/coater & IR dryers	Unknown	0.0242	Low-NO_X IR Burner
Stora-Enso NA, WI	2003	Paper Machine No. 16 w/coater	Unknown	0.01	Very Low NO_X Floatation Dryer Burners, Use of Natural Gas, Good Combustion Control
Georgia-Pacific, LA	2002	Paper Machine No. 6	90.0	0.18	Good Combustion Practices
Georgia-Pacific, LA	2002	Paper Machine No. 6	50.0	0.18	Good Combustion Practices
Georgia-Pacific, LA	2002	Paper Machine No. 6	21.0	0.18	Good Combustion Practices
Stora-Enso NA, WI	2002	Paper Machine No. P51	34.4	0.06	Low-NO_X IR Dryer Good Combustion Control
Stora-Enso, WI	2000	Paper Machine No. 16	11.7	0.26	Use of Natural Gas
Inter Lake Paper, WI	2000	#96, #97 Paper Machines and Coaters	60.0, 116.6	No numeric limit	Good Combustion Practices Use of Natural Gas
Proctor & Gamble, MO	1998	Tissue Machines (4)	261	0.173	Good Combustion Practices
Georgia-Pacific, AR	1997	Paper Machine No. 5	21.0	0.2142	Good Combustion Practices
Georgia-Pacific, AR	1997	Paper Machine No. 6	58.4	0.1139	Good Combustion Practices
Georgia-Pacific, AR	1997	Paper Machine No. 8	50.0	0.1139	Good Combustion Practices

Step 5: Select BACT

The Mill has established BACT for CO emissions based on the use of Maxon Crossfire low NO_X burners (see the NO_X BACT determination for further information). The Mill has proposed BACT to be combustion control through the use of good combustion practices / natural gas and a permit limit of 0.184 lb/MMBtu. Further reduction of the CO emission would likely result in a higher NO_X emission rate, which is undesirable. The proposed permit limit is approximately the same as the limit for the Georgia-Pacific units permitted in 2002. The limit is also approximately half of the emission rate associated with the current burners.

Conclusion – CO Control

The Division has determined that the Mill's proposal to use good combustion practices and natural gas to minimize CO emissions from the dryer burners of Paper Machine Nos. 17 and 18 is BACT. The BACT limit has been established as 0.184 lb/MMBtu.

Summary – Control Technology Review for CO from Paper Machine Nos. 17 and 18 Dryer Burners

To fulfill the PSD permitting requirements for CO, a BACT analysis was conducted for the dryer burners for Paper Machine Nos. 17 and 18. The BACT selection is summarized in Table 30. The proposed permit limit is approximately the same as the limit for the Georgia-Pacific units permitted in 2002.

Table 30: Summary of CO BACT Determinations for Dryer Burners from Paper Machine No. 17 and 18

Paper Machine No.	Emission Unit ID	Dryer Burner BACT Limit
17	PM02	Good Combustion Practices; Natural Gas; 0.184 lb/MMBtu CO
18	PM03	Good Combustion Practices; Natural Gas; 0.184 lb/MMBtu CO

Nitrogen Oxide (NO_X)

Step 1: Identify all Control Technologies

The Mill identified the use of low-NO_x or ultra low-NO_x burners as the main control technologies to reduce NO_x emissions when burning natural gas. The current burners in Paper Machine No. 18 are Maxon LV-85 Line Burners, which have a NO_x emission rate of approximately 0.15 lb/MMBtu. These burners are conventional burners that do not incorporate low-NO_x burner design. Other types of controls include low-NO_x infrared dryers using natural gas, low-NO_x floatation dryers using natural gas, and very low-NO_x floatation dryer burners using natural gas.

Low-NO_x floatation dryers or infrared dryers using natural gas are much different than Yankee dryers and are not commercially used to dry tissue, napkin, or towel products. Floatation dryers are normally used to dry solvent-containing coatings used on paper substrate surfaces while infrared dryers are normally used on heavier grades of products than tissue or toweling. The burners used in both floatation and infrared dryers are designed specifically for use only in these dryers and cannot be used in Yankee dryers. To the Mill's knowledge, there are no floatation or infrared dryers in use or available for use to manufacture tissue paper products.

The Mill also considered selective catalytic reduction (SCR), and selective non-catalytic reduction (SNCR), a flue gas recirculation (FGR) for reduction of NO_X from the dryer burners.

Step 2: Eliminate Technically Infeasible Options

Low NO_X Burners
The use of low-NO_x or ultra low-NO_x burners is technically feasible for the Paper Machine No. 18 dryer burners.

Selective Catalytic Reduction
The Mill eliminated the use of SCR for reducing NO_x emissions from the No. 18 Paper Machine dryer burners for several reasons. First, if the SCR system were designed to treat the burner exhaust after it leaves hood section of the paper machine, the exhaust temperature would be too low (400-450 °F) for the SCR catalyst to react and convert NO_x emissions to elemental nitrogen. The use of additional heat to raise the temperature of the exhaust gases would waste energy since the new hood for Paper Machine No 18 will recover the dryer heat to preheat the intake air. Second, even if the exhaust temperature were raised to the proper level for SCR to work effectively, PM emissions from the paper machine process (not from the dryer) would coat the SCR catalyst. This would significantly reduce the effectiveness of the SCR system. It should also be noted that previous analyses indicated that control of PM is economically infeasible. Lastly, there is no room inside of the dryer hood (where the burner is located) to install an SCR system. There are no paper machine burners in the U.S. that the Mill is aware of that use SCR technology to control NO_x emissions. For these reasons, the Mill has found SCR to be technically infeasible for controlling NO_x emissions from Paper Machine No. 18 dryer burners.

Selective Non-Catalytic Reduction
The Mill also eliminated the use of SNCR for reducing NO_x emissions from the Paper Machine No. 18 dryer burners for the same reasons stated above for an SCR system – the temperature of the paper machine exhaust is too low if attempting to treat the burner exhaust after it has left the hood section of the paper machine. Furthermore, SNCR systems require temperatures in the range of 1,700-2,000 °F to operate effectively. Also, the SNCR process actually would require the injection of ammonia in the zone above the paper machine dryer burner. This would contaminate the paper product. The Mill cannot risk contaminating the paper product with ammonia and still ensure that it conforms to customer specifications for sale to the general public. There are no paper machines in the U.S. that the Mill is aware of that use SNCR technology to control NO_x emissions. For these reasons, the Mill has found SNCR to be technically infeasible for controlling NO_x emissions from the Paper Machine No. 18 dryer burners.

Flue Gas Recirculation

FGR involves recirculating part of the combustion gases for use as combustion air, in order to reduce the available oxygen, which in turn limits the generation of NO_X. This means that the combustion gases from the Paper Machine No. 18 dryer burners would need to contain significantly higher oxygen content in order for FGR to be a usable source of combustion air. Since this is not possible, FGR used in conjunction with the existing or low-NO_X Maxon burners would not be able to lower NO_x emissions. In addition, FGR presents other complications. The recirculated combustion gas from the paper machine hood would contain suspended particulate matter (from the paper machine process) that could foul the burner air passages. This, in turn, would create a fuel rich condition, resulting in a potentially serious safety hazard. For these reasons, the Mill has found FGR to be technically infeasible for controlling NO_x emissions from the paper machine burners or low-NO_X burners.

<u>Step 3: Rank Remaining Control Technologies by Control Efficiency</u>

Table 31: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Ultra Low NO_X Burners	50%-95%
2	Low NO_X Burners	30%-75%

<u>Step 4: Control Effectiveness Evaluation</u>

The only feasible control technologies to reduce NO_x emissions are the use of either low-NO_x or ultra low-NO_x burners in the paper machine dryer. For cost estimating and emission estimating purposes, the Mill first calculated the cost effectiveness of North American's ultra low-NO_x burner since it has the lowest NO_x emission rate of several different burners investigated, which are listed below:

- North American Ultra low-NO_x burner (Model 4213 LEx)—0.015 lb NO_x/MMBtu;
- Maxon Crossfire low-NO_x burner—0.036 lb NO_x/MMBtu;
- Maxon Kinedizer low-NO_x burner—0.04 lb NO_x/MMBtu;
- North American low-NO_x burner (Model 4096)—0.05 lb NO_x/MMBtu; and
- Coen low-NO_x burner (Model THE-QL)—0.06 lb NO_x/MMBtu.

The cost effectiveness calculations were performed using standard cost spreadsheets available from EPA's Cost Control Manual, 6th edition, June 2003. The Mill obtained the capital equipment cost data and installation cost data for North American's ultra low-NO_x burner from Andritz Fiber Drying, an engineering firm that has worked with North American's burners on paper machine projects.

Georgia-Pacific's Engineering Department estimated the startup and testing costs and also suggested the use of 30% of the direct capital costs for project contingencies. The Mill used 30% as a contingency because of uncertainties with the use of a new type of burner that has never been used in any of Georgia-Pacific's paper mills and the fact that the cost estimate for North American's burner is based on a plus or minus 30% accuracy. This is in line with the instructions contained in EPA's New Source Review Workshop Manual (Draft October 1980, page B.35). The cost for direct labor for the operation of the new burner system was also estimated by Georgia-Pacific's Engineering Department. Georgia-Pacific used standard EPA Cost Control Manual factors for the following entries in the cost control spreadsheet and obtained an annualized cost of $189,239.

- Freight charges – 5% of basic equipment cost
- 30-day working capital cost – direct operating costs divided by 12 months
- Supervisory labor costs for new burner system – 15% of direct labor costs
- Maintenance labor and material costs – equal to direct labor costs for the operation of the new burner system
- Overhead costs – 60% of direct operating labor and maintenance costs
- Property taxes – 1% of total capital investment
- Insurance - 1% of total capital investment
- Administration - 2% of total capital investment
- Cost recovery factor – 0.1424 based on a 10-year life of the equipment and a 7% interest rate for capital monies

The Mill examined two different scenarios to determine the total amount of NO_x emissions reduced by using North American's ultra low-NO_x burner as compared to the burners currently installed in the No. 18 Paper Machine (Maxon LV-85 Line burners). The first scenario compared the difference between the baseline NO_x emissions (average of 2002-2003) for the No. 18 Paper Machine burners of 7.6 tons per year to the potential NO_x emissions for North American's ultra low-NO_x burner of 4.6 tons per year, indicating a difference of 3.0 tons per year of NO_x emissions. The annualized cost of $186,239 was then divided by the amount of NO_x reduced by using North American's burner, or 3.0 tons per year, to obtain a cost effectiveness value of approximately $62,000 per ton of NO_x reduced.

The second scenario compared the difference between the potential NO_x emissions from the burners currently installed in the No. 18 Paper Machine (assuming 8,760 hours of operation per year) of 32.9 tons per year to the potential NO_x emissions for North American's ultra low-NO_x burner of 4.6 tons per year, indicating a difference of 28.3 tons per year of NO_x emissions. The annualized cost of $186,239 was then divided by the amount of NO_x reduced by using North American's burner, or 28.3 tons per year, to obtain a cost effectiveness value of approximately $6,600 per ton of NO_x reduced.

The Mill states that the true cost effectiveness value for North American's ultra low-NO_x burner lies somewhere in between the two cost effectiveness values stated above. This is because the maximum actual NO_x emissions generated by the burners currently installed in the No. 18 Paper Machine lie somewhere in between the 7.6 tons per year (for average baseline 2002-2003) and 28.3 tons per year (potential). The burners currently in the No. 18 Paper Machine have never operated at their maximum potential firing rate every day throughout a full calendar year, and usually operate closer to the average baseline rate. Therefore, the Mill states that the real cost effectiveness value for North American's burner is closer to the higher value of $62,000 per ton of NO_x reduced.

Additionally, the Mill believes that the lowest cost effectiveness value of $6,600 per ton of NO_x reduced for North American's burner is still higher than what would normally be considered cost effective for a piece of equipment that generates a relatively small amount of NO_x emissions. To further support the Mill's view that North American's burner is not cost effective, the Mill performed an incremental cost effectiveness calculation comparing North American's ultra low-NO_x burner to Maxon's Crossfire low-NO_x burner. Maxon's Crossfire low-NO_x burner has the second best NO_x emission rate of the burners the Mill investigated.

The Mill prepared the incremental cost effectiveness by following the instructions contained in EPA's "New Source Review Workshop Manual for Prevention of Significant Deterioration and Nonattainment Area Permitting", page B.41, Draft, issued in October 1980. To determine the annualized cost for Maxon's Crossfire low-NO_x burner, the Mill used spreadsheet calculations similar to those used for the North American burner. The Mill also used an engineering contingency factor of 15% for Maxon's Crossfire burner since the Georgia-Pacific has previous experience installing this burner in at least one other paper machine in one of Georgia-Pacific's paper mills. The annualized cost for Maxon's Crossfire low-NO_x burner was determined to be $70,380.

Table 32: Top-Down NO_X Paper Machine Dryer Burner BACT Impact Summary

Control Alternative	Emissions (tpy)		Economic Impacts			Other Impacts	
	PTE (tpy)	Reduction (tpy)	Total Capital Investment ($)	Total Annualized Cost ($/yr)	Cost Effect. ($/ton)	Toxic Impact ?	Env. Impacts?
North American Ultra low-NO_x burner	4.6	3.0 to 28.3	867,163	186,239	6,600 to 62,000	No	No
Maxon Crossfire low-NO_x burner	11.0	21.9	231,893	70,380	3,214	No	No

Table 33: Incremental Cost Effectiveness Evaluation of Maxon Crossifre Burner and North American Ultra Low NO_X Burner

Control Alternative	Incremental Emission Reductions (tpy)	Total Annualized Cost Difference ($/yr)	Incremental Cost Effectiveness $/ton	Toxics Impact?	Env. Impacts?
Incremental	6.4	115,859	18,100	No	No

The Mill has stated that the incremental cost effectiveness value of $18,103 per ton of NO_x reduced for North American's ultra low-NO_x burner is much higher than what would normally be considered economically feasible for a piece of equipment that generates a relatively small quantity of NO_x emissions. The cost effectiveness for installing Maxon's Crossfire low-NO_x burner is $3,214 per ton of NO_x reduced, which would be more cost effective than installing North American's ultra low-NO_x. The difference in the potential NO_x emission rate between Maxon's Crossfire burner and North American's ultra low-NO_x burner is 6.4 tons per year.

It should be noted that the Mill does not have any way of verifying the operational reliability or performance of North American's ultra low-NO_x burner since North American cannot disclose the names of the paper companies it has sold its ultra low-NO_x burners to for use in Yankee Dryer applications. North American has informed Georgia-Pacific that it has signed confidentiality agreements with the customers who have installed the ultra low-NO_x burner. Because of this, Georgia-Pacific is unable to contact these companies to find out about the operational reliability of the burners.

Additionally, EPA's RBLC does not indicate any listing for the installation of North American's ultra low-NO_x burners as the result of a PSD application and BACT analysis. According to a North American sales representative, none of their ultra low-NO_x burners have been installed as a result of a BACT analysis. Table 34 summarizes limits found in the RBLC for NO_X emissions from paper machines dryer burners.

Table 34: Summary of NO_X Paper Machine Dryer Burner BACT Determinations from RBLC

Facility	Date	Equipment	Burner (MMBtu/hr)	Emission Rate (lb/MMBtu)	Controls
First Quality Tissue, PA	2004	Paper Machine Nos. 1 and 2	Unknown	12.4 lb/hr for both	Low-NO_X Burners
Stora-Enso NA, WI	2003	Paper Machine No. 26 w/coater	40.0	0.015	Low-NO_X Floatation Dryer using Natural Gas
Stora-Enso NA, WI	2003	Paper Machine No. 16 w/coater & IR dryers	Unknown	0.017	Low-NO_X IR Burners
Stora-Enso NA, WI	2003	Paper Machine No. 16 w/coater	Unknown	0.01	Very Low-NO_X Floatation Dryer using Natural Gas
Stora-Enso NA, WI	2002	Paper Machine No. P51	34.4	0.044	Low-NO_X Infrared Dryer using Natural Gas
Stora-Enso NA, WI	2000	Paper Machine No. 16	11.7	0.0375	Low-NO_X Infrared Dryer using Natural Gas
Inter Lake Paper, WI	2000	#95 Paper Machine and Coater	18.2	0.01	Low-NO_X Infrared Dryer using Natural Gas
Inter Lake Paper, WI	2000	#95 Paper Machine and Coater	18.2	0.04	Low-NO_X Floatation Dryer using Natural Gas
Inter Lake Paper, WI	2000	#95 Paper Machine and Coater	18.2	0.12	Conventional Dryer (modified)
Inter Lake Paper, WI	2000	#95, #87 Paper Machines and Coaters	60.0, 116.6	0.01	Low-NO_X Infrared Dryer using Natural Gas
Inter Lake Paper, WI	2000	#95, #87 Paper Machines and Coaters	60.0, 116.6	0.04	Low-NO_X Floatation Dryer using Natural Gas
Inter Lake Paper, WI	2000	#95, #87 Paper Machines and Coaters	60.0, 116.6	0.12	Conventional Dryer (modified)
Proctor & Gamble, MO	1998	Tissue Machines (4)	261	0.115	Low-NO_X Burners Good Combustion Control
Georgia-Pacific, AR	1997	Paper Machine No. 5	21.0	0.0913	Low-NO_X Burners
Georgia-Pacific, AR	1997	Paper Machine No. 6	58.4	0.0913	Low-NO_X Burners
Georgia-Pacific, AR	1997	Paper Machine No. 8	50.0	0.0913	Low-NO_X Burners
Gulf States, AL	1997	Paper Machine w/Dryers	Unknown	No numeric limit	Low-NO_X Burners

Step 5: Select BACT

The Mill has proposed that BACT for the No. 18 Paper Machine (and for the No. 17 Paper Machine) be the use of Maxon's Crossfire low-NO_x burner and an emissions limit of 0.036 lb/MMBtu. The Mill does not believe that North American's ultra low-NO_x burner should be installed in the No. 18 Paper Machine because its cost effectiveness value is close to $62,000 per ton of NO_x reduced when operating the dryer burners near the number of baseline hours. This economic cost for the ultra low-NOX model is not feasible at normal operating levels. Additionally, to the best of the Mill's knowledge, North American's ultra low-NO_x burner has not been installed in any Yankee Dryer hood as the result of a BACT analysis required by a PSD application. The proposed emission limit is lower than the comparable limits found in the RBLC database for similar equipment.

Conclusion – NO_X Control

The Division has determined that the Mill's proposal to use low-NO_X burners to minimize NO_X emissions from the dryer burners of Paper Machine Nos. 17 and 18 is BACT. The BACT limit has been established as 0.036 lb/MMBtu.

Summary – Control Technology Review for NO_X from Paper Machine Nos. 17 and 18 Dryer Burners

To fulfill the PSD permitting requirements for NO_X, a BACT analysis was conducted for the dryer burners for Paper Machine Nos. 17 and 18. The BACT selection is summarized in Table 35. The proposed emission limit is lower than the limits found in the RBLC database for similar equipment.

Table 35: Summary of NOX BACT Determinations for Dryer Burners from Paper Machine No. 17 and 18

Paper Machine No.	Emission Unit ID	Dryer Burner BACT Limit
17	PM02	0.036 lb/MMBtu NO_X
18	PM03	0.036 lb/MMBtu NO_X

(7) – CONVERTING DEPARTMENT EQUIPMENT – PM/PM_{10}

The Mill is proposing a number of minor changes for the Converting Department as part of the Mill Process Improvement program. Some of the changes that are proposed include changes to or the addition of rewinding equipment. The only pollutants emitted from Converting Department operations are PM/PM_{10} and VOC.

The Converting Department takes paper products from the paper machine, cuts or slices the product into smaller sizes and packages the product for shipment. The Converting Department also makes paper cores for use in the final packages and prints graphic designs on products with flexographic printing presses. Each of the rewinding/slitting machines has a trim collection system that picks-up waste from the cutting operation and directs the waste to a cyclone for product recovery. The recovered waste paper is sent back to the Pulp Processing Area where it is made into recycled pulp. The dust from the cyclone is discharged to one of two wet scrubbers to control emissions before clean air is discharged to the atmosphere. Inks, glues, pastes, and solvent cleaners are used throughout the Converting Department as necessary.

Step 1: Identify all Control Technologies

The Mill identified cyclone separators, baghouses, wet scrubbers, dry ESPs and wet ESPs as possible control technologies for reducing PM/PM_{10} emissions from the Converting Department.

Step 2: Eliminate Technically Infeasible Options

It is technically feasible to control PM/PM_{10} emissions from the Converting Department trim collection system with the above listed devices. The Mill has stated that this is the only operation within the department that generates a sufficient amount of dust to warrant pollution controls. The Mill currently uses two wet scrubbers to control PM/PM_{10} emissions from the trim collection system. The scrubbers have a PM/PM_{10} design collection efficiency of 99.5%.

Step 3: Rank Remaining Control Technologies by Control Effectiveness

Table 36: Ranking of Control Technology

Control Technology Ranking	Control Technology	Control Efficiency
1	Wet Scrubber	99.5%
2	Baghouses	99%
3	Wet or Dry ESP	99%
4	Wet Scrubbers	98%
5	Cyclone Separators	Up to 95%

Step 4: Evaluate Most Effective Controls and Document Results

Since the Mill already utilizes wet scrubbers to control dust from the trim collection system, and the scrubbers used have a design control efficiency of 99.5%, there is not any other type of control equipment that has a better control efficiency. Table 37 summarizes limits found in the RBLC for converting department equipment.

Table 37: Summary of PM/PM_{10} Converting Department Equipment BACT Determinations from RBLC

Facility	Date	Process Name	Control Description	Emission Limit
Georgia-Pacific, LA	2002	Converting Dust Scrubber No. 1	For Mist Elimination System and Dust Scrubber System: Wet Scrubbers with 98% Efficiency	1.75 lb/hr
Georgia-Pacific, LA	2002	Converting Dust Scrubber No. 1	For Mist Elimination System and Dust Scrubber System: Wet Scrubbers	1.75 lb/hr
Georgia-Pacific, LA	2002	Converting Dust Scrubber No. 2	For Mist Elimination System and Dust Scrubber System: Wet Scrubbers	1.75 lb/hr
Georgia-Pacific, LA	2002	Converting Dust Scrubber No. 2	For Mist Elimination System and Dust Scrubber System: Wet Scrubbers	1.75 lb/hr
Georgia-Pacific, LA	2002	Converting Pulper Exhaust	No Control	0.1 lb/hr
Georgia-Pacific, LA	2002	Converting Pulper Exhaust	No Control	0.1 lb/hr

Step 5: Select BACT

The Mill has proposed that BACT for PM/PM_{10} emissions from the trim collection system should be the use of a wet scrubber (or its equivalent) with a design control efficiency of 99.5%.

Conclusion – PM/PM_{10} Control

The Division has determined that the Mill's proposal to use a scrubber with a control efficiency of 99.5% for the trim collection system is BACT.

Summary – Control Technology Review for PM/PM_{10} from the Converting Department

To fulfill the PSD permitting requirements for PM/PM_{10}, a BACT analysis was conducted for the converting department. The BACT selection is summarized in Table 38.

Table 38: Summary of PM/PM_{10} BACT Determination for Converting Department

Equipment	Emission Unit ID	BACT
Converting Department	CONV	Wet Scrubber with 99.5% efficiency

5.0 TESTING, MONITORING, AND RECORDKEEPING REQUIREMENTS

Paper Machines

Testing Requirements

No testing will be required for PM/PM_{10} or VOC emissions from the No. 16-20 Paper Machine process sections. The Mill conducted stack testing on the No. 19 Paper Machine Building roof vents in November 2001 and on the Yankee dryer exhaust stack in July 2002 to determine the particulate matter emission rates from these emission sources. The testing conducted on the roof vents for the No. 19 Paper Machine roof vents was conducted before the time that a scrubber was installed to significantly reduce dust generated by the paper machine. Therefore, the testing on the roof vents was done under "worst-case" conditions regarding the amount of dust emitted out of the building through the roof vents. Due to the type of products manufactured on the No. 19 Paper Machine, it generates the most dust of the five paper machines located at the Mill. For this reason, the particulate matter emission factors developed from the stack testing (pounds of pollutant generated per ton of paper manufactured) and then used in the BACT analysis are very conservative and result in an overestimate of particulate matter emissions for all five paper machines.

The testing conducted on the Yankee Dryer exhaust for the No. 19 Paper Machine represents the location where the majority of dust is generated from any point source exhaust point on a paper machine. Since the No. 19 Paper Machine will have the largest amount of dust generated of all five paper machines at the Mill, the particulate matter emission factors developed from the stack testing represent the "worst-case" conditions regarding the amount of dust emitted from the Yankee Dryer exhaust.

No testing will be required for VOC from the No. 20 Paper Machine burner dryer. The paper machine dryer burners emit very small quantities of VOC because they will only combust natural gas. Emissions can be estimated using AP-42 emission factors multiplied by the amount of natural gas burned.

The Permittee will be required to conduct performance testing for NO_X and CO from the new Yankee Dryer burners on Paper Machine Nos. 17 and 18. The testing is necessary to demonstrate compliance with the new BACT limits for NO_X and CO and to verify the emissions based on the burner manufacturer's guarantee.

Monitoring Requirements

The Permittee will be required to monitor paper production on a daily basis for the No. 16-19 Paper Machines in order to demonstrate compliance with the BACT particulate matter limits. The machines will be in compliance provided that the production rates of 186,588 ADT/yr, 186,588 ADT/yr, 112,128 ADT/yr, and 112,128 ADT/yr are not exceeded on a rolling 12-month basis. The facility must monitor pressure drop and scrubbant flow rate for the scrubber installed on Paper Machine No. 19 to provide a reasonable assurance of compliance with the particulate matter BACT limit for this machine. The amendment requires the facility to establish the operating parameters for the scrubbers that indicate proper operation of the device.

The Permittee will be required to maintain records of the usage for all VOC-containing chemical additives and cleaning solvents for Paper Machine Nos. 16 – 20 and calculate the monthly VOC emissions generated by the five paper machines by multiplying the VOC usage (pounds) of each chemical or cleaning solvent used by the VOC content (percent). The total VOC emission rate from all five paper machines, based on the usage of all VOC-containing chemical additives and cleaning solvents, cannot exceed 206.3 tons per year based on a rolling 12-month average. This limit is based on the BACT analysis conducted by the facility.

The facility will be required to monitor and record fuel usage for all fuel burning sources on a daily basis. The records are necessary to provide a reasonable assurance that natural gas is the only fuel fired in the paper machine dryers as required by the BACT analysis. The fuel monitoring will also provide a reasonable assurance that the facility is in compliance with BACT limits for PM/PM_{10}, SO_2, NO_X, CO, and/or VOC for the dryers in Paper Machine Nos. 17, 18, and 20. The fuel monitoring also provides a reasonable assurance of compliance with the opacity and particulate matter emission limits under Georgia Rules (b) and (e) that apply to all of the paper machine dryers.

Other Requirements

The facility must use the New Substance Review Program protocol for the use of new VOC-containing materials on the paper machines. The protocol provides a reasonable assurance that VOC emissions are minimized where possible.

Pulp Processing Area and Bleaching Systems

Testing Requirements

No testing will be required for the Pulp Processing Area or Bleaching Systems.

Monitoring Requirements

The Permittee will be required to maintain records of the usage for all VOC-containing chemical additives and cleaning solvents for the Pulp Processing Area and the Bleaching Systems and calculate the monthly VOC emissions generated by multiplying the VOC usage (pounds) of each chemical or cleaning solvent used by the VOC content (percent). The total VOC emission rate from the Pulp Processing Area and the Bleaching Systems combined, based on the usage of all VOC-containing chemical additives and cleaning solvents, cannot exceed 97.3 tons per year based on a rolling 12-month average. This limit is based on the BACT analysis conducted by the facility.

The Permittee uses a continuous monitor to measure the chlorine concentrations from the Brine Dechlorinator Scrubber and the Absorber/Bleach Tank Scrubbers used in the manufacture of bleaching chemicals. The scrubbers are equipped with audible alarms that activate at or above 30 ppm and 10 ppm, respectively.

Other Requirements

The facility must use the New Substance Review Program protocol for the use of new VOC-containing materials in the Pulp Processing Area and the Bleaching Systems. The protocol provides a reasonable assurance that VOC emissions are minimized where possible.

Converting Department

Testing Requirements

No testing will be required for the Converting Department.

Monitoring Requirements

The Permittee is required to monitor pressure drop and scrubbant flow rate for the Trim Line Collection System Scrubbers to provide a reasonable assurance that particulate matter emissions are being properly controlled. The amendment also requires the facility to establish operating parameters for the scrubbers that indicate proper operation of the devices. The facility must continue to maintain monthly records of the total volume and organic HAP content of material used on the Flexographic Printers in the Converting Department to demonstrate compliance with 40 CFR 63 Subpart KK.

Material Processing Operations

Testing Requirements

No testing will be required for the Material Handling Operations.

Monitoring Requirements

The Permittee is required to perform visible emission checks and develop a preventative maintenance plan for the baghouses associated with the material handling operations. The VE checks and the preventative maintenance plan provide a reasonable assurance of compliance with the particulate matter and opacity limit specified by 40 CFR 60 Subpart Y, 40 CFR 60 Subpart OOO, Georgia Rule (b), and Georgia Rule (e).

Boilers

Testing Requirements

No additional testing will be required for the Boilers as a result of this permitting action.

Monitoring Requirements

The Permittee is currently required to continuously monitor opacity, NO_X, and SO_2 for each boiler. These monitoring systems are used to demonstrate compliance with the opacity, PM, NO_X, and SO_2 under 40 CFR 60 Subpart D, 40 CFR 60 Subpart Db, and 40 CFR 52.21.

The facility is currently required to collect fuel samples at the inlets of Boiler Nos. 4 and 5 for the purpose of determining compliance with the SO_2 limits under 40 CFR 60 Subpart Db. The facility is also required to monitor and maintain records of fuel usage in all of the boilers. These records, in conjunction with fuel supplier certifications, are necessary to demonstrate compliance with fuel oil sulfur limits under Georgia Rule (g) and 40 CFR 52.21 and fuel type restrictions under Georgia Rule 391-1-.03(2)(c).

The Permittee is required to perform visible emission checks and develop a preventative maintenance plan for the baghouses associated with the boilers. The VE checks and the preventative maintenance plan provide a reasonable assurance of compliance with the particulate matter limits specified by 40 CFR 60 Subpart D and 40 CFR 60 Subpart Db.

Other Requirements

The facility is currently required to maintain daily records for NO_X emissions from all three boilers to demonstrate compliance with the limits under 40 CFR 60 Subpart Db. The facility is currently required to maintain daily records for SO_2 emissions from Boiler Nos. 4 and 5 to demonstrate compliance with the limits under 50 CFR 60 Subpart Db. As a result of the additional limits taken during this 40 CFR 52.21 review, the Permittee is now required to maintain records of any exceedance of the 24-hour average SO_2 limits.

Combustion Turbines / Waste Heat Recovery Boilers

Testing Requirements

No additional testing will be required for the Combustion Turbines / Waste Heat Recovery Boilers.

Monitoring Requirements

The Permittee will now be required to continuously monitor NO_X emissions from the Combustion Turbines and Waste Heat Recovery Boilers to demonstrate compliance with the additional limits taken during this 40 CFR 52.21 review. These continuous monitors will also be used to demonstrate compliance with 40 CFR 60 Subpart GG requirements for the Combustion Turbines. The facility must also monitor and maintain records of fuel usage in the Combustion Turbines and Waste Heat Recovery Boilers. These records, in conjunction with fuel supplier certifications, are necessary to demonstrate compliance with fuel oil sulfur limits under 40 CFR 60 Subpart GG and Georgia Rule (g). The records also provide a reasonable assurance that the facility burns only natural gas or No. 2 fuel oil in these units, which in turn indicates compliance with particulate matter and opacity limits under Georgia Rule (d).

Other Requirements

As a result of the additional limits taken during this 40 CFR 52.21 review, the Permittee is now required to maintain records of any exceedance of the 24-hour average NO_X limits for the Combustion Turbines and Waste Heat Recovery Boilers. The facility is currently required to maintain records of sulfur analyses for the natural gas burned in the Combustion Turbines per 40 CFR 60 Subpart GG and U.S. EPA Region 4.

6.0 AMBIENT AIR QUALITY REVIEW

An air quality analysis is required due to the modifications associated with the paper machines and the Converting Department. The air quality analysis encompasses all emission sources at the mill. Sources affected at the Mill as a result of increasing paper production include the three power boilers, the two combustion turbines, and the waste heat boilers. Other affected sources include the pulp mill and four bleaching systems. The affected miscellaneous emission sources include fugitive and point source emissions from petcoke and coal handling, boiler ash handling and unloading, emissions from moving additional waste materials to the onsite landfill, and fugitive emissions associated with increased truck traffic to support the higher paper production.

The main purpose of the air quality analysis is to demonstrate that potential emission increase due to the 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. For this project, the potential emissions increase for PM/PM_{10}, SO_2, NO_X, CO, VOC, and SAM exceed the respective PSD significant thresholds. However, only PM_{10}, NO_X, and CO have NAAQS and PSD increments. Thus, an air quality analysis must be performed for only these air pollutants. Compliance with any NAAQS or PSD increment is based on the modeled ambient impact caused by the applicant's proposed emissions as well as those sources surrounding the mill within the impact area.

Modeling:

In general, the EPD assesses the ambient impact of a source through the use of mathematical dispersion models. The models are based on the assumption that the dispersion of pollutants is primarily a function of wind speed and direction, atmospheric stability conditions, and the characteristics of the effective point discharge of the exhaust plume. To predict ambient air concentrations, the models simulate the plume exhausting from the stack, rising a certain distance into the atmosphere, leveling off, and continuing downwind over relatively flat terrain. The concentrations of the pollutants are assumed to have a Gaussian distribution about the downwind axis centerline of the plume.

Modeling was completed using EPA Industrial Source Complex Short-Term Version 3 (ISCST3). ISCST3 is a Gaussian plume dispersion model that estimates hour-by-hour ground-level concentrations of emissions from an elevated source. The model provides maximum 24-hour and annual average concentrations for receptors located on many grid types around the source for various downwind distances. The model also takes into account the effect of downwash caused by nearby buildings and structures.

The Industrial Source Complex Short-Term Version 3 model (ISCST3, version 02035) was used to evaluate conformance with NAAQS and Class I 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 04112). The SO_2 concentrations in the three Class I areas were refined using the Calpuff model (version 5.711a).

Land Use Classification

Dispersion coefficients are set in the model by selecting the land-use mode as urban or rural. The land use in the vicinity of the source is the criteria used to determine the setting. The Mill is classified as a rural source.

Meteorological Data

Hourly pre-processed meteorological data from the Savannah, GA National Weather Service (NWS) surface station and the Waycross, GA NWS upper air station for the period 1982-86 were used to evaluate the proposed emission rates. In evaluating potential air quality impacts at the three Class I areas, Golder & Associates used gridded MM4/5 data with cells of 36- or 80-km size. The years of meteorological data used to address Class I issues were 1990, 1992, and 1996.

Background Concentrations

Background concentrations are defined as concentrations due to sources other than those quantified by the dispersion modeling and are necessary to determine total ambient air quality impacts to demonstrate compliance with the NAAQS. For this project, background concentrations were developed from 2003 air quality data and discussions between the facility and the EPD. A summary is provided in Table 39.

Table 39. Summary of Background Concentration for Savannah River Mill Analyses

Pollutant	Averaging Period	Background Concentration (ug/m^3)	Monitor Description
NO_X	Annual	31.0	Maximum measured in Georgia in 2003 from Station 131210048.
SO_2	3-Hour	120.5	Maximum measured in 2003 from Savannah Station 130511002.
	24-Hour	73.4	
	Annual	8.3	
PM_{10}	24-Hour	38	EPD recommended statewide values.
	Annual	20	

Building Downwash
Aerodynamic forces in the vicinity of structures and obstacles, such as buildings, disturb atmospheric flow fields. This flow disturbance near buildings and other structures can enhance the dispersion of emissions from stacks affected by the disturbed flow. The disturbance can also reduce the effective height of emissions from stacks located near buildings and obstacles. The height of these disturbances can be compared to the release points of modeled sources. For sources with release points above these disturbances, the effect on dispersion is not significant. This release height threshold is known as the Good Engineering Practice (GEP) height.

All modeled stack heights at the Mill are less than the calculated GEP formula heights. The dimensions for all significant building structures at the Mill were entered into the EPA program, Building Profile Input Program (BPIP). The BPIP program computes direction-specific building heights and widths. These data describe the downwash effects to the dispersion model.

Receptors
Gridded and boundary model receptors in the Class II area were assigned terrain elevations using the appropriate Digital Elevation Model data files at a scale of 1:24,000 (7.5 minute USGS quadrangle files). 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 7 kilometers from the site boundary in all directions, and is more than sufficient to cover the significant impact area. Class I Area boundary and internally-gridded receptors were used to assess Class I Significance and Increment consumption of the SO_2, NO_X, and PM10 project emissions. Terrain elevations were packaged with the horizontal UTM coordinates as the receptors from the Wolf Island, Okeefenokee, and Cape Romain Class I areas were extracted from the National Park Service/U.S. Fish and Wildlife air dispersion model receptor database.

Emissions Inventory
Offsite emissions inventories of PM10, NO_2, and SO_2 were developed by Georgia-Pacific based on the three spreadsheets compiled by Jim Stogner, and selected review of the EPD website and permit files (as well as emission inventory information provided by SCDHEC for sources located within the model screening area in South Carolina). No sources were eliminated from the Increment models. Georgia-Pacific originally screened many sources from the modeled NAAQS inventories using the "20-D technique". This review, conducted by GA EPD, conservatively incorporated all the Increment consuming sources in assessing NAAQS conformance.

SIGNIFICANT IMPACT ANALYSIS

Purpose and Methodology
The significant impact analysis is the first phase of the air quality analysis and determines two results: 1) the maximum impacts from the project emissions and 2) the location of predicted impacts greater than significant impact levels (SILs). The analysis defines the impact area of the project and the significant impact distance (SID). A significant impact analysis was performed to determine whether the emission increases result in predicted impacts greater than the PSD modeling SILs or the EPA monitoring de minimis concentrations. Table 40 summarizes the SILs and the de minimis concentrations.

Table 40. Significant Impact Levels and Significant Monitoring Concentrations

Pollutant	Averaging Period	PSD Significant Impact Level (ug/m^3)	Monitoring Concentration Level (ug/m^3)
PM_{10}	Annual	1	--
	24-Hour	5	10
CO	8-Hour	500	575
	1-Hour	2,000	--
NO_X	Annual	1	14
SO_2	Annual	1	--
	24-Hour	5	13
	3-Hour	25	--
VOC	None*	--	--

*No significant air quality concentration for ozone (VOC) monitoring has been established. The project is not likely to cause an exceedance of the 8-hour ozone standard based on the most recent data available from the ozone monitor located at East President Street, Savannah, Chatham County.

Significant Impact Analysis Results

The tables below summarize the results of the significant impact analysis. The maximum predicted impact exceeded the significant impact level for NO_X, SO_2, and PM_{10}; therefore full NAAQS and PSD Class II increment analyses must be completed for these pollutants. It was determined that the project would not have a significant impact for CO; therefore, no NAAQS or PSD Class II increment analysis is required for this pollutant.

Project emissions of CO and NO_X caused maximum concentrations lower than their respective monitoring *de minimis* concentrations. For this reason, no pre-construction ambient monitoring requirements apply for these pollutants. The modeled concentrations of PM_{10} and SO_2 were locally found to exceed their respective *de minimis* concentrations. The Division will rely on the use of existing ambient monitoring data provided by the nearby GA EPD monitoring stations in Savannah. These should provide conservative estimates of the ambient concentrations in the project area.

Table 41. Significant Impact Analysis – Significant Impact Level

Pollutant	Averaging Period	Max. Predicted Impact (ug/m^3)	Year	Receptor Location		Significant Impact Level (ug/m^3)	Significant?
				East (m)	North (m)		
NO_X	Annual	4.347	1986	481019	3577541	1	Yes
SO_2	Annual	1.565	1982	481100	3577900	1	Yes
	24-Hour	16.273	1984	481700	3577500	5	Yes
	3-Hour	59.136	1985	481700	3577400	25	Yes
PM_{10}	Annual	3.464	1984	480896	3577497	1	Yes
	24-Hour	14.823	1984	480900	3577500	5	Yes
CO	8-Hour	121.03	1983	481063	3577914	500	No
	1-Hour	305	1982	481841	3577169	2000	No

Table 42. Significant Impact Analysis – Monitoring Concentration Level

Pollutant	Averaging Period	Max. Predicted Impact (ug/m^3)	Year	Receptor Location		Monitoring Conc. Level (ug/m^3)	Exceed Conc. Level?
				East (m)	North (m)		
NO_X	Annual	4.347	1986	481019	3577541	14	No
SO_2	24-Hour	16.273	1984	481700	3577500	13	Yes
PM_{10}	24-Hour	14.823	1984	480900	3577500	10	Yes
CO	8-Hour	121.03	1983	481063	3577914	575	No

NAAQS MODELING ANALYSIS

Purpose and Methodology

As discussed above, modeling of the proposed project indicated a significant impact (*i.e.*, maximum impact at or above the PSD significance levels) for NO_X, SO_2, and PM_{10}. Therefore, PSD review requires a full air quality analysis to demonstrate compliance with the NAAQS. The NAAQS impact analysis predicts the maximum ambient air concentration due to 1) all Mill sources emitting at maximum potential emission rates, 2) off-site sources at maximum permitted rates, and 3) natural and background sources. The total of these concentrations must be less than the NAAQS. Table 43 summarizes the NAAQS.

Table 43. NAAQS Values by Pollutant

Pollutant	Averaging Time	NAAQS (ug/m^3)
PM	Annual	50
	24-Hour	150
NO_X	Annual	100
SO_2	Annual	80
	24-Hour	365
	3-Hour	1,300

NAAQS Analysis Results

The following table summarizes the results of the NAAQS analyses. The modeling demonstrates that the project changes will not cause or contribute to a violation of the NAAQS for NO_X, SO_2, or PM_{10}.

Table 44. NAAQS Results

Pollutant	Averaging Period	Max. Predicted Impact (ug/m^3)	Year	Receptor Location		Background Conc. (ug/m^3)	Total Conc. (ug/m^3)	NAAQS (ug/m^3)	NAAQS Exceeded?
				East (m)	North (m)				
NO_X	Annual	6.6164	1982	480368	3576782	31.0	37.6164	100	No
SO_2	Annual	16.98	1982	481100	3577900	8.3	25.28	80	No
	24-Hour	103.3	1986	480900	3577800	73.4	176.7	365	No
	3-Hour	303.18	1984	480900	3577900	120.3	423.68	1300	No
PM_{10}	Annual	10.698	1984	481438	3576575	20	30.698	50	No
	24-Hour	36.75	1985	480797	3577466	38	74.75	150	No

PSD CLASS II INCREMENT ANALYSIS

Purpose and Methodology

Preliminary modeling of the proposed project indicated a significant impact (*i.e.*, maximum impact at or above the PSD significance levels) for NO_2, SO_2, and PM_{10}. Therefore, PSD review requires a full air quality analysis to demonstrate compliance with the PSD Class II Increments. The Increment impact analysis predicts the maximum ambient air concentration due to all Mill sources and off-site sources within the screening areas that affect PSD increment. The total of these concentrations must be less than the allowable PSD Increment, as listed in Table 45.

Table 45. PSD Class II Increments for Modeled Pollutants

Pollutant	Averaging Time	Allowable PSD Increment (ug/m^3)
PM	Annual	17
	24-Hour	30
NO_X	Annual	25
SO_2	Annual	20
	24-Hour	91
	3-Hour	512

PSD Increment Analysis Results

The following table summarizes the results of the NAAQS analyses. The modeling demonstrates that the project changes will not cause or contribute to a violation of the PSD Class II Increments for NO_X, SO_2, or PM_{10}.

Table 46. PSD Class II Increment Results

Pollutant	Averaging Period	Maximum Predicted Impact (ug/m^3)	Year	Receptor Location		Allowable Increment (ug/m^3)	Increment Exceeded?
				East (m)	North (m)		
NO_X	Annual	5.39672	1982	480368	3576782	25	No
SO_2	Annual	11.58	1982	481100	3577900	20	No
	24-Hour	65.01	1982	481100	3577900	91	No
	3-Hour	239.06	1986	484900	3580400	512	No
PM_{10}	Annual	8.7	1984	480851	3576575	17	No
	24-Hour	26.38865	1986	480851	3577477	30	No

PSD CLASS I ANALYSES

General Modeling Approach

Generally, if the project site is within 200 kilometers of a PSD Class I area, a significant impact analysis is also performed at the PSD Class I area. There are three PSD Class I areas (Okefenokee, Wolf Island, and Cape Romain NWAs) within 200 km of the Savannah River Mill. To evaluate the effects of the proposed project on these areas, air modeling analysis were performed using the emission inventory for the significant impact analysis and modeling receptors specified by the Federal Land Manager (FLM).

Significant Impact Analysis and Increment Results

A significance analysis was performed for the Class I areas. The significance level was not exceeded for any pollutant. Similarly, the maximum concentrations were well below Class I PSD Increment thresholds. No further modeling is required. The facility submitted N/S deposition data and visibility data to the FLM. No comments or questions were received from the FLM.

Table 47. Class I Area Maximum Pollutant Concentration

Pollutant	Averaging Time	Maximum Concentration (ug/m^3)	Model Met Data	Receptor Location		Significant Impact Level (ug/m^3)	Significant?
				East (m)	North (m)		
SO_2	Annual	0.007137	1992	625889	3639427	0.10	No
	24-Hour	0.1831	1992	634250	3655247	0.20	No
	3-Hour	0.4567	1992	650467	3663800	1.00	No
PM_{10}	Annual	0.00413	1984	626396	3638064	0.20	No
	24-Hour	0.06400	1983	471500	3465500	0.30	No
NO_X	Annual	0.02514	1984	625407	3638064	0.10	No

Table 48. Class I Increment Analysis Summary

Pollutant	Averaging Time	Maximum Concentration (ug/m^3)	Model Met Data	Receptor Location		Allowable Increment (ug/m^3)	Increment Exceeded?
				East (m)	North (m)		
SO_2	Annual	0.007137	1992	625889	3639427	2	No
	24-Hour	0.1831	1992	634250	3655247	5	No
	3-Hour	0.4567	1992	650467	3663800	25	No
PM_{10}	Annual	0.00413	1984	626396	3638064	4	No
	24-Hour	0.06400	1983	471500	3465500	8	No
NO_X	Annual	0.02514	1984	625407	3638064	2.5	No

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 exceeded the SIL for NO_X, SO_2, and PM_{10}. However, additional modeling showed compliance well below the NAAQS. Therefore, no negative impacts on soils and vegetation are anticipated to result from the implementation of the proposed project.

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.

Georgia's SIP and Georgia *Rules for Air Quality Control* provide no specific prohibitions against visibility impairment other than regulations limiting source opacity and protecting visibility at federally protected Class I areas. To otherwise demonstrate that visibility impairment will not result from continued operation of the mill, the VISCREEN model was used to assess potential impacts on ambient visibility at sensitive receptors.

The primary variables that affect whether a plume is visible or not at a certain location are (1) quantity of emissions, (2) types of emissions, (3) relative location of source and observer, and (4) the background visibility range. The VISCREEN model is designed specifically to determine whether a plume from a facility may be visible from a given vantage point. VISCREEN performs visibility calculations for two assumed plume- viewing backgrounds (horizon sky and a dark terrain object). The model assumes that the terrain object is perfectly black and located adjacent to the plume on the side of the centerline opposite the observer.

In the visibility analysis, the total project NO_X and PM_{10} emissions increases are modeled using the VISCREEN plume visibility model to determine the impacts. For both views inside and outside the Class II area, calculations are performed by the model for the two assumed plume-viewing backgrounds. The VISCREEN model output shows separate tables for inside and outside the Class II area. Each table contains several variables: theta, azi, distance, alpha, critical and actual plume delta E, and critical and actual plume contrast. These variables are defined as:

1. *Theta* – Scattering angle (the angle between direction solar radiation and the line of sight). If the observer is looking directly at the sun, theta equals zero degrees. If the observer is looking away from the sun, theta equals 180 degrees.

2. *Azi* – The azimuthal angle between the line connecting the observer and the line of sight.

3. *Alpha* – The vertical angle between the line of sight and the plume centerline.

4. *delta E* – Used to characterize the perceptibility of a plume on the basis of the color difference between the plume and a viewing background. A delta E of less than 2.0 signifies that the plume is not perceptible.

5. *Contrast* – The contrast at a given wavelength of two colored objects such as plume/sky or plume/terrain.

Several potentially sensitive Class II visible plume receptors were identified, but many are relatively distant from the Georgia-Pacific facility**.** Screening modeling of those receptors farther than 30 km from the facility was conducted with VISCREEN. Guidance indicated that, based on a no-more-than-12-hour persistence for this distance, this plume travel time could occur with a wind speed of at least 4 m/sec (based on an average speed of one-half of the wind speed interval). At 4 m/sec, the most stable condition possible is a Pasquill-Gifford "E". All the receptors beyond 30 km from the facility were found to produce no visible plume at background visual ranges of 25 km (in South Carolina) or 40 km (in Georgia), using facility-wide potential emission rates.

The Savannah International Airport and the Ridgeland, SC Landing Strip both required refined modeling with the PLUVUE II model. These receptors are located at distances of 23 km and 24 km, respectively, from the Georgia Pacific facility. For this modeling, conditions of E-3 m/sec and F-3 m/sec were used, respectively. Each receptor was modeled twice using potential emission rates, once assuming all three boilers emitted from a single stack, and once assuming both waste-heat boilers used a single stack. The predicted Delta E values and the contrast values of the two iterations were added together, although the plume centerlines were predicted to lie 31 m apart vertically (250 m and 219 m, respectively). The sums of both the Delta E and the contrast were lower than the corresponding visual plume screening threshold values.

8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 2621-103-0007-V-02-1.

Part 1.0 Facility Description

The EPD has provided a description of the modifications to the facility in Section 1.3 of the amendment.

Part 2.0 Requirements Pertaining to the Entire Facility

There are no modifications or additions to Section 2.0 of the permit.

Part 3.0 Requirements for Emission Units

Condition 3.3.4 has been modified. Reference to Package Boiler No. 6 (Source Code BO06) has been removed from the condition. The boiler has been permanently shutdown and was moved to another facility.

Condition 3.3.6 has been modified. Reference to Flexographic Printer No. 4 (Source Code FX04) has been removed from the condition. The equipment has been removed from the facility.

Condition 3.3.8 has been modified. Reference to Package Boiler No. 6 (Source Code BO06) has been removed from the condition.

Condition 3.3.9 has been modified. The condition previously listed the SO_2 emission limit for Boiler No. 3 (Source Code BO01) as specified in 40 CFR 60 Subpart Db. The new SO_2 emission limit taken to reduce the impact of the project on the surrounding area has been added to the condition. The citation has been updated to include 40 CFR 52.21. The NSPS limit is now paragraph (a) of the condition and the PSD limit is now paragraph (b) of the condition.

Condition 3.3.10 has been modified. The condition previously listed the SO_2 emission limit for Boilers No. 4 and 5 (Source Codes BO02 and BO03) as specified in 40 CFR 60 Subpart Db. The new SO_2 emission limits taken to reduce the impact of the project on the surrounding area has been added to the condition. The citation has been updated to include 40 CFR 52.21. The NSPS limit is now paragraph (a) of the condition and the PSD limit is now paragraph (b) of the condition.

Condition 3.3.11 has been deleted. The condition contained provisions for Package Boiler No. 6 (Source Code BO06).

Condition 3.3.12 has been modified. The condition previously listed the NO_X emission limits for Boilers No. 3, 4, and 5 (Source Codes BO01, BO02, and BO03) as specified in 40 CFR 60 Subpart Db. The NSPS limit of 0.6 lb/MMBtu has been replaced with the more stringent NO_X emission limit of 0.4 lb/MMBtu taken to reduce the impact of the project on the surrounding area. The citation has been updated to include 40 CFR 52.21.

Condition 3.3.13 has been deleted. The condition contained provisions for Package Boiler No. 6 (Source Code BO06).

Condition 3.3.15 has been modified. Reference to Flexographic Printer No. 4 (Source Code FX04) has been removed from the condition.

Condition 3.3.16 has been modified. Previously, the condition contained a PSD avoidance limit that restricted VOC emissions to 40 tpy due to solvent usage for Paper Machines Nos. 16-19 (Source Codes PM01-PM04) and 40 tpy due to solvent usage for Paper Machine No. 20 (Source Code PM05). The machines have gone through a retroactive PSD review and the facility has accepted new PSD limits. The condition now limits VOC emission to 206.3 tpy due to chemical additive/solvent usage from the paper machines and limits VOC emissions to 97.3 tpy due to chemical additive/solvent usage in the bleaching systems (Source Codes FP04, FP05, FP06, and FP08) and the pulp processing area (Source Code PULP). The citation has been changed from PSD avoidance to PSD.

Conditions 3.3.17 and 3.3.18 have been deleted. The conditions contained provisions for Package Boiler No. 6 (Source Code BO06).

Condition 3.3.19 has been modified. The condition previously limited the sulfur content of fuel oil burned at the facility to 0.5 percent sulfur, by weight. The facility has accepted a sulfur content limit of 0.05 percent in order to reduce the project's impact on the surrounding area. The condition has been changed to include the new sulfur content limit for all oil combusted at the facility.

Condition 3.3.20 has been deleted. The condition contained provisions for the combustion of No. 2 fuel oil in the Paper Machine No. 20 (Source Code PM05) dryer burners. The facility will no longer burn No. 2 fuel oil in these units based on the BACT analysis. Natural gas will be the only fuel burned in the paper machine dryer burners.

Condition 3.3.21 has been added to the permit. The condition states that the facility is allowed to burn only natural gas in the paper machine (Source Code PM01-PM05) dryer burners. This requirement is a condition of the PSD BACT analysis.

Condition 3.3.22 has been added to the permit. The condition limits the emission of VOC from the Paper Machine No. 20 (Source Code PM05) dryer burners to 0.0067 lb/MMBtu. This is new limit based on the PSD BACT analysis.

Condition 3.3.23 has been added to the permit. The condition requires the new burners in the Paper Machine Nos. 17 and 18 (Source Code PM02 and PM03) dryers to be low-NO_X burners. The condition also limits the emissions of PM/PM_{10}, SO_2, NO_X, CO, and VOC from the new burners based on the PSD BACT analysis.

Condition 3.3.24 has been added to the permit. The condition requires the Permittee to limit the particulate matter emission from Paper Machines Nos. 16-19 (Source Codes PM01-PM04) by limiting production on a 12-month basis. The particulate matter and production rate limits are based on the PSD BACT analysis.

Condition 3.3.25 has been added to the permit. The condition requires the Permittee to limit the emission of nitrogen oxides from each combustion turbine / waste heat recovery boiler combination (Source Codes CT01/WH01 and CT02/WH02) to no more than 105.0 pounds per hour. This limit was taken in order to reduce the project's impact on the surrounding area.

Condition 3.3.26 has been added to the permit. The condition is a general provisions requirement that applies to all facilities regulated under 40 CFR Part 63. The facility is subject to 40 CFR 63 Subparts KK, JJJJ, and DDDDD.

Condition 3.3.27 has been added to the permit. The condition is a general applicability condition for 40 CFR 63 Subpart DDDDD, also known as the Boiler MACT. The compliance date for existing equipment is in 2007. The facility will be subject to this rule for the operation of the boilers (Source Code BO01, BO02, and BO03) and waste heat recovery boilers (Source Code WH01 and WH02).

Condition 3.3.28 has been added to the permit. The condition is a general applicability condition for 40 CFR 63 Subpart JJJJ, also known as the Web and Paper Coating MACT. The facility is subject to this rule for the use of coatings and glues in the converting department.

Condition 3.3.29 has been added to the permit. The condition is a general applicability condition for 40 CFR 60 Subpart Y, which regulates coal preparation plants. The mill is subject to this regulation because of the preparation operations that are in place for the coal burning the boilers.

Conditions 3.3.30 and 3.3.31 have been added to the permit. The conditions contain limits for particulate matter and opacity as they apply to the coal preparation operations regulated under 40 CFR 60 Subpart Y.

Condition 3.3.32 has been added to the permit. The condition is a general applicability condition for 40 CFR 60 Subpart OOO, which regulates the solid fuel and limestone handling system at the mill.

Condition 3.3.33 has been added to the permit. The condition contains limits for particulate matter and opacity as they apply to the solid fuel and limestone handling system at the mill regulated under 40 CFR 60 Subpart OOO.

Conditions 3.3.34 and 3.3.35 have been moved from Section 3.5 of the permit. The conditions contain chlorine limits, in ppm, for the operation of the Chlor-Alkali Plant and the two Chlor-Alkali Plant scrubbers. The citations for the conditions have been updated to include reference to 40 CFR 52.21. The conditions have been moved to Section 3.3 of the permit because the citation now includes a federal regulation.

Condition 3.4.4 has been modified. The condition previously permitted the facility to burn both natural gas and No. 2 fuel oil in the Package Boiler (Source Code BO06), Paper Machine (Source Codes PM01-PM05) dryers, Combustion Turbines (Source Codes CT01 and CT02), and Waste Heat Recovery Boilers (Source Codes WH01 and WH02). Reference to the Package Boiler and Paper Machine dryers has been removed. The BACT analysis requires the facility to burn only natural gas in the Paper Machine dryers.

Condition 3.4.6 has been modified. Reference to Package Boiler No. 6 (Source Code BO06) has been removed from the condition.

Condition 3.4.9 has been added to the permit. The condition is a general opacity limit under Georgia Rule 391-3-1-.02(2)(b) of 40 percent. The limit applies to equipment previously listed in the Title V permit as well as the boiler related material handling operations that were omitted from the initial Title V permit. These material handling operations include silos and transfer systems.

Condition 3.4.10 has been added to the permit. The condition is a general particulate matter limit under Georgia Rule 391-3-1-.02(2)(e). The limit applies to equipment previously listed in the Title V permit as well as the boiler related material handling operations that were omitted from the initial Title V permit. These material handling operations include silos and transfer systems.

Conditions 3.5.1 and 3.5.2 have been deleted and moved to Section 3.3 of the permit. Please see the discussion for Conditions 3.3.34 and 3.3.35.

Part 4.0 Requirements for Testing

Condition 4.1.3 has been modified. Paragraph (n) has been added to include test method 10 or 10B for the determination of carbon monoxide concentrations. This method is necessary because the permit requires the facility to conduct performance testing for carbon monoxide from the new low-NO_X dryer burners installed in Paper Machines No. 17 and 18 (Source Codes PM02 and PM03).

Condition 4.2.2 has been modified. The condition contains the methods by which the facility must calculate 30-day averages for SO_2 emissions for limits under 40 CFR 60 Subpart Db. The reference to Condition “3.3.10” has been changed to “3.3.10.a” due to the format change from adding the 40 CFR 52.21 emission limit to Condition 3.3.10.

Condition 4.2.4 has been deleted. The condition contained provisions for Package Boiler No. 6 (Source Code BO06).

Condition 4.2.6 has been added to the permit. The condition requires the facility to conduct performance tests for nitrogen oxides and carbon monoxide for the new low-NO_X natural gas dryer burner in Paper Machines No. 17 and 18 (Source Codes PM02 and PM03). The tests are necessary to confirm the manufacturer's guarantee for the burners and the demonstrate compliance with the BACT PSD limits.

Part 5.0 Requirements for Monitoring

Paragraphs (b) and (e) of Condition 5.2.1 and paragraph (a) of Condition 5.2.2 have been deleted. The paragraphs contained provisions for Package Boiler No. 6 (Source Code BO06).

Condition 5.2.3 has been modified. The condition contains the monitoring provisions for the scrubbers that control chlorine emissions from the Chlor-Alkali Plant. The facility has changed the source codes for the scrubbers from CA20 and CA21 to SB01 and SB02, respectively.

Condition 5.2.6 has been modified. The condition contains the CEMS provisions for NO_X emission from Boiler Nos. 3, 4, and 5 (Source Codes BO01, BO02, and BO03) under 40 CFR 60 Subpart Db. The citation has been updated to include 40 CFR 52.21 due to the more stringent NO_X limit taken to reduce the impact of the project on the surrounding area.

Condition 5.2.8.a has been added to the permit. The condition requires the facility to record the production for Paper Machines No. 16-19 (Source Codes PM01-PM04) on a daily basis. These records are necessary to demonstrate compliance with the particulate matter BACT limits for emissions from the paper machine process.

Condition 5.2.8.b has been added to the permit. The condition requires the facility to record pressure drop and scrubbant flow rate for the Trim Line Collection System Scrubbers (Source Codes SB06 and SB07) once per shift. The monitoring is necessary to demonstrate proper operation of the scrubbers and the proper control of particulate matter emissions from the converting department. This also provides assurance that the facility is complying with the findings of the BACT analysis.

Condition 5.2.8.c has been added to the permit. The condition requires the facility to record pressure drop and scrubbant flow rate for the Paper Machine Scrubbers (Source Code SB03, SB04, and SB05) once per shift. The monitoring is necessary to demonstrate proper operation of the scrubbers and the proper control of particulate matter emissions from the process emissions. This also provides assurance that the facility is complying with the findings of the BACT analysis.

Condition 5.2.8.d has been added to the permit. The condition requires the Permittee to records the type and quantity of fuel burned at the facility once per day. The condition requires the records to be kept for each separate fuel-burning unit. The monitoring provides a reasonable assurance that the facility is in compliance with all fuel burning requirements found throughout the permit.

Condition 5.2.9 has been added to the permit. The condition requires the facility to install and operate the CEMS equipment necessary to monitor NO_X from the combustion turbines (Source Codes CT01 and CT02) and waste heat recovery boilers (Source Codes WH01 and WH02) and demonstrate compliance with the 105.0 lb/hr limit under 40 CFR 52.21.

Conditions 5.2.10 and 5.2.11 have been added to the permit. The conditions require the facility to conduct VE checks for the various baghouses in use at the plant and to develop a Preventative Maintenance Plan for the baghouses. These measures are designed to both detect problems that may result in excess particulate matter emissions or opacity and to prevent conditions that lead to control device malfunctions. These conditions have been added to the permit in conjunction with the addition of the boiler material handling equipment that has been added to the equipment list.

Conditions 5.2.12 and 5.2.13 have been added to the permit. The conditions require the facility to establish monitoring parameter ranges for pressure drop and scrubbant flow rate for the Trim Line Collection System Scrubbers (Source Code SB06 and SB07) and the Paper Machine Scrubbers (Source Codes SB03, SB04, and SB05) and submit the information to the Division. The values will be used to determine excursions under

Condition 6.1.7.c. The excursion values are necessary to provide reasonable assurance that the scrubbers are operating properly.

Condition 5.3.1 has been modified. Reference to Package Boiler No. 6 (Source Code BO06) has been removed from the condition.

Condition 5.3.3 has been modified. The condition requires the facility to submit the records prescribed by Section 5.3 of the permit with the report required by Condition 6.1.4. The condition has been modified to include the condition numbers for the new conditions added through the amendment. The citation has been updated to include 40 CFR 52.21.

Condition 5.3.4 has been added to the permit. The condition requires the facility to maintain records of periods when the 24-hour average SO_2 limit for Boiler No. 3 (Source Code BO01) as listed in Condition 3.3.9.b is exceeded. The facility is also required to submit this information as part of the quarterly report discussed in Condition 6.1.4. The records are necessary to determine compliance with the new SO_2 limit.

Condition 5.3.5 has been added to the permit. The condition requires the facility to maintain records of periods when the 24-hour average SO_2 limit for Boiler Nos. 4 and 5 (Source Codes BO02 and BO03) as listed in Condition 3.3.10.b is exceeded. The facility is also required to submit this information as part of the quarterly report discussed in Condition 6.1.4. The records are necessary to determine compliance with the new SO_2 limit.

Condition 5.3.6 has been added to the permit. The condition requires the facility to maintain records of periods when the 24-hour average NO_X limits for the combustion turbines / waste heat boilers (Source Codes CT01/WH01 and CT02/WH02) as listed in Condition 3.3.25 are exceeded. The facility is also required to submit this information as part of the quarterly report discussed in Condition 6.1.4. The records are necessary to determine compliance with the new 40 CFR 52.21 NO_X limit.

Part 6.0 Other Recordkeeping and Reporting Requirements

Condition 6.1.7.a(i) has been modified. Reference to Package Boiler No. 6 (Source Code BO06) has been removed from the condition.

Condition 6.1.7.b(i) has been modified. The condition previously described as an excess emission under 40 CFR 60 Subpart Db any 30-day average that NO_X emission exceeded 0.6 lb/MMBtu from Boiler Nos. 3, 4, and 5 (Source Codes BO01, BO02, or BO03). The limit has been revised down to 0.4 lb/MMBtu. A citation has been added and includes 40 CFR 60 Subpart Db and 40 CFR 52.21.

Condition 6.1.7.b(ii) has been deleted. The condition contained provisions for Package Boiler No. 6 (Source Code BO06).

Condition 6.1.7.b(vi) has been modified. Reference to Flexographic Printer No. 4 (Source Code FX04) has been removed from the condition.

Condition 6.1.7.b(vii) has been deleted. The condition contained provisions for Package Boiler No. 6 (Source Code BO06).

Condition 6.1.7.b(x) has been added to the permit. The condition describes as an exceedance any 24-hour average sulfur dioxide emission rate from Boiler No. 3 (Source Code BO01) that exceeds 491.4 pounds per hour.

Condition 6.1.7.b(xi) has been added to the permit. The condition describes as an exceedance any 24-hour average sulfur dioxide emission rate from Boiler No. 4 or 5 (Source Code BO02 or BO03) that exceeds 381.5 pounds per hour.

Condition 6.1.7.b(xii) has been added to the permit. The condition describes as an exceedance any time that the fuel oil burned at the mill has a sulfur content of more than 0.05 percent sulfur, by weight. The citation for the condition includes 40 CFR 52.21, 40 CFR 60 Subpart Db, and Georgia Rule (g).

Condition 6.1.7.b(xiii) has been added to the permit. The condition describes as an exceedance as any time that a Paper Machine (Source Codes PM01-PM05) dryer is fired with a fuel other that natural gas. The facility will fire only natural gas in the dryers as a result of the BACT analysis. The citation for this condition also includes Georgia Rule 391-3-1-.03(2)(c).

Condition 6.1.7.b(xiv) has been added to the permit. The condition describes as an exceedance as any 12-month period during which production for Paper Machine Nos. 16-19 (Source Codes PM01-PM05) exceeds the limits found in Condition 3.3.24. These limits provide a reasonable assurance that the facility is in compliance with the particulate matter limits established in the PSD BACT analysis.

Condition 6.1.7.b(xv) has been added to the permit. The condition describes as an exceedance as any 24-hour average NO_X emission rate from the combustion turbines / waste heat recovery boiler (Source Codes CT01/WH01 and CT02/WH02) that exceeds 105.0 pounds per hour.

Condition 6.1.7.b(xvi) has been added to the permit. The condition describes as an exceedance any time of process operation during which the fuel burned in a combustion turbine (Source Code CT01 or CT02) or waste heat recovery boiler (Source Code WH01 or WH02) is other than natural gas or No. 2 fuel oil. This reporting requirement is based on an existing condition enforced under Georgia Rule 391-3-1-.03(2)(c).

Conditions 6.1.7.c(i) and (ii) have been deleted. The conditions contained provisions for Package Boiler No. 6 (Source Code BO06). The boiler has been permanently shutdown and was moved to another facility.

Condition 6.1.7.c(iii) has been deleted. The condition contained provisions for the firing of No. 2 fuel oil in the Paper Machine No. 20 (Source Code PM05) dryer burners. Based on the BACT analysis, the facility will only burn natural gas in these units.

Conditions 6.1.7.c(v) and (vi) have been modified. The conditions contain the reporting provisions for the scrubbers that control chlorine emissions from the Chlor-Alkali Plant. The facility has changed the source codes for the scrubbers from CA20 and CA21 to SB01 and SB02, respectively.

Condition 6.1.7.c(vii) has been added to the permit. The condition describes as an excursion any two consecutive VE checks for a mill baghouse that reveal that visible emissions are present. This reporting is necessary to demonstrate compliance with the particulate matter and opacity limits found in Part 3.0 of the permit.

Condition 6.1.7.c(viii) has been added to the permit. The condition describes as an excursion any adverse condition discovered during the periodic inspections prescribed by the baghouse Preventative Maintenance Plan. This reporting is necessary to demonstrate that the control equipment is properly operated and maintained.

Condition 6.1.7.c(ix) has been added to the permit. The condition describes as an excursion any three consecutive pressure drop or scrubbant flow rate determinations for the Trim Line Collection System Scrubbers (Source Codes SB06 and SB07) that are outside of the range established by the mill. The reporting is necessary to demonstrate that the control equipment is properly operated and maintained.

Condition 6.1.7.c(x) has been added to the permit. The condition describes as an excursion any three consecutive pressure drop or scrubbant flow rate determinations for the Paper Machine Scrubbers (Source Codes SB03, SB04, and SB04) SB07) that are outside of the range established by the mill. The reporting is necessary to demonstrate that the control equipment is properly operated and maintained.

Condition 6.1.7.d(i) has been added to the permit. The condition requires the facility to submit a statement with the quarterly report that certifies that the fuel supplier certifications used to demonstrate compliance with fuel oil sulfur limits represents all of the fuel oil combusted at the mill during the quarter. These records provide reasonable assurance that the facility is in compliance with 40 CFR 52.21, 40 CFR 60 Subpart Db, and Georgia Rule (g).

Condition 6.2.1 has been modified. The condition requires the facility to obtain fuel supplier certifications for each shipment of No. 2 fuel oil. The condition has been modified through the addition of a statement that the certification must show that the sulfur content of the fuel is not greater than 0.05 percent sulfur, by weight. Reference to 40 CFR 52.21 has been added to the citation.

Condition 6.2.3 has been modified. The condition requires the Permittee to maintain fuel records for the boilers (Source Codes BO01-BO03 and BO06) and combustion turbines (Source Codes CT01 and CT02). Reference to Package Boiler No. 6 (Source Code BO06) has been removed from the condition. Reference to the waste heat recovery boilers (Source Codes WH01 and WH02) have been added to condition. The records for the waste heat recovery boilers are necessary to provide a reasonable assurance of compliance with fuel burning restrictions.

Condition 6.2.5 has been deleted. The condition contained provisions for Package Boiler No. 6 (Source Code BO06).

Condition 6.2.6 has been deleted. The condition contained provision for the firing of No. 2 fuel oil in the Paper Machine No. 20 (Source Code PM05) dryer burners. Based on the BACT analysis, the facility will only burn natural gas in these units.

Condition 6.2.7 has been deleted. The condition contained provisions for Package Boiler No. 6 (Source Code BO06). The boiler has been permanently shutdown and was moved to another facility.

Condition 6.2.8 has been deleted. The condition contained provisions for the firing of No. 2 fuel oil in the Paper Machine No. 20 (Source Code PM05) dryer burners. Based on the BACT analysis, the facility will only burn natural gas in these units.

Condition 6.2.9 has been modified. Previously, the condition contained provisions for maintaining VOC usage records for materials used on the paper machines (Source Codes PM01-PM05) and in the pulp processing area (Source Code PULP). The condition has been modified to specifically keep usage records for additive and cleaning solvents used on the paper machines, the pulp processing area, and the bleaching systems (Source Codes FP04, FP05, FP06, and FP08). These usage records are needed to determine compliance with the new BACT limits for these sources. The citation has been modified from 40 CFR 52.21 Avoidance to 40 CFR 52.21.

Condition 6.2.10 has been modified. Previously, the condition required the facility to use VOC material usage records to calculate VOC emissions from the paper machines (Source Code PM01-PM05) and in the pulp processing area (Source Code PULP). The condition has been updated to explicitly require the records to be kept on a monthly total basis and a 12-month rolling basis. The condition now requires the facility to report the VOC emission totals for the paper machines, pulp processing area, and bleaching system (Source Code FP04, FP05, FP06, and FP08) with the quarterly report required by Condition 6.1.4. The equation used to conduct the VOC emission calculations has been updated to include the bleaching system emissions. Finally, the facility is now required to submit a report for any month that emissions exceed $1/12^{th}$ of the total yearly emission limit. The citation has been modified from 40 CFR 52.21 Avoidance to 40 CFR 52.21.

Condition 6.2.12 has been modified. Reference to Flexographic Printer No. 4 (Source Code FX04) has been removed from the condition. The equipment has been removed from the facility.

Condition 6.2.13 has been added to the permit. The condition requires the facility to use paper production records for Paper Machines Nos. 16-19 (Source Code PM01-PM05) to calculate production for each machine on a monthly total basis and a 12-month rolling basis. The condition also requires the facility to report the production totals in the quarterly report required by Condition 6.1.4. Finally, the facility is now required to submit a report for any month that production for a machine exceeds 1/12th of the total yearly limit that machine. The records are necessary to demonstrate compliance with the particulate matter limits established through the BACT analysis.

Condition 6.2.14 has been added to the permit. The condition requires the facility to submit a protocol summary for the use of the mill's New Substance Review Program as specified in the BACT analysis. The condition requires the facility to comply with the provisions of the Program when using new chemical additives or solvents on the paper machines (Source Codes PM01-PM05), the pulp processing area (Source Code PULP), and in the bleaching systems (Source Codes FP04, FP05, FP06, and FP08). The facility must submit information regarding new chemical additives or solvents with the quarterly report required by Condition 6.1.4. The use of the Program provides a reasonable assurance that VOC emissions are minimized while allowing the facility to maintain product quality and meet customer specifications.

Condition 6.2.15 has been added to the permit. The condition requires the facility to commence construction of the modifications within 18 months of the issuance of the permit. This condition provides assurance that the BACT analysis and air quality analysis are up-to-date at the time of construction.

Condition 6.2.16 has been added to the permit. The condition requires the facility to provide notification to the state and at the completion of the Mill Process Improvement modifications. The condition provides a reasonable assurance that the facility is in compliance with Condition 6.2.15 and to keep the EPD informed of operations at the plant.

Condition 6.2.17 has been added to the permit. The condition requires the facility to submit an application to incorporate the provisions of 40 CFR 63 Subpart JJJJ.

Part 7.0 – Other Specific Requirements

There are no modifications or additions to Section 7.0 of the permit.

Part 8.0 – General Provisions

Section 8.23 of the permit has been replaced and Sections 8.24 through 8.26 have been added to the permit to reflect changes in the Title V permit template.

Attachment B

The Insignificant Activities Checklist has been updated. The totals under the following categories have been changes from "N/A" to "1":

- Mobile Sources - Cleaning and sweeping of streets and paved surfaces;
- Combustion Equipment - Open burning and Stationary engines burning gasoline, provided that the output of each engine does not exceed 100 horsepower and that no individual engine operates for more than 500 hours per year;
- Maintenance, Cleaning, and Housekeeping - Non-routine clean out of tanks and equipment for the purposes of worker entry or in preparation for maintenance or decommissioning; and
- Industrial Operations - Carving, cutting, routing, …etc.

The totals under the following categories have been changed as noted below:

Maintenance, Cleaning, and Housekeeping - Cold cleaners having an air/vapor interface of not more than 10 square feet and that do not use a halogenated solvent: Decreased from 18 to 8;
Storage Tanks and Equipment - All petroleum liquid storage tanks storing a liquid with a true vapor pressure of equal to or less than 0.50 psia as stored: Increased from 3 to 5;
Storage Tanks and Equipment - Gasoline storage and handling equipment at loading facilities handling less than 20,000 gallons per day or at vehicle dispensing facilities that are not subject to any standard, limitation or other requirement under Section 111 or 112 (excluding 112(r)) of the Federal Act: Increased from 1 to 2; and
Storage Tanks and Equipment - All chemical storage tanks used to store a chemical with a true vapor pressure of less than or equal to 10 millimeters of mercury (0.19 psia): Increased from 4 to 19.

The Insignificant Activities Based on Emission Levels table has been updated. The following equipment has been added to the list:

Tank No. 12 – 28.5% HCl;
Tank No. 14 – 50% solution of hydrogen peroxide;
Tank No. 15 – Sodium Hydrosulfite solution;
Tank No. 16 – DTPA;
Tank No. 19 – 62% phosphoric acid;
Tank No. 21 – polymer for papermaking; and
Tanks No. 10 and 11 – Lixator (brine solution).

APPENDIX A

Draft Revised Title V Operating Permit Georgia-Pacific Corporation dba Fort James Operating Company
Savannah River Mill
Rincon (Effingham County), Georgia

APPENDIX B

Georgia-Pacific Corporation dba Fort James Operating Company – Savannah River Mill
PSD Permit Application and Supporting Data

Contents Include:

1. PSD Permit Application No. 15491 dated January 19, 2005 (includes information included in original July 13, 2004 submittal).
2. PSD Application table of contents and Tables with updated page numbers, dated January 27, 2005.
3. Additional information and various pieces of correspondence.

APPENDIX C

EPD'S PSD Dispersion Modeling