

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

**PRELIMINARY DETERMINATION
SIP Permit Application No. 15920
May 2005**

**State of Georgia
Department of Natural Resources
Environmental Protection Division
Air Protection Branch**

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SUMMARY

The Environmental Protection Division (EPD) has reviewed the Brunswick Cellulose, Inc. Pulp and Paper Mill (Brunswick Mill) application for a permit for the construction and operation of modifications at their facility in Brunswick, Georgia (Glynn County). The project will modify the combustion air system for Power Boiler #4 (Source Code: U700) in order to improve combustion efficiencies.

The proposed project includes modifications to the boiler and bark delivery system to improve combustion efficiency in the boiler and reduce the mill's dependency on No. 6 fuel oil. The bark fuel feeders will be relocated lower in the furnace and a new Over Fire Air (OFA) system will be installed above these fuel feeders. The OFA system will provide a curtain of air at the proper location in the furnace to support efficient combustion through improved mixing of the various fuels and the combustion air. The bark delivery system, including a new bark transfer cyclone (Source Code: U703), will be improved to ensure a steady and sufficient supply of bark to the boiler. Additionally, the first fields in Power Boiler #4 electrostatic precipitator (ESP) (Source Code: UEP4) will be replaced.

Power Boiler #4 is currently permitted to burn bark, tire-derived fuel (TDF), wastewater treatment sludge, waste oil, natural gas, and No. 6 fuel oil. The unit's heat input capacity rate will not change as a result of this modification and remains a maximum of 800 MMBtu/hr. The boiler was installed at the mill in 1961. Brunswick has proposed to install and operate a continuous emissions monitoring system (CEMS) for oxides of nitrogen (NO_x) for this unit in order to demonstrate compliance with a proposed Prevention of Significant Deterioration (PSD) avoidance limit. The unit already utilizes a continuous opacity monitoring system (COMS).

The modification of the Brunswick Mill due to the modifications of Power Boiler #4 will result in an emissions increase in sulfur dioxide (SO₂), particulate matter (PM/PM₁₀), NO_x, carbon monoxide (CO), and ozone (VOC), and lead (Pb). A PSD analysis was performed for the boiler for all pollutants to determine if any increase was above the "significance" level. The PM/PM₁₀ emissions increase was above the PSD significant level threshold.

Brunswick Cellulose, Inc. is located in Glynn County, which is classified as "attainment" or "unclassifiable" for SO₂, PM/PM₁₀, NO_x, CO, and ozone (VOC) in accordance with Section 107 of the Clean Air Act, as amended August 1977.

Best Available Control Technology (BACT) for Power Boiler #4 was determined to be the use of an existing ESP to control PM/PM₁₀ emissions. The Brunswick Mill currently employs this control scheme; however, the facility is proposing to upgrade the controls and replace the first fields in order to increase the efficiency of the existing ESP. BACT for the new bark transfer cyclone was determined to be a new cyclone.

The modeled PM/PM₁₀ emissions increase is below PSD ambience significance levels. The modeling analysis shows that the proposed project will not contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS) or PSD increment. The additional impacts analysis showed no adverse effects on the local economy, soils and vegetation, or visibility from the proposed project.

The EPD review of the data submitted by the Brunswick Mill related to the proposed modifications indicates that the project will be in compliance with all applicable state and federal air quality regulations.

It is the preliminary determination of the EPD that the proposal provides for the application of BACT for the control of PM/PM₁₀ from Power Boiler #4, as required by Federal 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 the nearby Class I area. It has further been determined that the proposal will not cause impairment of visibility or detrimental effects on soils or vegetation. Any air quality impacts produced by project-related growth will be inconsequential.

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

1.0 INTRODUCTION

On December 27, 2004, Brunswick Cellulose, Inc. Pulp and Paper Mill submitted an application for an air quality permit for modifications to Power Boiler #4. The facility is located at 1400 West Ninth Street, Brunswick (Glynn County), Georgia. The project will modify the combustion air system for Power Boiler #4 in order to improve combustion efficiencies.

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

PSD regulations require that emission increases be calculated based on the difference between past actual emissions (in this case, the average for the two year period from 2002-2003) and the potential-to-emit at proposed limits. The past actual emissions were based on emission factors from stack testing conducted in November 2004. AP-42 factors were used to supplement the stack test data where specific data did not exist. All future potential emissions calculations were based on a projected fuel firing mix of 5.57 million MMBtu/year of bark, TDF, and wastewater sludge, and 2,500,000 gallons/year of No. 6 fuel oil, which is the worst-case scenario secondary fuel. The future potential emissions for PM/PM₁₀ were based on a proposed BACT emissions limit. The future potential emissions for SO₂, NO_x, CO, and VOC were based on proposed PSD avoidance levels and existing limits in the permit. The estimated incremental increases of regulated pollutants from the mill are listed in Table 1.

Table 1: Emissions Increases from the Project

Pollutant	Potential Emissions Increase / (Decrease) tpy	PSD Significant Levels tpy	Subject to PSD Review
PM ₁₀	80.0	15	Yes
PM	80.0	25	Yes
SO ₂	39.0	40	No
NO _x	39.7	40	No
CO	99.3	100	No
VOC	39.0	40	No
Pb	0.16	0.6	No
H ₂ SO ₄	(19.62)	7.0	No
Be	1.8 E-4	4.00 x 10 ⁻⁴	No
Hg	4.0 E-3	0.10	No
Vinyl Chloride	1.3 E-02	1	No
Fluorides	(1.3 E-01)	3	No

The net increases were calculated by subtracting the past actual emissions (based upon the annual average emissions from 2002 and 2003) from the future potential emissions. The emissions calculations for the proposed modifications can be found in detail in the Exhibit A of Application No. 15920. These calculations have been reviewed and approved by the Division.

Based on the above information in Table 1, the Brunswick Mill's proposed modification, as specified per Georgia Air Quality Permit Application No. 15920, is classified as a major modification under PSD because the potential emissions increase of PM/PM₁₀ exceed the PSD significance levels. Through its new source review (NSR) procedure, EPD has evaluated Brunswick's proposal for compliance with State and Federal requirements. The findings of EPD have been summarized in this Preliminary Determination.

2.0 PROCESS DESCRIPTION

This project will modify the combustion air system for Power Boiler #4. The goal of the project is to reduce the mill's dependency on fossil fuel usage, improve combustion efficiencies, and to meet the requirements of 40 CFR 63 Subpart DDDDD – *“National Emission Standards for Hazardous Air Pollutants for Industrial/ Commercial/Institutional Boiler and Process Heaters.”*

Currently, Power Boiler #4 operates as a base-loaded boiler to minimize the number of potential opacity excursions. The number of reportable opacity excursions has been reduced, but at the expense of using higher cost fossil fuels in the other power boilers to “swing” the mill steam header due to fluctuations in the mill's steam demand. An ideal “swing” boiler must be able to quickly accommodate the change in steam demand by significantly adding or reducing the amount of fuel and combustion air necessary to keep the system in balance and stabilize furnace operations. This frequent change in steam demand creates the potential for the fuel and combustion air to become temporarily unbalanced, leading to disruptive furnace conditions and less efficient combustion of the fuels that can often lead to higher emissions and opacity.

Installation of an OFA system will provide a curtain of air at the proper location in the furnace to support efficient combustion through improved mixing of the various fuels and combustion air, as well as address the existing operation of unburned char leaving the combustion zone of the boiler.

The facility has also proposed to improve the bark delivery system to ensure a steady and sufficient supply of bark to the boiler. The existing bark teepee may be replaced with a new live bottom bin. Larger blower motors to feed the blow line and a new dedicated bark cyclone (to replace the existing bark cyclone) may be installed at the boiler to feed the new day bin. The project may also include a second cyclone for the wastewater sludge if it is determined necessary to transfer this stream separately.

Various other modifications and replacements may also be performed at the Brunswick Mill in order to improve the boiler efficiency, including the projects listed below:

- Over Fire Air System
- Backstop upgrade
- Stoker fabric seal
- Generating bank hopper
- Generator bank replacement
- Replace the economizer to air heater ductwork
- Replace the duct from ID fan to roof
- Replace north and south side burner ducts
- Replace Buells with new mechanical dust collectors
- Replace air heater
- MFA drum level control
- Supervisory energy management software
- Replace clinker tube on north and south walls
- Install a bark day bin
- Improve bark delivery system
- Replace existing bark teepee with a new live bottom bark bin (optional)
- Add new sand shakers
- Fuel oil burner cleaning or rebuild
- Upgrade ESP controls
- Rebuild first fields on ESP
- New air swept fuel distributors with new ambient air fan
- New feedwater heater
- Replace or modify ID fan and turbine (optional)
- Replace or modify FD fan and motor (optional)
- Modify fly ash, grate ash, and ash reinjection systems

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 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) further states 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) [391-3-1-.02(2)(b)] is a general rule that limits the opacity of emissions from any air contaminant source to less than 40%. Georgia Rule (b) applies to Power Boiler #4 since Georgia Rule 391-3-1-.02(2)(d)3 is not being triggered by this modification. The opacity from the boiler has been, and will continue to be, monitored using a COMS. For Power Boiler #4, no conditions need to be modified or added in order to meet the requirements of this rule. This rule also applies to the Bark Transfer Cyclone. A new condition must be added to the permit in order to fully incorporate the requirements of this rule for the Bark Transfer Cyclone.

Georgia Rule (d) [391-3-1-.02(2)(d)] is a general rule that contains requirements for fuel burning equipment. Emissions that may be regulated under Georgia Rule (d) include PM, opacity, and NO_x. Power Boiler #4 is subject to the rule for PM at a rate limited by equation $P = 0.7(10/R)^{0.202}$ where P is the emission limit in lb/MMBtu heat input and R is equal to the boiler heat input. This results in a limit of 0.289 lb/MMBtu. The limit is subsumed by a more stringent proposed BACT limit of 0.05 lb/MMBtu heat input. The facility controls PM emissions from this source using an ESP. Since the boiler is not being modified, and the construction date was prior to January 1, 1972, the NO_x requirements of 391-3-1-.02(2)(d)4 are not triggered. Additionally, since the boiler is not being modified, and the construction date was prior to January 1, 1972, the more stringent opacity requirements of 391-3-1-.02(2)(d)3 are not triggered. Permit Condition 3.4.7 will be removed from the permit since its limit is subsumed by the new PSD limit.

Georgia Rule (e) [391-3-1-.02(2)(e)] is a general rule that contains requirements for particulate matter emissions from manufacturing processes. The Bark Transfer Cyclone is subject to the rule for PM at a rate limited by equation $E = 4.1P^{0.67}$ where E is the emission rate in pounds per hour and P is the process input weight rate in tons per hour. This results in a limit of 1.95 lb/hour, based on an input weight rate of 0.33 tons/hour. A new condition must be added to the permit in order to fully incorporate the requirements of this rule for the Bark Transfer Cyclone.

Georgia Rule (g) [391-3-1-.02(2)(g)] applies to all fuel-burning sources. 391-3-1-.02(2)(g)2 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 and applies to Power Boiler #4. Since the boiler is not being modified, and the construction date was prior to January 1, 1972, the SO₂ requirements of 391-3-1-.02(2)(g)1 are not triggered. No conditions need to be modified or added in order to meet the requirements of this rule.

Federal Rule – Prevention of Significant Deterioration

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 modifications 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 (NSPSs), National Emission Standards for Hazardous Air Pollutants (NESHAPs), or State Implementation Plan (SIP). In addition, if EPD determines that there is no economically reasonable or technologically feasible way to measure the emissions, and hence to impose an enforceable emissions standard, it may require the source to use a design, equipment, work practice or operations standard or combination thereof, to reduce emissions of the pollutant to the maximum extent practicable.

The BACT determination should, at a minimum, meet two core requirements. The first core requirement is that the determination follows 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 and will be discussed in later section of this Preliminary Determination:

- 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

Now that the PSD BACT standards have been defined, the next step is to review the remaining applicable federal requirements. This step will aid in citing the appropriate legal authority for each requirement in the Title V permit. This analysis will show that the PSD BACT standards represent the most stringent limit.

The Power Boiler #4 proposed project is classified as a major modification because the potential emission increase in PM/PM₁₀ exceeds the threshold of PSD Significance level.

Federal Rule – 40 CFR 60 Subpart Db

Power Boiler #4 was constructed prior to June 19, 1984, but does have a boiler rating greater than 100 MMBtu/hr. The unit may therefore become subject to 40 CFR 60 Subpart Db – “Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units” if this project constitutes a modification or reconstruction.

An NSPS modification is triggered if a regulated pollutant is increased on a maximum actual short-term (i.e., lb/hr) basis as a result of the proposed project. The proposed project will not increase the maximum hourly firing rates of the fuel being burned in the boiler, nor does it increase the maximum steaming rate capability of the boiler as the volume of the furnace is not being modified. Additionally, the hourly emission rates of PM/PM₁₀, NO_x, and SO₂ will be reduced or, at worse, stay the same. Therefore, the unit is not being “modified” as defined under 40 CFR 60.

An evaluation of whether the project meets the requirements of “reconstruction” must also be performed. Reconstruction is defined as the replacement of components of an existing facility to such an extent the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility and it is technologically and economically feasible to meet the applicable standards set forth in 40 CFR Part 60. The costs of the proposed modifications to Power Boiler #4 are estimated at \$14,000,000 and the estimated replacement cost for the unit is \$50,000,000 - \$80,000,000. The costs are well below 50% of the replacement costs; therefore the modifications will not trigger 40 CFR 60 Subpart Db for this unit.

No conditions need to be modified or added in order to meet the requirements of this rule.

Federal Rule – 40 CFR 61 Subpart E

40 CFR 61 Subpart E – “National Emission Standards for Mercury” applies to the drying or incinerating of municipal or industrial wastewater sludge. Power Boiler #4 burns industrial wastewater sludge. The mercury limit is 7.1 pounds (3.2 kg) per 24-hour period and compliance can be determined either by stack testing or sampling of the sludge being burned. Brunswick provided data from 1999 that indicates the maximum mercury emissions to be 1.1 grams/day. The facility utilized the sludge sampling requirements of 40 CFR 61.54 to determine mercury emissions. Since this is well below the level of 3.5 pounds (1.6 kg) per 24-hour period that triggers additional monitoring per 40 CFR 61.55(a), the facility is not required to monitor mercury emissions from wastewater sludge any further.

In order to fully incorporate the applicable requirements, the limit of 7.1 pounds per 24-hour period will be included in the Permit in new Permit Condition 3.3.32. New Permit Conditions 3.3.33 and 3.3.34 will also be added to subject Power Boiler #4 to the applicable requirements of 40 CFR 61 Subparts A and E while firing wastewater sludge.

Federal Rule – 40 CFR 63 Subpart DDDDD

Power Boiler #4 will be subject to 40 CFR 63 Subpart DDDDD – “*National Emission Standards for Hazardous Air Pollutants for Industrial/Commercial/Institutional Boilers and Process Heaters.*” The standard has a compliance date of September 13, 2007. Power Boiler #4 will be covered under the standards set for existing large solid fuel fired boilers. The rule sets PM emission limits of 0.07 lb/MMBtu (as a surrogate for metal HAPs) for solid fuel fired units. Alternatively, the total hazardous air pollutants (HAP) could be monitored not to exceed 0.001 lb/MMBtu for total selected metals. The standard also sets an opacity limit of 20% opacity.

If the boiler is being reconstructed, it is considered “new” under 40 CFR 63. Therefore, it must be addressed to see if the project meets the requirements of “reconstruction.” The costs of the proposed modifications to Power Boiler #4 are estimated at \$14,000,000 and the estimated replacement cost for the unit is \$50,000,000 - \$80,000,000. The costs are well below 50% of the replacement costs; therefore the modifications will not trigger the 40 CFR 63 Subpart DDDDD requirements for “new” units for this boiler.

New Permit Condition 3.3.35 will require the facility to be in compliance with all applicable requirements of 40 CFR 63 Subpart DDDDD for the power boilers, including Power Boiler #4, as of September 13, 2007.

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 cannot anticipate or predict malfunctions. However, the facility must minimize emissions during periods of startup, shutdown, and malfunction.

Federal Rule – 40 CFR 64- Compliance Assurance Monitoring

40 CFR 64 – “*Compliance Assurance Monitoring*” (CAM) 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 requirements for Power Boiler #4 are not being incorporated at this time because the changes being made to the boiler do not qualify as modifications based on emission changes. CAM requirements for this and all other applicable units will be added in the Title V renewal permit.

4.0 CONTROL TECHNOLOGY REVIEW

POWER BOILER #4 – PARTICULATE MATTER

Step 1: Identify all Control Technologies

The current available PM/PM₁₀ controls include ESPs, wet ESPs, baghouses, and high efficiency wet scrubbers. In the case of an ESP, high voltage electrodes impart a negative charge to the particles entrained in the exhaust gas stream. These negatively charged particles are then attracted to a grounded collecting surface, which is positively charged. The cleaned gas then exits the ESP. Inside the ESP, the particles build up on the collecting plates. At periodic intervals the plates are rapped, causing the agglomerated particles to fall into hoppers. The particles are then removed from the hoppers by a gravity fed rotary screw arrangement. In the case of wet ESPs, a liquid wash down collects the particulates and wet sluicing is used to remove the particles. ESPs offer very high efficiencies for particulates of very small size (above 1 micron in size).

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

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

Cyclones are also used to control the particulate emissions from waste fuel boilers. Particulate matter is removed from the flue gas by a combination of centrifugal and gravitational forces developed from swirling winds in the cyclone, which force the particulate to collect in a hopper below. Cyclone control devices are limited to the collection of heavier particles and are typically used as pre-cleaning devices before other control devices.

- | |
|--|
| Option 1: Dry Electrostatic Precipitator |
| Option 2: Wet Electrostatic Precipitator |
| Option 3: Dry Filtration (Baghouse) |
| Option 4: Wet Scrubber |
| Option 5: Cyclone |

Step 2: Eliminate Technically Infeasible Options

All options are considered technically feasible for a wood waste fired boiler. Table 4-1 of Application No. 15920 presents the results from the RACT/BACT/LAER Clearinghouse search completed for PM/PM₁₀ emissions from wood waste fired boilers. The wood waste boilers with the lowest emission rates have ESPs and baghouses as control devices. Cyclones and venturi scrubbers were also listed.

Step 3: Ranking Remaining Control Technologies by Control Effectiveness

According to the results of the RACT/BACT/LAER Clearinghouse search, ESPs and baghouses are considered the most effective means of PM/PM₁₀ control from a wood waste fired power boiler. A cyclone would be expected to be the least effective of the available PM control technologies.

Step 4: Evaluate Most Effective Controls and Document Results

Table 4-1 of Application No. 15920 shows a list from the RACT/BACT/LAER Clearinghouse database of PM/PM₁₀ emissions limits and controls that are in place for wood waste fired boilers. It shows that the units with the lowest emission rates are controlled by ESPs or ESPs with cyclones or baghouses, with the remaining units being controlled by baghouses or cyclones and venturi scrubbers in series. The PM/PM₁₀ emission rates vary from 0.02 to 0.25 lb/MMBtu and from 0.007 gr/dscf to 0.3 gr/dscf.

Step 5: Select BACT

The units with the lowest PM/PM₁₀ emission rates in the RACT/BACT/LAER Clearinghouse database are controlled by ESPs or ESPs with cyclones or baghouses. The remaining units are controlled by baghouses or cyclones and venturi scrubbers in series. Many of the units in the study do not burn the wide range of fuels that will be burned in Power Boiler #4. Also, the listed units were permitted as new sources as opposed to an existing unit where adapting a new control device to an existing source would involve significantly more costs in order to accommodate existing structures and fit within the existing space requirements.

The Brunswick Mill proposes an emission limit for PM/PM₁₀ of 0.05 lb/MMBtu as BACT for Power Boiler #4. When compared to the existing limit of 0.11 lb/MMBtu, this represents a 55% decrease in allowable PM/PM₁₀ emissions from the boiler.

As shown in Table 4-1 of Application No. 15920, emission levels as low as 0.02 lb/MMBtu have been demonstrated on other wood waste boilers. The BACT process allows for a comparison of alternate control options on the basis of economic impact, energy consumption, and environmental benefits (or negatives). To compare demonstrated levels of 0.02 lb/MMBtu to the proposed level of 0.05 lb/MMBtu, a cost benefit analysis was conducted. In order to achieve an emissions rate of 0.02 lb/MMBtu, the mill would need to install either a new ESP or a new baghouse on Power Boiler #4.

Total installed capital costs for a new ESP and baghouse were estimated to be \$13,000,000 and \$4,000,000, respectively. The estimated capital cost of the new ESP and baghouse were amortized over a 20-year period at a 7% interest rate, and then added to the annual operating costs. The annual costs were determined from direct and indirect costs.

Two cases were evaluated for the existing ESP: 1) ESP as is with no modifications or upgrades, and 2) ESP upgraded with better controls and new plates on the first field of the ESP. The second case assumes a total capital investment of approximately \$500,000. The estimated capital cost of modifications to the existing ESP were amortized over a 20-year period at a 7% interest rate, and then added to the annual operating costs. The annual costs were determined from direct and indirect costs.

According to the Manual, it is necessary to compare both the total and incremental cost effectiveness of achieving respective emission limits. These comparisons are provided below in Table 2 using cost data and assuming the following performance levels of control alternatives:

1. Lowest Demonstrated Level – New baghouse (0.02 lb/MMBtu) – Most cost-effective choice between new baghouse or new ESP.
2. Improved Control Performance – Upgrade Existing ESP (0.05 lb/MMBtu)
3. Current Emission Limit with no modifications – 0.11 lb/MMBtu

Table 2 below shows a cost break going from 0.05 to 0.02 lb/MMBtu, from both a total and incremental cost effectiveness standpoint. This table demonstrates that achieving an emission level of 0.05 lb/MMBtu is cost effective and that achieving lower emission levels would not be cost effective.

Table 2: Summary of BACT Economic Analysis for Power Boiler #4 PM/PM₁₀ Control

Control Alternative (lb/MMBtu)	Condition	Emissions		Emissions Reduction (tpy)	Installed Capital Cost (\$)	Amortized Capital Cost (\$)	Operating Cost (\$/yr)	Total Annual Cost (\$/yr)	Total Annual Cost (\$/ton)	Total Cost Effectiveness (\$/ton)
		(lb/hr)	(tpy)							
0.56	No controls	448	1962	0	0	0	264,749	264,749	135	--
0.11	Current	88	385	1577.2	0	0	264,749	264,749	688	168
0.05	ESP mods	40	175.2	1786.8	500,000	60,000	264,749	324,749	1,854	182
0.02	New baghouse	16	70.1	1891.9	4,262,952	381,006	1,516,717	1,897,723	27,072	1,003
0.02	New ESP	16	70.1	1891.9	13,159,454	1,242,159	1,037,721	2,279,940	32,524	1,205

Conclusion – PM Control

The Division has determined that the Brunswick Mill's proposal to use the existing dry ESP to minimize PM/PM₁₀ emissions constitutes BACT. The BACT emission limit has been established as 0.05 lb/MMBtu, as proposed by this facility. Compliance with the PM limit must be demonstrated through performance testing and monitoring of the ESP.

Summary – Control Technology Review for PM from Power Boiler #4

To fulfill the PSD permitting requirements for PM/PM₁₀, a BACT analysis was conducted for Power Boiler #4. The BACT selection for Power Boiler #4 is summarized in Table 3 below. The emission limit selected is representative of previous PSD BACT determination levels published in the RACT/BACT/LAER Clearinghouse database.

Table 3: BACT Summary for Power Boiler #4

Pollutant	Control Technology	Proposed BACT Limit
PM/PM ₁₀	Dry ESP	0.05 lb/MMBtu

BARK TRANSFER CYCLONE – PARTICULATE MATTER

As noted in the project description, the facility may install a new cyclone to handle both wood waste and wastewater sludge. The Brunswick Mill may utilize a separate cyclone to handle just the wastewater sludge stream. Or, the facility may continue to operate the existing cyclone. Since a new cyclone would be a source of PM/PM₁₀, the facility conducted a BACT analysis for the new unit. This analysis assumes a single cyclone will be installed. In the event that two cyclones are installed, the total PM/PM₁₀ BACT limit proposed below would apply to the combined exhaust of the two cyclones.

Step 1: Identify all Control Technologies

The current available PM/PM₁₀ controls include ESPs, wet ESPs, baghouses, and high efficiency wet scrubbers, and cyclones. The theory and operation of each of these control technologies was discussed in detail in Power Boiler #4 BACT analysis. The proposed bark cyclone provides a mechanism for the collection of the bark being pneumatically transferred to Power Boiler #4.

- | |
|--|
| Option 1: Dry Electrostatic Precipitator |
| Option 2: Wet Electrostatic Precipitator |
| Option 3: Dry Filtration (Baghouse) |
| Option 4: Wet Scrubber |
| Option 5: Cyclone |

Step 2: Eliminate Technically Infeasible Options

All options are considered technically feasible; however, a baghouse would be the most effective of the available options.

Step 3: Ranking Remaining Control Technologies by Control Effectiveness

A baghouse would be the most effective control for emissions from the cyclone.

Step 4: Evaluate Most Effective Controls and Document Results

A review of the RACT/BACT/LAER did not find any cyclones listed for the transfer of bark. There were cyclones listed for the transport of other materials such as dust, wood chips, and aggregate materials. Since the effectiveness of a cyclone is highly dependent on the type of material being transported, these units were not considered comparable to the proposed system.

Step 5: Select BACT

The bark being transferred in the cyclone is made of very large chips and will be effectively collected and separated from the air at the proposed cyclone. There is a potential for a small amount of particles to be generated in the transport of the bark, which could be emitted out the cyclone. These smaller particles could theoretically be controlled further in a control device such as a baghouse.

A baghouse would be expected to control up to 99% of the particulate matter leaving the cyclone. With an estimated emission rate of 8.5 tpy from the cyclone and a possible control of up to 99%, a baghouse would collect an additional 8.4 tpy of particulate matter. The estimated cost of a baghouse on this system would be \$300,000 per year. The cost would then be \$35,715/ton of PM/PM₁₀ reduction. This high cost would not be considered cost effective for such an application. The facility proposes to use the cyclone with no further controls with an estimated emission rate of 1.9 lb/hr.

Conclusion – PM Control

The Division has determined that the Brunswick Mill's proposal to use the existing cyclone to minimize PM/PM₁₀ emissions with no additional controls constitutes BACT.

Summary – Control Technology Review for PM/PM₁₀ from Bark Transfer Cyclone

To fulfill the PSD permitting requirements for PM/PM₁₀, a BACT analysis was conducted for the Bark Transfer Cyclone. The BACT selection for the Bark Transfer Cyclone is summarized in Table 4 below. The Division has determined that the Brunswick Mill's proposal to use utilize no additional equipment on the Bark Transfer Cyclone for PM/PM₁₀ control constitutes BACT.

Table 4: BACT Summary for Bark Transfer System Cyclone

Pollutant	Control Technology	Proposed BACT Limit
PM/PM ₁₀	No additional controls	None

5.0 TESTING AND MONITORING REQUIREMENTS

Testing Requirements

Per the requirements of Permit Conditions 4.2.1 and 4.2.2, Power Boiler #4 is currently required to undergo annual PM stack testing. This testing will continue at the frequency outlined in the current Title V permit. The facility will be required to undergo initial performance testing for PM, CO, and VOC emissions from Power Boiler #4 when the modifications to unit are completed per the requirements of new Permit Conditions 4.2.11, 4.2.12, and 4.2.13. The facility will be required to create site-specific emission factors for CO and VOC emissions during this compliance testing. Additionally, the facility will be required to verify or reestablish the excursion value for Power Boiler #4 ESP power during the PM performance test.

The facility will be required to undergo initial performance testing for opacity from the Bark Transfer Cyclone when the modifications to the system are completed per the requirements of new Permit Condition 4.2.14.

Monitoring Requirements

The Permittee is currently required to measure the secondary current and secondary voltage for Power Boiler #4 ESP on a continuous basis. The secondary parameters must then be used to calculate the total power once per shift. Monitoring of the secondary parameters and calculating the total power provides a reasonable assurance of compliance with the proposed BACT PM limit found in Permit Condition 3.2.1.

The Brunswick Mill is currently required to operate a COMS on the boiler. The monitor provides a reasonable assurance of compliance with the Georgia Rule (b) opacity limit found in Permit Condition 3.4.6.

The Brunswick Mill has proposed to operate a CEMS for NO_x for Power Boiler #4. The CEMS is necessary to provide a reasonable assurance of compliance with the PSD Avoidance limit in Permit Condition 3.2.18. The facility will also monitor fuel usage on a continuous basis.

Compliance with the PSD Avoidance limit contained in Permit Condition 3.2.17 for SO₂ emission from Power Boiler #4 will be determined using the calculation method discussed in new Permit Condition 6.2.28. The facility will need to continue to monitor fuel type, quantity, and sulfur content to calculate the SO₂ emissions on a 12-month rolling basis.

Compliance with the PSD Avoidance limit contained in Permit Condition 3.2.19 for CO emission from Power Boiler #4 will be determined using the calculation method discussed in new Permit Condition 6.2.29. After conducting an initial stack test to determine a site-specific emission factor, the facility will need to continue to monitor fuel type and quantity to calculate the CO emissions on a 12-month rolling basis.

Compliance with the PSD Avoidance limit contained in Permit Condition 3.2.20 for VOC emission from Power Boiler #4 will be determined using the calculation method discussed in new Permit Condition 6.2.30. After conducting an initial stack test to determine a site-specific emission factor, the facility will need to continue to monitor fuel type and quantity to calculate the VOC emissions on a 12-month rolling basis.

The Brunswick Mill will be required to monitor the amount of fuel burned in Power Boiler #4 on a continuous basis per the requirements of new Permit Condition 5.2.2.a.iii through vii. The fuel records are necessary to provide a reasonable assurance of compliance with the allowable firing rates of TDF and wastewater sludge in Permit Condition 3.2.2, as well as provide information needed to calculate SO₂, CO, and VOC emissions. All of these limits are for PSD Avoidance.

The Brunswick Mill will be required to monitor the visual emissions from bark transfer cyclone once per day per the requirements of new Permit Condition 5.2.5. This monitoring is necessary to provide a reasonable assurance of compliance with the opacity limit for the bark transfer cyclone. Additionally, the facility will be required to conduct daily visual inspection of the cyclone per the requirements of new Permit Condition 5.2.6. Any instance of adverse condition for either daily inspection will be reported as an excursion under Permit Condition 6.1.7.c. The cyclone is designed to reduce PM emissions and opacity. The calculated PM emissions from the bark transfer system are close to none; therefore, the violation of Georgia Rules 391-3-1-.02(2)(b) and (e) is not likely.

6.0 AMBIENT AIR QUALITY REVIEW

An air quality analysis is required by the PSD rules to determine the ambient impacts associated with the proposed modifications to Power Boiler #4. The purpose of the air quality analysis is to demonstrate that emission increases from the proposed project, 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 NAAQS or PSD increment in a Class I or Class II area. NAAQS exist for NO_x, CO, PM/PM₁₀, SO₂, ozone, and Pb. PSD increments exist for NO_x, PM/PM₁₀, and SO₂.

This analysis is required for each pollutant emitted in an amount over the PSD significant emission rate threshold. As shown in Table 1 of this document, PM/PM₁₀ exceeds the PSD significant threshold. Thus an air quality analysis was performed for this pollutant.

Compliance with any NAAQS is based on the total estimated air quality, which is the sum of the ambient estimates resulting from existing sources of air pollution (modeled source impacts plus measured background concentrations) and the modeled ambient impact caused by the applicant's proposed emission increase and associated growth. It is important to note that the air quality cannot be allowed to deteriorate beyond the concentration allowed by the applicable NAAQS, even if not all of the PSD increment is consumed.

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.

In analyzing the air quality impact of these modifications, the EPA Industrial Source Complex Short-Term Version 3 (ISCST3) model was used for all PSD modeling results presented in the preliminary determination. 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.

For the air quality analyses, National Weather Service (NWS) meteorological data from the years 1970-1974 for Jacksonville, Florida were used as surface data and the same years for Waycross, Georgia were used as upper air data. EPA's Building Profile Input Program (BPIP) was used to calculate flow vectors based on 36 possible wind directions in order to allow for building downwash. The modeling included all stacks with applicable emission changes resulting from Power Boiler #4 project, and the individual stack parameters were used in calculating building downwash using BPIP.

A Cartesian receptor grid was used for the modeling runs, including receptors spaced at 100 meter intervals along the fence line/patrolled property line and out to a distance of 2 km, 500 meter intervals from 2 km to 6 km, and 1000 meter intervals from 6 km to 10 km.

PSD Screening Results

The PSD regulations establish specific maximum allowable increases in ambient concentrations (or increments) for PM/PM₁₀ for all areas in compliance with the NAAQS. All areas of the country are categorized as a function of overall use. The regulations were designed to prevent significant air quality deterioration by specifying allowable incremental changes in PM/PM₁₀ concentrations within each area category. The area categories are defined below:

Class I – Those areas where almost any deterioration of current air quality is undesirable, and little or no industrial development would be allowed (e.g., national parks, wilderness areas).

Class II – Those areas where moderate, well-controlled energy or industrial growth is desired without air quality deterioration up to the national standards (all attainment areas not categorized as Class I were initially designated Class II).

Class III – Those areas where substantial energy or industrial development is intended, and where modest increases in ambient concentrations above Class II increments, but below national standards, would be allowed (designation to Class III must follow strict redesignation procedures).

The Glynn County area and all other attainment areas in Georgia, not designated as Class I areas, are Class II areas. The Class I areas nearby the facility are Wolf Island (26 km), Okefenokee Swamp (64 km), and Cape Romain (288 km).

The first step in the air quality analysis was to determine whether the incremental ambient impacts due to new emissions from the project were greater than U.S. EPA-prescribed Modeling Significance Levels. This “significance analysis” determined whether the Brunswick mill could forgo a full-scale impact analysis to demonstrate compliance with the NAAQS and PSD Class II Increments.

The results of the significance analysis conducted for the Brunswick Mill project are summarized in Table 5. The impacts due to the total project emissions of PM/PM₁₀ were calculated in this analysis using the ISCST3 dispersion model. Table 5 shows the highest concentration modeling result for each pollutant. The complete modeling analysis results are located in Section 5.0 and Exhibit D of Permit Application 15920. The EPD modeling results are found in Appendix C of this document.

Table 5. Significant Impact Levels and Significant Monitoring Concentrations

Pollutant	Averaging Period	PSD Significant Ambient Impact Level (ug/m ³)	Monitoring Concentration Level (ug/m ³)	Modeled Concentration (ug/m ³)	Notes
PM ₁₀	24-Hour	5	10	8.11	Additional modeling needed
	Annual	1	--	1.67	Additional modeling needed

The maximum PM/PM₁₀ concentration did exceed its significant ambient impact level (SAIL); therefore refined modeling is required for the pollutant.

Because the modeled PM/PM₁₀ concentration increases exceed the SAIL, further modeling is required under PSD to ensure that PSD increment for the area is not consumed. This further evaluation must include all sources within 50 kilometers of the project's area of impact. The Significant Impact Area (SIA) was determined to be the circular area with a radius of the distance from the center of the facility to the furthest point predicted by the screening model to exceed the applicable SAIL. An SIA was determined for each averaging period. This distance was 0.54 km; therefore, along with the modeled sources, all increment-consuming sources within 50.54 km (0.54 km + 50 km) of the Brunswick mill were included in the modeling. The SIA extends into Florida; however, the closest off-site source is outside the 50.54 km radius, so only Georgia off-site sources were considered in the refined modeling. Georgia EPD has provided (via our web page) the Brunswick Mill with a list of all the increment consuming sources that qualified.

PSD Increment Modeling

The goal of the PSD Increment modeling analysis is to determine the increase in ground level concentration of PM/PM₁₀ since the established PM/PM₁₀ baseline (1975) and determine if the increase exceeds the allowable PSD increment. The PSD Increment modeling evaluates future potential emissions input as positive emission rates and the actual 1975 emissions input as a negative emission rate. The PSD increment model also includes off-site emission sources, which are increment consumers or expanders. The same receptor grid and meteorological data used for NAAQS modeling was utilized for PSD increment consumption modeling.

Table 6. PSD Increment Impacts

Pollutant	Averaging Period	PSD Increment (ug/m ³)	Modeled Concentration (ug/m ³)	Notes
PM ₁₀	24-Hour	30	29.4	Includes all sources within 50.54 km
	Annual	17	5.8	Includes all sources within 50.54 km

As shown in Table 6 above, the modeled impacts of PM/PM₁₀ are below the PSD increment. Given this, the proposed project will comply with the PSD Class II Increment analysis.

Preconstruction Monitoring

The PSD regulations require that continuous preconstruction monitoring of regulated pollutants emitted in significant amounts be conducted to establish existing air quality concentrations in the vicinity of the proposed source or modification. However, no preconstruction monitoring data are required if the impact on the ambient air quality is below *de minimis* concentrations. In performing this analysis, the maximum impact for the proposed scenario was determined to be less than the corresponding *de minimis* concentrations, as shown in Table 6. Therefore PM/PM₁₀ did not exceed its pre-construction monitoring levels.

Ambient Air Quality

The NAAQS are established as ambient ceilings applicable to the entire country, and they must be attained and maintained. PSD requires that any pollutant that has predicted significant impacts due to the modification alone must be evaluated for NAAQS compliance. Table 5 above shows that PM/PM₁₀ was above the SAIL; therefore, it must be evaluated further. The ISCST3 model was used with the addition of all contributing sources within 50.54 km of the Brunswick mill. The background concentrations, as determined by the EPD, were added to the modeled results. In all cases, the modeled impacts are below the associated NAAQS limits.

Table 7. Ambient Air Quality Impacts

Pollutant	Averaging Period	Modeled Conc. (ug/m ³)	Background Conc. (ug/m ³)	Combined Conc. (ug/m ³)	NAAQS (ug/m ³)
PM ₁₀	24-Hour	52.54	38	90.5	150
	Annual	11.2	20	31.2	50

Class I Evaluation

The impacts for the proposed project on the Class I area within 100 km of the Brunswick Mill were also evaluated. The mill is located roughly 26 km from the Wolf Island Class I Area and 64 km from the Okefenokee Swamp Class I Area in South Georgia. This analysis was completed per discussions with the PSD Permit coordinator with the US National Park Service and as outlined in the Federal Land Managers Air Quality Related Values Workgroup (FLAG) Phase I document dated December 2000. The PSD coordinator indicated that if no impairments on Wolf Island were identified, then it could be assumed that the other Class I areas are also not negatively impacted by the project. EPD indicated that PSD Increment modeling should be completed for the Class I areas within 100 km of the Brunswick Mill. This includes running a PSD Increment model using receptor sets for Wolf Island and Okefenokee Swamp.

The purpose of the Class I Area modeling analysis is to demonstrate that the new project will not consume more than the available Class I PSD Increments in the Class I Area. A significance analysis was conducted, first to determine whether the project could be expected to have a significant impact in the Class I Area. Table 8 below details the findings of the modeling for the Wolf Island Class I Area for the proposed project. PM/PM₁₀ emissions at the Wolf Island Class I Area are below the EPA Class I screening levels and no further analysis is required.

Table 8. Class I Area Evaluation

Pollutant	Averaging Period	AQRV Level (ug/m ³)	Modeled Conc. (ug/m ³)	Notes
PM ₁₀	24-Hour	0.32	0.18	No additional modeling required
	Annual	0.16	0.013	No additional modeling required

Georgia Air Toxics

Impacts from each of the pollutants listed Table 6-1 of Permit Application No. 15920 were analyzed using the EPD Guidance for Ambient Impact Assessment of Toxic Air Pollutant Emissions (referred to as the Georgia Air Toxics Guideline; dated June 21, 1998). The Georgia Air Toxics Guideline is a guide for estimating the environmental impact of sources of toxic air pollutants.

A toxic air pollutant is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. The EPA SCREEN3 computer screening dispersion model was used to predict the maximum 15-minute, 24-hour, and annual average ground level concentration (referred to as Maximum Ground Level Concentration (MGLC)) for each pollutant. Each MGLC was compared to its respective Acceptable Ambient Concentration (AAC). The basis for calculation of AAC comes from the pollutant toxicity rating systems described in the Georgia Air Toxics Guideline. If the screening analysis did not demonstrate an acceptable MGLC, the ISCST3 refined dispersion model was used to predict a more accurate MGLC.

The SCREEN3 evaluation demonstrated that maximum impacts of toxic air pollutants due to the proposed project are less than the maximum AAC levels for all compounds listed in Table 6-1 of Application No. 15920, except acrolein, arsenic, benzene, hexavalent chromium, manganese, and sulfuric acid mist. As per the Georgia Guidelines, ISCST3 modeling was completed for those pollutants that were not screened out through the SCREEN3 program. Based on EPD's analysis, the predicted MGLC for each applicable pollutant is below its Georgia AAC. Table 6-3 and 6-4 of Permit Application No. 15920 and Appendix C of this document contains the toxic modeling results.

Class I Visibility Analysis

Emissions from certain sources can create visible, defined plumes that are noticeable to the casual observer. An exhaust plume visibility analysis was performed for this project to assure that the emissions from the project do not create a noticeably visible plume in a Class I Area.

In the case of the Brunswick Mill, the distance from the mill to the closest Class I Area boundary is 26 km (Wolf Island). The Flag document states that for distances under 50 km, the EPA VISCREEN model should be used for visibility modeling. The VISCREEN analysis was completed for PM₁₀ emissions from the project for Wolf Island per the PSD Permit coordinator. If the results of this modeling are below the acceptable screening criteria, then no additional modeling would be required.

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. For this project, visibility analysis was performed using the latest version of the EPA VISCREEN model according to the guidelines published in the *Workbook for Plume Visual Impact Screening and Analysis* (EPA-450/4-88-015). 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.

The default particulate size and density from the VISCREEN model were used for the analysis. The project's increase in PM₁₀ emissions was put into the model. The Level I VISCREEN analysis uses the default worst-case modeling parameters for stability class and wind speed. When the PM₁₀ emissions are modeled using this default value, the modeled impacts are greater than the screening criteria.

The analysis then proceeded to the Level 2 analysis, where more realistic worst-case stability classes and wind speeds could be used. An evaluation of meteorological data for the Jacksonville weather station was completed in order to determine the appropriate wind speed and stability class. The frequency distribution of various dispersion conditions was determined for a 5-year set of meteorological data. The mill is located southwest of Wolf Island; therefore, the data was evaluated for the frequency of wind coming only from that direction.

EPA procedures for defining worst-case meteorology for Level 2 VISCREEN modeling indicates that the modeled dispersion condition is selected such that the sum of all frequencies of occurrence of condition worse than this conditions totals 1 percent (4 days per year). The frequency data indicates that the 1% cumulative frequency is not reached until the stability class/wind category of E3. The VISCREEN model was then run at a wind speed of 3 m/s and a stability category of 5 or E. With this information, the model then determines the impact on visibility using the background visual range of 40 km (Jacksonville, FL).

The analysis is generally considered satisfactory if ΔE and plume contrast are less than critical values of 2.0 and 0.05, respectively. The Division has reviewed the VISCREEN results presented in the Permit Application No. 15920 and has determined that the project has no impact on visibility at Wolf Island. ΔE and plume contrast have been determined to be 0.145 and 0.001, respectively, at 26 km.

Class II Visibility Analysis

A Class II visibility analysis was evaluated for the nearest Class II area to the facility utilizing the VISCREEN model. The nearest Class II area is the Glynco Jetport, which is approximately 10 km from the Brunswick facility (at the closest point). This VISCREEN modeling followed the same procedures outlined in the Class I modeling evaluation. The Jetport is located roughly in the same wind direction as Wolf Island, so the same meteorological data set was used. Because of its proximity to the Brunswick Mill and VISCREEN's inability to predict accurate projections at close receptors, the analysis proceeded to a Level 3 Screening, which involve the use of the Pluvue model. The Pluvue model accounts for the dispersion of the pollutants due to stack height and plume rise due to stack temperature and velocity. The model was run at worst-case wind conditions previously determined for this wind direction and therefore represents the maximum impact of these emissions on the Jetport.

The analysis is generally considered satisfactory if ΔE and plume contrast are less than critical values of 2.0 and 0.05, respectively. Both of these critical values are Class I, not Class II, area thresholds. The Division has reviewed the VISCREEN results presented in Permit Application No. 15920 and has determined that the project has no impact on visibility at the Glynco Jetport. ΔE and plume contrast have been determined to be 0.018 and 0.000, respectively, at 10 km.

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.

Visibility

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

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

The Brunswick Mill presented visibility impact analyses as discussed in the Section 6.0 of this document. The results of these analyses showed that the proposed project should have no perceptible impact on visibility within the Class I Area of interest – Wolf Island or Okefenokee Swamp - or in any of the Class II Areas of interest.

Soils and Vegetation

Since ground level concentrations of PM/PM₁₀ are not expected to increase by a significant degree as a result of this project, the impacts on soil and vegetation are predicted to be insignificant. There are currently no known adverse impacts on local environment from the Brunswick Mill's emissions and no discernible changes are expected to result from the proposed modifications to Power Boiler #4.

Growth

An increase in employment at the Brunswick Mill is not expected as a result of these proposed changes; therefore, there will be no permanent impacts on the surrounding community with regards to demographics. All the plant modification will occur on existing operations and no grading will be required. The construction phase will not adversely impact air quality in the area.

8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 2631-127-0003-V-04-4.

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 3.2.1 has been modified. The condition limits the amount of PM emissions from Power Boiler #4. The limit has been decreased from 0.11 lb/MMBtu to 0.05 lb/MMBtu. This was previously a PSD Avoidance condition. The citation has been changed to 40 CFR 52.21, as well as to subsume 391-3-1-.02(2)(d)1(ii).

New Permit Conditions 3.2.17, 3.2.18, 3.2.19, and 3.2.20 were added as twelve-month rolling total PSD Avoidance limits for SO₂, NO_x, CO, and VOC, respectively, from Power Boiler #4.

New Permit Condition 3.3.32 was added to include the 40 CFR 61 Subpart E limit for mercury emissions while firing wastewater sludge from Power Boiler #4. This limit was added to fully incorporate the requirements of a previously applicable rule.

New Permit Conditions 3.3.33 and 3.3.34 subject Power Boiler #4 to the applicable requirements of 40 CFR 61 Subparts A and E while firing wastewater sludge. These requirements were added to fully incorporate the requirements of a previously applicable rule.

New Permit Condition 3.3.35 requires the facility to be in compliance with all applicable requirements of 40 CFR 63 Subpart DDDDD for the recovery boilers and power boilers as of September 13, 2007.

New Permit Conditions 3.4.21 and 3.4.22 were added to include the Georgia Rule (b) and (e) requirements for the Bark Transfer Cyclone.

Part 4.0 Requirements for Testing

New Permit Conditions 4.2.11, 4.2.12, and 4.2.13 outline the testing the facility must conduct for PM, CO, and VOC, respectively, once all the modifications to Power Boiler #4 are made. Permit Condition 4.2.11 also requires the facility to verify or reestablish the excursion value for Power Boiler #4 in Permit Condition 6.1.7.c.iii through this performance test. The results from Permit Conditions 4.2.12 and 4.2.13 will be used to determine site-specific emission factors in order to calculate the twelve-month rolling totals to determine compliance with the PSD Avoidance limits in Permit Conditions 3.2.19 and 3.2.20 and the PSD limit in Permit Condition 3.2.1.

New Permit Condition 4.2.14 requires the facility to test the Bark Transfer Cyclone for opacity in order to demonstrate compliance with the opacity limit in Permit Condition 3.4.21.

Part 5.0 Requirements for Monitoring

New Permit Condition 5.2.1.f requires the facility to operate NO_x CEMS on Power Boiler #4. The facility has proposed the use of the CEMS in order to prove compliance with the PSD avoidance limit in Permit Condition 3.2.18.

New Permit Condition 5.2.2.a.iii through 5.2.2.a.vii requires the facility to monitor the fuel feed flow of No. 6 fuel oil, bark, TDF, wastewater sludge and natural gas to Power Boiler #4.

New Permit Condition 5.2.5 requires the facility to monitor the visual emissions from the Bark Transfer System Cyclone once per day of daily operation.

New Permit Condition 5.2.6 requires the facility to visually inspect the Bark Transfer Cyclone once per day of daily operation.

Part 6.0 Other Recordkeeping and Reporting Requirements

New Permit Conditions 6.1.7.a.iii(F) through 6.1.7.a.iii(I) were added to define excess emissions for the new PSD avoidance limits outlined in Permit Conditions 3.2.17 through 3.2.20.

New Permit Conditions 6.1.7.b.iv was added in order to provide a reportable threshold for TDF and wastewater sludge fired in Power Boiler #4. These should have been included in a previous permit and were simply overlooked.

Permit Condition 6.1.7.c.iii was modified to reference the PM performance test in Condition 4.2.11, in case the facility must reestablish the excursion value for total power on Power Boiler #4 ESP.

New Permit Condition 6.1.7.c.viii was added to provide a reportable excursion for any adverse condition of the daily inspections of the Bark Transfer System cyclone.

New Permit Condition 6.1.7.d.v was added to require the facility to report each month's twelve-month rolling total of emissions for SO₂, CO, VOC, and NO_x, respectively, from Power Boiler #4.

New Permit Conditions 6.2.28 through 6.2.31 outline the calculation methods for determining monthly and twelve-month rolling total emissions of SO₂, CO, VOC, and NO_x, respectively, from Power Boiler #4.

Part 7.0 – Other Specific Requirements

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

Part 8.0 – General Provisions

There are no modifications or additions to Section 8.0 of the permit.

APPENDIX A

Draft Title V Operating Permit Amendment
Permit Amendment No. 2631-127-0003-V-04-4
Koch Cellulose, LLC – Brunswick Cellulose, Inc. Pulp & Paper Mill
Brunswick (Glynn County), Georgia

APPENDIX B

Koch Cellulose, LLC – Brunswick Cellulose, Inc. PSD Permit Application and Supporting Data

Contents Include:

1. PSD Permit Application No. 15920, dated December 22, 2004

APPENDIX C

EPD'S PSD Dispersion Modeling and Air Toxics Assessment Review