

**NORTH CAROLINA  
DEPARTMENT OF ENVIRONMENT AND NATURAL  
RESOURCES  
DIVISION OF AIR QUALITY  
AIR PERMITS SECTION**

**PREVENTION OF SIGNIFICANT DETERIORATION  
PRE-CONSTRUCTION REVIEW AND PRELIMINARY  
DETERMINATION**

**FOR**

**WEYERHAEUSER COMPANY  
GREENVILLE SAWMILL  
GRIFTON, NORTH CAROLINA  
PITT COUNTY**

**THIS REVIEW WAS PERFORMED BY THE AIR PERMITS  
BRANCH IN ACCORDANCE WITH NCDEM REGULATION  
FOR PREVENTION OF SIGNIFICANT DETERIORATION OF  
AIR QUALITY, 15A NCAC .0530, AND 2Q .0100**

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| EPA         | Mr. Bob Blaszcak<br>BACT/LAER Clearinghouse<br>OAQPS, MD-13<br>RTP, N.C. 27711  | BACT Input Summary Sheet                |

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Determination & Application

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## FACTS SHEET

### Applicant

Weyerhaeuser Company  
Greenville Sawmill  
Grifton, North Carolina  
Pitt County

### Consultant

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- URS Corporation, on behalf of Weyerhaeuser Company submitted a Prevention of Significant Deterioration (PSD) application to the North Carolina Division of Air Quality (NCDAQ), Air Permits Branch on January 24, 2005.
- The Application was deemed complete for review purposes pursuant to 40 CFR 51.166 (q) and 15A NCAC 2D .0530 (o) on April 13, 2005.
- The applicant proposes to modify its Greenville Sawmill lumber facility located on State Road 1900 in Grifton, Pitt County, North Carolina. The approximate Mercator co-ordinates are Latitude N35° 24' 51" and Longitude E77° 25' 11".
- The facility is a major source under the definition contained in 40 CFR 51.166 and therefore is subject to a pre-construction PSD review. The source is major for carbon monoxide and volatile organic compounds (VOCs).
- The modification is the addition of one indirectly oil-heated lumber drying kiln.
- The PSD significant emission increases resulting in PSD review are volatile organic compounds (VOC).
- The facility is proposing no control for VOC emissions from the new kilns.
- The following "Best Available Control Technology" (BACT) emission limits are proposed:

| Emission Source      | Pollutant                          | Proposed BACT Limit | Proposed Control |
|----------------------|------------------------------------|---------------------|------------------|
| Drying kiln<br>No. 7 | volatile organic<br>compounds(VOC) | 34.6 lbs. per hour  | none             |

# 1.0 INTRODUCTION

## 1.1 Preliminary Determination

Weyerhaeuser Company's PSD application has been reviewed by the NC Division of Air Quality Major New Source Review Branch to determine compliance with the requirements of all NCDAQ air pollution regulations. New Source Review of the application was performed for the following categories:

- Prevention of Significant Deterioration (PSD) including determination of Best Available Control Technology (BACT) with consideration of non-PSD regulated air toxic pollutants, an air quality impact analysis, and an additional impact analysis on soils, vegetation and visibility; and
- Compliance with the North Carolina Environmental Management Commission regulations in Title 15A, North Carolina Administrative Code.

The NCDAQ Major New Source Review staff has conducted its preconstruction review of the application and made a preliminary determination that the proposed project will comply with all applicable North Carolina Environmental Commission air pollution regulations including PSD requirements. Therefore, the NCDAQ proposes to issue an air permit for the modification and operation of the Weyerhaeuser Company's Ayden sawmill with specific permit conditions and emission limits.

Preliminary preconstruction approval under the PSD requirements was contingent upon the following findings:

- A demonstration that neither allowable PSD ambient air increments nor National Ambient Air Quality Standards (NAAQS) will be violated as a result of emissions from the proposed project;
- A demonstration that air emissions resulting from the proposed facility will not adversely impact any PSD Class I area;
- A demonstration that Best Available Control Technology is applied to each emission unit that will emit any amount of a significant pollutant, including a demonstration that emissions of air toxic pollutants will not exceed the acceptable ambient levels (AALs) as regulated by the NCDAQ; and
- A demonstration that emissions from the proposed project will neither cause adverse impacts to soils and vegetation, cause degradation of visibility, nor cause a significant increase in regional air pollution levels.

The remainder of this report contains a review by NCDAQ of the required demonstrations and analyses submitted by Weyerhaeuser Company. Appendix A contains the draft modified permit.

In addition, the application must undergo adequate public participation. The NCDAQ solicits and encourages participation by the general public, industry, and other persons impacted by the proposed project. Specific public notice requirements and a thirty (30) day public comment period are required before the NCDAQ takes final action on this application. Appendix B contains a copy of the public notice.

## **2.0 GENERAL DESCRIPTION**

### **2.1 Existing Facility Description**

The Weyerhaeuser Company, Inc. Greenville facility is a sawmill producing dimension lumber from Southern Yellow Pine. Permitted items on existing Permit No. 06270T14 include a manual painting operation using water-based paints for marking lumber, three (3) woodwaste/ No. 2 fuel oil equivalent waste oil - fired thermal oil heaters (57.16 million Btu/hr maximum permitted heat input rate each) equipped one each with a multicyclone and both exhausting to a single electrostatic precipitator, a pneumatic dry woodwaste collection system equipped with a cyclone and bagfilter in series, a woodwaste chipper exhausting to a transfer cyclone, seven (7) indirect thermal oil heated lumber drying kilns, two thermal oil system emergency diesel - powered pump and one fire fighting diesel - powered pump. The facility-wide 290 tons per year VOC PSD avoidance condition (added March 15, 1996) currently limits maximum lumber production to approximately 226 million Board Feet of finished dried lumber per year.

### **2.2 Process Description**

Incoming logs are stored in the log yard. First, the logs are debarked. Removed bark is hogged and conveyed using enclosed conveyors either to storage for trucking off-site or to the woodwaste storage silos. The debarked logs are cut into rough dimensional lumber using chipping heads and bandsaws. Chips and sawdust generated are collected, separated by screening and conveyed to storage silos. The rough lumber is sorted and dried in six (6) indirect thermal oil heated kilns. The green lumber is stacked on carts inside one of the drying kilns. Drying is accomplished by circulating thermal oil through coils in the drying kilns. The heated oil heats the air inside the kiln which is circulated by fans over green lumber stacked inside during each drying cycle. Moisture and volatile organic compounds driven off are exhausted through roof vents. The thermal oil is heated by three (3) woodwaste/waste oil\*-fired, wet-cell thermal oil heaters (57.2 million Btu per hour maximum permitted heat input rate each) each equipped with a multicyclone. The dried lumber is finished by trimming and planing. Planer shavings and chips are collected, pneumatically sent to a transfer cyclone equipped with a bagfilter, and placed in a storage silo. Finished lumber is then graded, packaged and either stored or shipped. Stored woodwaste and bark are used as fuel in the thermal oil system's wet-cell burners. Truck washdown water and kiln condensate water may be injected into oil heaters during wood firing only, limited to 10,000 gallons per week total and 25,000 gallons per week total, respectively.

\* waste oil - generated on site only (hydraulic oil, lubrication oil, etc.), considered equivalent of No. 2 fuel oil - currently limited to 500.0 gallons per day total

### 2.3 PSD Project Description

Weyerhaeuser wishes to expand lumber production at the Grifton facility to 300 million board feet of finished dried lumber per year. The proposed modification include expansion of the lumber drying capacity by addition of one new indirect hot oil heated kiln (No. ES-DK-7). This kiln was previously permitted, but never installed. The existing sawmill chipper equipped with a transfer cyclone and dry woodwaste fuel collection system equipped with a bagfilter will be rearranged as a planer shavings and sawdust woodwaste collection system equipped with a bagfilter and a dry shavings truck loadout. There will be no increase of the current 500.0 gal/day facility waste oil firing limit and truck washdown water and kiln condensate water injection limits.

Current drying capacity limits full capacity usage of debarking, sawing, oil heaters and planing operations. An increase in TSP and PM<sub>10</sub> potential emissions will occur from the increased wood through-put resulting from [debottlenecking] drying capacity by the addition of the new kiln. This results in an indirect uncontrolled PM<sub>10</sub> emission increase to the planer shavings and sawdust transfer system.

### 2.4 Pollutant Emissions

The summary of potential PSD regulated pollutant emission increases are:

| Regulated Pollutant                | Potential Emission Increase from Proposed Modification |
|------------------------------------|--|
| Particulate Matter (TSP/PM-10)     | 3 t/yr   |
| Nitrogen Oxides (NO <sub>x</sub> ) | 38 t/yr  |
| Carbon Monoxide (CO)               | 0.9 t/yr   |
| Volatile Organic Compounds (VOC)   | 151.5 t/yr   |

## 3.0 REGIONAL DESCRIPTION

### 3.1 Site Location

The Weyerhaeuser Company Greenville facility is located in a rural area on State Road 1900 in southern Pitt County in Eastern North Carolina. This area is classified as rural as described in [Correlation of Land Use and Cover with Meteorological Anomalies], A.H. Auer, Journal of Applied Meteorology 17: 636-643.

### 3.2 Area Description

#### 3.2.1 Class I Areas

There is one Class I area within 100 kilometers (60 miles) of the Greenville facility, the Swanquarter Wildlife Refuge.

#### 3.2.2 Topography

This facility is located in the North Carolina Coastal Plain, where flat ground is typical. Elevations change only a few feet within several kilometers of the Greenville facility. Complex terrain is therefore not required in the air dispersion modeling analysis presented in Section 6.0 of this report.

#### 3.2.3 Soils

Soils in the vicinity of this facility are in the Norfolk-Exum-Goldsboro soil association. Characteristics are moderately well drained to well drained soils that have a subsoil of dominantly friable sandy clay loam or clay loam. There is a seasonal high water table. The area is especially well suited for cultivation of tobacco, peanuts, cotton, and cucumbers. (*Pitt County North Carolina Soil Survey*, USDA, November, 1974)

### 3.3 Area Classification

Ambient Air Quality near the Greenville facility is classified as attainment for the criteria pollutants (*i.e.* particulate, sulfur dioxide, nitrogen dioxide, carbon monoxide and ozone). The baseline has not been triggered for particulate, sulfur dioxide, and nitrogen dioxide.

## 4.0 REGULATORY ANALYSIS

The following discussion pertains to the regulatory requirements that must be met for the modification of the Weyerhaeuser Company, Inc. Greenville sawmill. These requirements include both Federal Prevention of Significant Deterioration (PSD) regulations and State Air Quality regulations.

### 4.1 PSD Applicability and Required Analysis

The basic goal of the PSD regulations is to insure that the air quality in clean (*i.e.* attainment ) areas does not significantly deteriorate while maintaining a margin for future industrial growth. The PSD regulations focus on industrial facilities, both new and modified, that create large increases in the emission of certain pollutants. The USEPA promulgated final regulations governing the Prevention of Significant Deterioration (PSD) in the Federal Register published August 7, 1980. Effective March 25, 1982, the North Carolina Division of Environmental Management (NCDEM) received full authority from the USEPA to implement PSD regulations in the State.

Under PSD requirements all major new or modified stationary sources of air pollutants regulated and listed in the Prevention of Significant Deterioration section of the Clean Air Act must be reviewed and approved prior to construction by the permitting authority. A "major stationary source" is defined as any one of the 28 named source categories which has the potential to emit 100 tons per year of any PSD regulated pollutant or any other stationary source which has the potential to emit 250 tons per year of any PSD regulated pollutant.

The Greenville facility is not one of the 28 named source categories. The original permit for this facility included a facility-wide VOC emissions limit of less than 250 tons per year to insure PSD minor status. The following actual emission rates were reported in the 2003 Annual Air Pollutant Emissions Inventory:

| PSD Regulated Pollutant | 2003 Actual Emission Rate (facility wide) |
|-------------------------|---|
| TSP/PM <sub>10</sub>    | 48.3 tpy                                  |
| NO <sub>x</sub>         | 163.1 tpy                                 |
| CO                      | 215.9 tpy                                 |
| VOC                     | 407.0 tpy                                 |

A facility-wide PSD review avoidance limit increase to less than 290 tpy VOC emissions was requested as a stop gap until a PSD permit application for an overall physical facility expansion could be submitted. Permit No. 6270R6 with a less than 290 tpy VOC PSD review avoidance

limit was issued on March 15, 1996. The facility was then classified as a PSD major stationary source. Because this facility is classified as major, each PSD regulated pollutant with a potential increase resulting from the proposed modification must be compared with the PSD significance levels as listed in 40 CFR 51.166 (23)(i) to determine which pollutant must undergo a PSD review.

The PSD regulated pollutants from the proposed new kiln are PM, CO, NO<sub>x</sub> and VOC. Potential emission rate emission increases of TSP and PM-10 particulate matter emitted from the debarking, sawing and planing operations and the associated woodwaste collection systems will result indirectly from the proposed increase in lumber drying capacity.

| PSD regulated pollutant | Potential Increases from Proposed Modification | PSD Significance Levels | PSD Review Required |
|-------------------------|--|-------------------------|---------------------|
| PM (TSP)                | 3 tpy*   | 25 tpy                  | No                  |
| PM(PM <sub>10</sub> )   | 3 tpy*   | 15 tpy                  | No                  |
| SO <sub>2</sub>         | 0 tpy  | 40 tpy                  | No                  |
| CO                      | 0.9 tpy  | 100 tpy                 | No                  |
| NO <sub>x</sub>         | 38 tpy   | 40 tpy                  | No                  |
| VOC                     | 151.5 tpy                                      | 40 tpy                  | Yes                 |

Therefore, a PSD review is required for volatile organic compounds (VOCs). This review was conducted and contains the following reviews and analyses:

1. A Best Available Control Technology (BACT) determination, including an evaluation of non-PSD regulated pollutants such as toxic air pollutants.
2. A demonstration of compliance with the North Carolina State Implementation Plan (SIP) regulations and 40 CFR part 60 (New Source Performance Standards);
3. An Air Quality Impact Analysis of toxic air pollutants; and
4. An Additional Impacts Analysis, including impacts on industrial, residential and commercial growth, soils and vegetation, and visibility from VOCs and toxic air pollutants.

## 4.2 Other Regulation Applicability

### 4.2.1 Indirectly-heated lumber drying kiln No. 7 (ID No. ES-DK-7)

#### 1. **15A NCAC 2D .0515 - Particulates from Miscellaneous Industrial Processes**

Allowable emission of particulate matter is calculated as a function of the process rate:

$$E = (55.0 \times P^{0.11}) - 40 \text{ where process rate (p) in tons per hour} > 30 \text{ t/hr}$$

$$P = 39.0 \text{ t/hr}$$

$$E = 28.8 \text{ lbs. / hr}$$

The estimated potential particulate emission rate is 0.7 pounds per hour, and the kiln is considered to be in compliance.

## 5.0 **BEST AVAILABLE CONTROL TECHNOLOGY**

### 5.1 **INTRODUCTION**

The Weyerhaeuser Greenville facility currently has six existing dry kilns and proposes to install a new indirect-heated dry kiln. The proposed kiln will be indirectly heated by Thermal Oil Units Nos. 1, 2, and 3. The Thermal Oil Units are not being modified and have adequate capacity to provide heat to the proposed kiln. Because the Thermal Oil Units are not being modified, they are considered affected sources and not modified sources as per U.S. EPA guidance memorandum dated September 17, 1993 from Mr. Jole C. Luehrs, Chief, New Source Service Section.

The PSD regulations require new or modified major stationary sources to apply best available control technology (BACT) for each regulated compound that has potential emissions greater than PSD Significant Emission Rates. BACT is essentially an emission limitation based on the maximum degree of reduction for each compound, taking into account energy, environmental, and economic impacts. This numerical limit can be based on the application of air pollution equipment or specific production processes, methods, systems, or techniques.

The proposed project is a major PSD modification as described in Section 3. A BACT analysis is required for VOC emissions from Lumber Drying Kiln No. 7

### 5.2 **TECHNICAL APPROACH**

The definition of BACT may be found in Section 169(3) of the Clean Air Act and in the PSD regulations under 40 CFR 52.21(j). BACT is defined as:

*"...an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Clean Air Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and*

*economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of the measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology.”*

Each pollutant specific emission unit<sup>1</sup> subject to a Prevention of Significant Deterioration (PSD) review must apply "Best Available Control Technology" (BACT). BACT, as previously defined in this document and the relevant statutory and regulatory documents, refers to the maximum amount of emission reduction currently available considering technical feasibility in addition to economic, energy, and environmental considerations. Given the variation between emission sources, facility configuration, local airsheds, and other case-by case considerations, Congress determined that it was impossible to establish a single BACT determination for a particular pollutant or source. Economics, energy, and environmental impact are mandated in the Clean Air Act to be considered in the determination of case-by-case BACT for specific emission sources. In most instances BACT may be defined through an emission limitation. In cases where this is impossible BACT can be defined by the use of a particular type of control device and its achievable emission reduction efficiency. In no event can a technology be recommended which would not comply with any applicable standard of performance under 40 CFR Part 60 and 61.

As a result of the EPA remand involving the North County Resource Recovery project in Region IX, the effects of non-regulated PSD pollutants, such as toxic air pollutants, are to be accounted for in determining if the BACT otherwise being prescribed for a regulated pollutant still represents an appropriate level and type of control. There is no specific formula for making PSD decisions for unregulated pollutants; this is a case-by-case process involving the judgment of the reviewing authority. If the reviewing authority judges the potential environmental effects of such unregulated pollutants to be of possible concern to the public, then the final BACT decision for a regulated pollutant should address these efforts and reflect, as appropriate, the control technology beyond what might be otherwise chosen as BACT.

To assist in bringing consistency to the BACT process, the EPA developed guidance for PSD applicants to use the "top-down" approach to BACT. In this case, the applicant's BACT analysis is consistent with the EPA based top-down approach. However, as previously noted, NC DAQ does not strictly adhere to EPA's top-down guidance. Rather DAQ implements BACT in strict accordance with the statutory and regulatory language. As such, DAQ's BACT conclusions may

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<sup>1</sup> Pollutant specific emission unit (PSEU) is defined in 40 CFR § 64.1 in the context of the Compliance Assurance Monitoring rule but that designation is useful in the discussion of PSD applicability in most cases.

differ from those of the applicant or EPA.

The first step in this analysis was to identify all possible control options. Next, all technically infeasible or undemonstrated control options were eliminated and the remaining options were ranked in order of control effectiveness. After ranking control options, the most stringent emission level was considered BACT unless economic, energy, or environmental impacts precluded its selection. If adverse impacts precluded selection of the most stringent option, the next most stringent emission level was evaluated. This process continued until a control option could not be eliminated and was selected as BACT.

Control options for VOCs were developed using information from the following resources:

- RBLC database (a.k.a., the RACT/BACT/LAER Clearinghouse) located on EPA's Technology Transfer Network in the EPA electronic bulletin board system (EPA, 2004);
- Various air pollution control technology vendors;
- Plywood and oriented strandboard manufacturers using pollution control technologies considered in the BACT analysis that, although control emissions from very different applications, control similar emission species;
- State and EPA regulatory agencies;
- EPA control technology documents;
- Experts familiar with the Lumber Manufacturing Industry and control of similar VOC emissions; and
- Lumber drying kiln manufacturers.

The RBLC database system contains a compilation of reasonably available control technology (RACT), BACT, and lowest achievable emission rate (LAER) analyses submitted by air pollution control agencies throughout the United States.

## **5.3 LUMBER KILN**

### **5.3.1 Introduction**

The proposed lumber kiln is an indirect-heated kiln. The primary compound emitted by indirect-heated lumber kilns is VOC. The lumber kiln is expected to result in 34.6 lb/hr (152 tons/year) of VOC. The control technology assessment for VOCs, the compound subject to PSD review, is provided below.

### **5.3.2 Volatile Organic Compounds**

The first step in this BACT analysis was to characterize the emissions from the emission unit for which BACT is required in order to identify possible control options. Information pertaining to the exhaust stream from the proposed lumber drying kiln was obtained from numerous sources including studies of emissions from lumber drying conducted by NCASI, humidity data based on typical wet and dry bulb temperatures of kiln exhausts, suggested drying schedules from

Wellons, Inc. (kiln manufacturer), and a number of industry experts familiar with kiln operating procedures and exhaust characteristics.

Typical kiln exhaust characteristics upon which control technology feasibility and costs were based are discussed below.

Kiln Vent Locations and Operating Characteristics: Lumber kilns are generally equipped with 10 to 20 individual roof vents spaced equidistantly following the ridge of the roof. An equal number of vents are located on each side of the kiln roof, and each set of vents reacts in unison during the kiln drying cycle. At any given time, one set of vents allow moisture to exhaust from the kiln while the other set of vents allow dry make-up air to enter from the atmosphere. Approximately every two hours, the direction of heated air circulating within the kiln is changed to ensure proper drying. As this direction is changed, kiln dampers are automatically adjusted to allow vents that were exhausting to provide the fresh air intake and vents that were providing fresh air to exhaust.

Exhaust Flow Rate: Exhaust flow rates in indirect-heated kilns can be highly variable, largely because the availability of heat to the kiln heat exchangers is variable and is dependent upon the quantity of heated thermal oil available from the existing kilns. The amount of venting is controlled by sophisticated automated controls that are influenced by a variety of kiln process parameters including relative humidity, moisture removal rate, and internal kiln temperatures and, therefore, is directly linked to the quantity of heat available.

During periods when heat supply does not completely meet necessary demands, vents may completely or almost completely close rapidly to maintain optimal conditions within the kiln. After return of an adequate supply of heat to the kiln, kiln conditions may rapidly rise to their proper set point conditions or may even slightly overshoot these conditions causing a response by the kiln controls to quickly open the vents to maintain optimum drying conditions.

Exhaust Temperature and Moisture Content: During the initial drying cycle, kiln exhaust temperatures average the nominal kiln set points of 180 degrees (F) dry bulb and 160 degrees (F) wet bulb, resulting in a nearly saturated air exhaust stream. The moisture content of the exhaust is approximately 30 percent by weight, and 48 percent by volume. Following this period, exhaust temperatures average approximately 220 degrees (F) dry bulb and 160 degrees (F) wet bulb with 28 and 44 percent moisture by weight and volume, respectively. A constant evaporation rate of 15,000 lb/hr of water was assumed in the BACT analysis, although actual rate of evaporation may fluctuate during the cycle.

VOC Emission Rate: The VOC emissions rate during the drying cycle is expected to vary due to the extreme fluctuations in flow rate and, to a lesser extent, fluctuations in VOC concentration. To perform the BACT analysis a constant VOC emission rate of 34.6 lb/hr was assumed.

### **5.3.2.1 Identification of Available Control Technologies**

An extensive study of potentially applicable control technologies was conducted prior to evaluation of specific control options to ensure that the BACT analysis would be as comprehensive as possible. Information obtained from the data sources reviewed and interviews conducted during this study indicate that no add-on air emission controls have ever been applied to lumber drying kilns and that the combined characteristics of the exhaust from indirect-heated lumber drying kilns present a number of obstacles to control. However, several control technologies were identified that have been used by other industries to control similar VOC species and were considered in this analysis. These technologies are as follows:

- Regenerative catalytic oxidation;
- Regenerative thermal oxidation;
- Non-regenerative thermal oxidation technologies;
- Carbon adsorption; and
- Biofiltration.

Although a few other control technologies are available that reduce VOC emissions, these technologies primarily target reduction of other regulated compounds and are generally recognized by industry and permitting agencies as not being particularly effective for VOC control. For example, wet electrostatic precipitators and wet scrubbing systems are control technologies designed to reduce particulate matter emissions and have low reduction efficiencies for the VOC species typically emitted from lumber kilns. Consequently, these technologies were not considered in this analysis.

### **5.3.2.2 General Challenges of Kiln Emissions Control**

The purpose of this section is to describe the technical challenges that are involved in applying any of the previously mentioned control technologies to lumber kiln emissions. Although the control technologies previously identified have been proven as being effective VOC control technologies for specific applications, none of these technologies has been applied to indirect-heated lumber kilns or emission streams with a similar combination of characteristics and, consequently, there are a number of inherent difficulties in designing a cost-effective control system for a lumber kiln. Because emission control technologies have never been applied to lumber kilns, actual maintenance and operational problems are unknown and it is possible that the technologies considered in this BACT analysis would cost substantially more than presented in this analysis. These challenges are categorized as follows:

- Exhaust collection/kiln air intake ductwork and automated control system design;
- Reduction of condensation formation;
- Collection and treatment of condensation;
- Maintenance; and
- Potential pollution control system re-engineering after installation.

Each of these challenges is discussed below.

#### 5.3.2.2.1 Exhaust Collection/Kiln Air Intake Design

To summarize the operation of the kiln exhaust collection and air intake system, two sets of vents are spaced equidistantly along the roof of the proposed kiln. Each set of vents react in unison during the kiln drying cycle and, at any given time, one set of vents exhaust from the kiln while the other set of vents intake air from the atmosphere. As the direction of “drying air” inside the kiln is changed, dampers are automatically adjusted to allow switching between intake and exhaust vents.

In order to route emissions from the kiln to any pollution control device, a complex ductwork system must be connected to all exhaust vents on the kiln roof, which in turn connects all vents to a single duct connected to the control device. While many control systems have been designed that connect multiple vents to a single control device, this design is especially complicated because several damper controllers and additional ductwork must be installed to allow instantaneous switching between air intake ducts and exhaust ducts. Damper controls must always allow one set of vents to exhaust while the other intakes air. Design and operation of this system are further complicated by the extraordinary measures necessary to reduce condensation, collect and treat condensate, and finally to prevent malfunction of the ductwork control system due to condensation, each of which is discussed in the following subsections.

#### 5.3.2.2.2 Reduction of Condensate Formation

One of the most critical aspects of operation of any pollution control system for a lumber kiln is that condensation of the kiln exhaust must be minimized as much as possible to reduce the number and severity of system malfunctions and to reduce the amount of wastewater. As explained earlier, approximately 15,000 pounds (1,800 gallons) per hour of water is evaporated and exhausted from the kiln in a nearly saturated air stream.

First, any ductwork system must be very well insulated due to the large surface area involved. Furthermore, ductwork would be heated if possible. Typical “heat tracing” techniques such as steam and electrical tracing are not viable options due to the substantial costs of tracing such large surface areas and the great financial risks of tracing large amounts of ductwork that may require frequent disassembly, maintenance, and re-design. Routing of hot combustion gases from thermal and catalytic oxidation technologies and introducing these gases directly into the kiln exhaust ductwork would have the greatest likelihood of reducing condensation. However, it is unlikely that this method can completely prevent all condensation and requires additional ductwork and damper controls. Although it is theoretically possible to introduce enough hot gas from the oxidation technologies to prevent condensation, reintroduction of gases causes the total air flow rate to the oxidation control device to increase, which increases the size and cost of the oxidation equipment. Other technologies under consideration in this BACT analysis cannot heat the kiln exhaust and would generate considerable condensate.

#### 5.3.2.2.3 Condensation-Related Problems

Kiln condensate is very “sticky” due to the presence of resinous VOC compounds in the exhaust, and points of condensation will, over time, build up and could cause severe blockages and malfunctions of ductwork dampers openings. The quantity of buildup could not be predicted by any of the various control technology vendors and kiln experts consulted during this BACT analysis. However, several persons interviewed about problems caused by kiln condensate agreed that severe control system malfunctions are possible and that an abnormally large amount of maintenance labor is likely. Because pollution controls on the proposed kiln would be the “first-of-a-kind,” substantial ductwork re-engineering and replacement is possible due to problems caused by condensation.

Condensation in control system ductwork must be collected and treated prior to off-site discharge to remove VOC and to adjust pH because the condensate is slightly acidic. Currently a small amount of condensate is combusted in the thermal oil units. However, these units could not handle the volume of condensate that would be generated in control system ductwork, and a wastewater treatment facility would have to be constructed to manage the condensate. *It is important to note that the costs of wastewater treatment were not included in any of the cost impact analyses presented in this section due to the difficulty of accurately estimating the quantity of condensate generated.*

#### 5.3.2.3 Technically Infeasible and Inferior Control Options

Of the “available” control technologies presented earlier, one of the technologies is technically infeasible and another is inferior to other technologies under consideration and, consequently, these technologies were rejected from further consideration as BACT. The following describes these control technologies.

Adsorption systems utilize adsorption media that must be periodically regenerated to desorb VOC from the adsorption media so that the media can be reused. Although some VOC can be desorbed by chemical treatment, information obtained during this study indicates that terpenes, the primary VOC constituent in kiln exhaust, must be thermally desorbed and that temperatures necessary for desorption are excessively high and would damage any commercially-available adsorption media. Therefore, adsorption is technically infeasible due to an inability to desorb kiln VOCs from the adsorption media.

Regenerative oxidation technologies considered in this BACT analysis are superior to other oxidation technologies sometimes used to control VOC emissions, such as simple flaring and recuperative thermal oxidation. Therefore, these “other” oxidation technologies were not evaluated.

Regenerative oxidation technologies are almost as effective at controlling VOC emissions as the “other” oxidation technologies; however, regenerative technologies are much more cost-effective for controlling VOC in the kiln exhaust because regenerative technologies use much less fuel.

#### **5.3.2.4 Technical Evaluation and Ranking of Feasible Control Technologies**

This section presents a technical evaluation of each control technology included in the analysis, describing the principals of operation and the VOC control efficiency associated with each technology. The technical evaluation of control technologies is followed by “ranking” of the effectiveness of each technology.

##### **5.3.2.4.1 Technical Evaluation of Feasible Control Technologies**

###### **5.3.2.4.1.1 Regenerative Catalytic and Thermal Oxidation**

The principles utilized in regenerative catalytic oxidation (RCO) and regenerative thermal oxidation (RTO) of VOC are based on simple chemistry and heat transfer phenomena. Since oxidation technologies have been widely accepted as the most effective technologies for VOC destruction and are well-understood by the environmental community, a rigorous technical evaluation is unwarranted. However, a brief explanation is provided here to provide those readers unfamiliar with these technologies with enough background to understand the basic principles of operation and performance of these technologies.

Oxidation, often called “combustion,” of VOC involves a chemical reaction between hydrocarbons and oxygen to form carbon dioxide and water. Combustion of VOC emission streams occurs spontaneously at elevated temperatures, which are typically attained by combustion of an auxiliary fuel within the “combustion zone” of the combustion equipment. The percent conversion of VOC to carbon dioxide and water is dependent upon temperature and “residence time” of the VOC in the fuel combustion zone. Combustion of VOC in the presence of a catalyst is referred to as “catalytic oxidation” and requires substantially lower temperatures for oxidation to occur and, therefore, requires less auxiliary combustion fuel.

Regenerative oxidation systems operate on the same principal of reacting VOC in the presence of oxygen at elevated temperatures; however, the heat generated by combustion of auxiliary fuel and VOC is “reused” to reduce the amount of auxiliary fuel necessary for VOC oxidation. VOC oxidation is accomplished by passing the emission stream being controlled through a heated “bed” of media such as ceramic packing to preheat the emission stream, followed by a final combustion zone in which auxiliary fuel is burned to “boost” the stream to the required combustion temperature. Exhaust from the combustion zone is then passed through another packed bed, which absorbs and retains heat until it can be used later to preheat the emission stream being controlled. Air flow is periodically switched to allow beds through which hot exhaust gases have passed to preheat the emission stream prior to passing through the combustion zone. Regenerative systems are typically designed to recover nearly all heat of combustion, greatly reducing auxiliary fuel requirements.

The RCO and RTO upon which the BACT evaluations were based is manufactured by Monsanto-Envirochem and REECO, respectively. The design specifications for this system

include 85.5 percent overall VOC destruction efficiency based on 95 percent destruction efficiency within the oxidizer and a 90 percent “capture” efficiency to account for a 10 percent loss of emissions from kiln and ductwork leakage. The RCO and RTO also include ductwork needed to recirculate hot gases from a “hot zone” of the oxidizer to the kiln exhaust collection points directly above the kiln to raise kiln exhaust temperatures and reduce condensation.

#### 5.3.2.4.1.2 Biofiltration

Biofiltration uses microorganisms to biologically degrade VOC into carbon dioxide and water. In biofiltration systems, the emission stream being controlled is passed through one or more beds of biomedica such as compost or beds of packing using nutrient recycle. Since biofilters are dependent upon biological activity to destroy VOC, removal efficiencies of biofilters are widely variable. All biofilters are extremely sensitive to a number of exhaust stream characteristics including moisture content, temperature, VOC species and concentration, and bed retention time.

The biofiltration vendor contacted for the BACT evaluation has substantial experience in treating the same VOC species that are emitted from the lumber kiln, primarily alpha- and beta-pinenes, although this manufacturer has not built a biofiltration system for an emission stream with especially similar characteristics to the kiln exhaust. However, this vendor was able to provide rough estimates of necessary exhaust “conditioning” requirements and control efficiency. The only conditioning requirement for this system is that the kiln exhaust gas temperature must be cooled using a water-cooled heat exchanger to approximately 100 degrees (F) to achieve a temperature suitable for the biofiltration microorganisms. An estimated VOC control efficiency of nearly 90 percent was quoted as being achievable during “average” ppmv loading, but is much less during periods when ppmv concentrations rise above the “average” ppmv level.

Consequently, 80 percent control efficiency was used in the BACT impact analyses.

The only major technical uncertainty about this control option other than actual control efficiency and than the technical considerations pertaining to reliability of the damper systems, which has been discussed in detail in previous sections, is whether or not the biofilter beds would periodically plug due to buildup of the sticky terpenes present in the kiln exhaust. It is believed that the likelihood of bed pluggage cannot be conclusively determined without pilot scale testing.

#### 5.3.2.4.2 Ranking of Feasible Control Technologies

A summary of the VOC control efficiencies of all technologies under consideration, ranked in order of decreasing effectiveness is presented below:

- RCO and RTO = 85.5 percent; and
- Biofiltration = 72 percent.

### 5.3.2.5 Impacts Analysis of Feasible Control Technologies

As discussed earlier, the BACT approach requires evaluation of control options beginning with the most stringent option, followed by evaluation of the remaining options in decreasing order of efficiency, if adverse economic, environmental, or energy impacts precludes selection of an option as BACT. Adverse economic impacts were determined for all technically feasible control options evaluated and included in the following impacts analysis. In order to streamline discussion of each type of impact (i.e., economic, etc.) the impacts discussions of all technologies are discussed collectively.

#### 5.3.2.5.1 Economic Impacts

As required by EPA, the following economic impacts portion of the BACT analysis includes budgetary estimates of total capital and annual costs, as well as an estimated cost effectiveness of each control technology evaluated, which is calculated from estimated annual costs and VOC control effectiveness. Although the cost estimates presented in the following analysis are considered cost prohibitive, these costs do not fully convey the magnitude of the economic impacts that would be caused by requirements to apply any of the technologies under consideration. Therefore, this evaluation presents other costs impacts, including impacts on profitability, competitiveness, and project viability.

#### 5.3.2.5.2 Capital and Operating Costs and Cost Effectiveness

Total capital costs range from \$1,366,856 for RCO control to \$2,070,920 for RTO control. Total annual costs range from \$457,509 for use of the RCO control to \$660,151 for RTO control. All capital costs include a 50 percent contingency above vendor quote to adequately take into account the high capital costs that may be involved in construction cost overruns often associated with “first-of-kind” control systems and to account for the potentially high replacement, repair, and re-engineering costs involved in developing a control system that will provide continuous compliance with the control efficiencies of each option. Annual maintenance costs were estimated as being two times the costs typically associated with the technologies evaluated to account for the additional routine repair and maintenance costs that are anticipated.

Not only are the capital and maintenance cost contingencies deemed justifiable given that the control equipment vendors from whom capital cost quotes were obtained have not previously built a system to control an emissions stream with a similar combination of characteristics, but it is possible that these costs actually *underestimate* the actual capital and operating costs that would be incurred. It is important to note that these costs do not account for production losses to kiln down-time or costs associated with wastewater treatment of kiln condensate.

Cost effectiveness estimates are range from a minimum of \$3,532 per ton for RCO control to \$5,096 per ton for RTO control. Again, these numbers are minimum values and would actually be much higher.

Weyerhaeuser believes that the cost effectiveness estimates are unreasonably high given that kiln pollution controls have not been demonstrated on any other kilns in the United States (and perhaps the entire world) and a requirement for Weyerhaeuser to install such controls would severely damage the facility's ability to remain competitive with other lumber manufacturers and drastically reduce profits. Furthermore, such costly controls are considered unnecessary because control of VOC emissions would have a minimal impact on air quality. Additional discussions pertaining to economic and environmental impacts are presented later in this analysis.

#### 5.3.2.5.3 General Economic Considerations

In order to fully appreciate the economic impacts that would be incurred by any of the control options evaluated, it is necessary to provide the following information pertaining to the Lumber Manufacturing Industry:

- Costs of kiln control that result in a non-competitive position in the Lumber Market;
- Project viability; and
- Control cost relative to total project cost.

#### Cost of Control Would Result In Non-Competitive Position In Market

Although costs presented in the previous BACT analyses *are underestimated* for reasons already discussed, the cost for all control options are considered unbearably high in a market characterized by very low profit margins. The minimum cost of any of the control options evaluated in the BACT analysis (i.e., use of the RCO) would result in an increased production cost of \$25 per thousand board feet (MBF), in the initial years assuming an initial production rate of 30 percent of maximum capacity in the new kiln. In order to recoup these costs, Weyerhaeuser would have to raise its lumber prices substantially higher than other competitors. However, since costs are essentially "fixed" by the market, these prices would be considered extremely uncompetitive, making sale of the lumber impossible.

#### Project Viability

In order to remain competitive with other manufacturers if pollution controls are required on the kiln, lumber from the kiln must be sold at essentially the same price as other manufacturers. However, because the costs to control VOC emissions would result in unreasonably low profit, Weyerhaeuser would consider the project economically unviable and would not install the kiln.

### Control Cost Relative to Total Project Cost

Another issue that Weyerhaeuser requests NCDAQ to consider when determining whether to concur with Weyerhaeuser's finding that pollution controls are cost prohibitive is that the capital cost of even the least costly of the control options evaluated is more than 80 percent of the entire capital cost of the kiln installation project itself. The total installed capital cost of the kiln is estimated to be \$1,700,000.

#### 5.3.2.5.4 Environmental Impacts

An essentially negligible beneficial impact on air quality is accomplished by reducing air toxic emissions present in kiln exhaust using any of the control options evaluated. As seen by the two air toxics emitted in the largest quantity, formaldehyde and methanol, emission reductions of only 518 and 12,435 pounds per year or less of formaldehyde and methanol, respectively, would be obtained using any option evaluated. The cost effectiveness of controlling formaldehyde is estimated to be a minimum of \$1.8 million per ton and that of methanol at least \$73,000 per ton.

Slight adverse air quality impacts are caused by the RCO and RTO control options in that NO<sub>x</sub> and HAPs are emitted from each option. RCO and RTO options emit up to 2.5 and 3.8 tons per year of NO<sub>x</sub>, respectively, and substantially smaller quantities of HAPs from No. 2 fuel oil combustion required for heating.

Although wastewater will be generated from kiln exhaust condensate, no adverse impacts are incurred from wastewater discharges because kiln condensate is dilute in VOC, which could readily be removed prior to discharge. There are no hazardous waste impacts associated with any of the options evaluated.

Not only are the beneficial impacts of reducing toxic air pollutants considered negligible, but it is believed that reduction of the primary compound being controlled, VOC, would have a negligible impact on air quality in the vicinity of the facility. Under the PSD program, VOC is regulated to prevent significant deterioration of air quality due to ozone formation. Ozone is formed in the atmosphere due to atmospheric chemical reactions of NO<sub>x</sub> and VOC catalyzed by sunlight, and excessive ambient concentrations of ozone in the lower atmosphere can be injurious to health and damage vegetation. The facility is located in a lightly populated and developed area of North Carolina and ambient concentrations of ozone in this area are known to be below regulated levels.

Recent developments in air dispersion modeling and studies in ozone formation seem to indicate that even substantial reductions in VOC emissions in rural areas such as the Greenville facility will have a relatively small impact on ozone formation. This phenomena has been substantiated in previous modeling analyses conducted using the Urban Airshed Model (UAM). Moreover, it should also be noted that VOC emissions from the proposed kiln are extremely small compared to the biogenic (naturally occurring) VOC emissions from forests in the vicinity of the facility and, consequently, reduction of VOC from the kiln will negligibly reduce ozone formation and concentrations in the area.

#### 5.3.2.5.5 Energy Impacts

All of the technologies require energy to operate exhaust collection fans, with impacts ranging from 204,000 KWH per year for RCO control to 481,800 KWH per year for RTO control. All of the oxidation technologies under consideration also require additional fuel (5,484 million Btu per year for RCO control to 15,768 million Btu per year for RTO control). There are no additional fuel requirements associated with biofiltration.

#### 5.3.2.6 BACT Selection

Results of the BACT analysis indicate that there are no demonstrated control techniques in practice, numerous technical challenges, and no cost-effective control technologies for control of VOC emissions from lumber drying kilns and, consequently, the BACT proposed for the kiln is “no control.” All of the control technologies under consideration cause severe economic impacts that would make installation of the kiln economically unviable. Costs included in the BACT analysis are underestimated due to difficulty of accurately estimating a system that has never been successfully demonstrated. Unknown maintenance and operational problems due to the unique characteristics of kiln emissions could make costs even higher. Furthermore, it is believed that controlling VOC emissions from the kiln would result in essentially no benefit in the air quality of the region because VOC emissions are dwarfed by biogenic emissions in the vicinity of the Weyerhaeuser Greenville facility and because reducing the quantity of VOC emissions from a source as minor as a lumber drying kiln will negligibly reduce ozone formation in the area.

## **5.4 REFERENCES**

Woodward-Clyde Consultants. Prevention of Significant Deterioration (PSD) Permit Application for International Paper Company, Riegelwood, North Carolina, September 1996.

Environmental Protection Agency. *New Source Review Workshop Manual*. Office of Air Quality Planning and Standards. October 1990. Draft

RACT/BACT/LAER Clearinghouse (RBLCL). U.S. Environmental Protection Agency. Available on the Internet at <http://cfpub.epa.gov/rblc/htm/bl02.cfm>, November 2004.

**WEYHAEUSER COMPANY (GREENVILLE SAWMILL)  
SIGNIFICANT DETERIORATION (PSD)  
AIR DISPERSION MODELING ANALYSIS**

**6.0 Introduction**

This air dispersion modeling analysis is for the proposed installation of a new lumber kiln (Number 7). PSD regulations (40 CFR 51.166 (k)) require an applicant to perform an air quality ambient impact analysis to show that no National Ambient Air Quality Standard (NAAQS) and PSD Increment will be exceeded in the area where the proposed new source will have a significant impact. **The modeling analysis shows that this facility will not cause or contribute to the exceedance of the Class II NAAQS and PSD Increment, Class I Increment, any NC toxic air pollutant's Acceptable Ambient Levels (AALs) or any Air Quality Related Value (AQRV) for Class 1 areas within 200 kilometers of the facility.**

**6.1 Proposed Project**

The Weyerhaeuser Greenville lumber mill is currently permitted for seven lumber kilns with a total capacity of 300 million board feet (MMBF) of lumber per year. However, the seventh kiln was never constructed, and the current capacity of the six existing kilns at the mill is approximately 240 MMBF per year. Weyerhaeuser now is proposing to install the seventh kiln in order to attain the currently permitted production rate of 300 MMBF per year. Associated equipment at the mill is currently designated to process the additional production from the seventh kiln.

Table 6.1-1 Actual Kiln No. 7 Emission Increases (tpy)

| Source Description                     | CO           | NOx          | PM          | PM <sub>10</sub> | SO <sub>2</sub> | VOC           | lead           |
|--|--------------|--------------|-------------|------------------|-----------------|---------------|----------------|
| Kiln 7 Emissions                       | .88          | 0            | 3.03        | 3.03             | 0               | 151.5         | 0              |
| Additional Emissions*                  | 50.62        | 38.08        | 5.64        | 4.64             | 4.19            | 1.52          | .000849        |
| <b>Total actual Emission Increases</b> | <b>51.49</b> | <b>38.08</b> | <b>8.67</b> | <b>7.67</b>      | <b>4.19</b>     | <b>153.02</b> | <b>.000849</b> |
| NSR Significant Emission Rates         | 100          | 40           | 25          | 15               | 40              | 40            | .6             |
| Major NSR Review Required              | No           | No           | No          | No               | No              | Yes           | No             |

\* Emission increases associated with the addition of the seventh kiln.

The netting analysis shows that VOC emissions are the only pollutant to exceed its Significant Emission Rates (SERs) as established in the New Source Review Workshop Manual (NSRWM), Draft October 1990. Since VOC's are a precursor to Ozone and are addressed by North Carolina on a regional basis, Ozone is not modeled using the industrial Source Complex Short-term (ISCST3) dispersion model. This modeling analysis will only model the toxics associated with the increase in VOC emissions from those previously modeled. Five toxics will be emitted as part of this analysis acetaldehyde, acrolein, ammonia, formaldehyde and phenol.

## 6.2 NAAQS & PSD Increment Air Dispersion Modeling Analysis

### 6.2.1 NAAQS & PSD Increment Analysis

A NAAQS and PSD Increment Analysis was not required as part of this analysis. Previous modeling for this facility has been accomplished in 1997 (PSD) and updated in January and May 1999 (See Memorandum of Record to Rahul Thacker). Those three efforts modeled and demonstrated compliance with the total facility emissions encompassed in the review. The additional emissions associated with this modification will NOT exceed the previously modeled emission levels established in the current permit and thus no further air dispersion modeling is required for the NAAQS and or PSD Increment Analysis.

### 6.3 Non Regulated Pollutant Impact Analysis (North Carolina Toxics)

The modeling was accomplished using the EPA approved ISCST3 and SCREEN3 models to evaluate simple/rolling terrain and building cavity impacts. Seven point sources and two volume sources were evaluated as part of this project. Table 6.3-1 shows the sources modeled and the associated modeling parameters.

**Table 6.3-1 Weyerhaeuser Modeled Sources**

| Stack ID  | Source         | Base Elevation (m) | Stack Height(m) | Temp (k) | Velocity (m/sec) | Stack Diameter (m) |
|-----------|----------------|--------------------|-----------------|----------|------------------|--------------------|
| EP01-EP02 | Kiln 1-2       | 20.4               | 7.92            | 483      | .01              | .52                |
| EP03      | Kiln 3         | 20.3               | 7.92            | 483      | .01              | .52                |
| EP04-07   | Kiln 4-7       | 20.1               | 7.92            | 483      | .01              | .52                |
| F11*      | Logo Painting  | 20.9               | Surface         | –        | –                | –                  |
| F12*      | Spray painting | 20.7               | Surface         | –        | –                | –                  |

\* Volume source.

The facility is located in the North Carolina coastal plain (Pitt County) near the town of Grifton, NC. The area is characterized by generally flat terrain and is rural in nature. The emission sources (Table 6.3-1) were modeled using 1987 – 1991 Raleigh-Durham, NC surface and Greensboro, NC upper-air meteorological data to determine location and extent of the maximum impacts. Two receptor grids, totaling nearly 1300 receptors and extending outwards to 5 kilometers, were used in the analysis. The first receptor grid placed receptors at 100-meter spacing along the property boundary out to approximately 1 kilometer. The second polar grid extended outwards from 1 kilometer, at 500-meter intervals, to 3 kilometers. Finally, receptors were placed at 1000-meter intervals from 3 kilometers out to 5 kilometers.

The toxic pollutant impact analysis was performed for non-regulated pollutant emissions as part of the Best Available Control Technology (BACT) analysis process. The toxic modeling analysis conformed to the North Carolina Administrative Code (NCAC) sections 2Q.0700 and 2D.1100 and used the modeling approach discussed in section 6.3. Facility toxic emissions indicated that acrolein and formaldehyde (Table 3-6 of the analysis) would exceed their respective Toxic Exemption Pollution Rates (TEPRs) and were subsequently modeled. The results show each pollutant impacts would be less than their respective Acceptable Ambient Levels (AALs). To maximize operational flexibility the facility modeled emissions at or near each pollutant AAL (Table 6.3-2).

**Table 6.3-2 Air Toxics Modeling Results**

| <b>Toxic Pollutants</b> | <b>Averaging Period</b> | <b>Modification Emission rate (lb/hr)</b> | <b>Impact (mg/m<sup>3</sup>)</b> | <b>AAL (mg/m<sup>3</sup>)</b> | <b>% of AAL</b> |
|-------------------------|-------------------------|---|----------------------------------|-------------------------------|-----------------|
| Acetaldehyde            | 1-hour                  | .217                                      | N/A                              | 27                            | N/A             |
| <b>Acrolein</b>         | <b>1-hour</b>           | <b>.90</b>                                | <b>.078</b>                      | <b>.08</b>                    | <b>98</b>       |
| Ammonia                 | 1-hour                  | .121                                      | N/A                              | 2.7                           | N/A             |
| <b>Formaldehyde</b>     | <b>1-hour</b>           | <b>.67</b>                                | <b>.147</b>                      | <b>.15</b>                    | <b>98</b>       |
| Phenol                  | 1-hour                  | .01                                       | N/A                              | .95                           | N/A             |

#### **6.4 Additional Impact Analysis**

PSD regulations [40 CFR 51.166 (o)] and the Interagency Workgroup on Air Quality Modeling (IWAQM), Phase 1 Report, requires an applicant to provide an analysis of the impacts of the proposed source on growth, soils, vegetation, regional visibility, and any Federal Class I area Air Quality Related Values (AQRVs) that the facility might adversely impact.

Weyerhaeuser Greenville is approximately 95 kilometers west-northwest of the Swanquarter National Wildlife Refuge and greater than 200 kilometers northwest of Cape Romain National Wildlife Refuge in South Carolina.

#### **6.4.1 Growth Impacts**

The growth analysis includes the projection of the associated industrial, commercial, and residential source emissions that will occur in the area as a result of the construction of this facility. This is accomplished by evaluating the local work force and assessing secondary emission sources that will build to support the IP facility.

The Economic impact of this facility is expected to be minimal. The facility expansion with the additional log supply and delivery operations will not significantly increase labor requirements. With no or few jobs created, the Pitt County labor force is sufficiently large to provide any labor required. Furthermore, no new housing construction will be anticipated as a result of this project since any labor requirements will be sufficient to fill the jobs. Finally, the increased commercial and industrial activity, which will be minimal, associated with this project will not affect road or traffic issues near the facility.

#### **6.4.2 Soils and Vegetation**

This analysis was based on an inventory of the soils and vegetation types found in the impact area and included all vegetation with any commercial or recreational value. The inventory was determined by assessing the U.S. Department of Agriculture soil survey of Pitt County.

The soil types within the region are predominantly Norfolk- Lynchburg-Goldsboro, Rains-Lynchburg-Goldsboro, Foreston-Torhunta-Autryville, and Johnston-Meggett-Muckalee. These soils are characterized by well-drained, sandy and or loamy soils. Soil acidity within this area, due to the facility operations is not expected to significantly alter the pH balance of the soils in the impact area of the facility.

The major cash crops in Pitt County are soybeans, corn and wheat along with tobacco. A literature search was conducted to document the potential pollutant impact on vegetation. NO<sub>x</sub> emissions have been shown to inhibit photosynthesis production within field crops such as oats and alfalfa. Furthermore, effects of NO<sub>x</sub> emissions have been shown to affect eastern pine forest species.

A review of the local area ozone monitors show that the average High 4th High (H4H) value that is representative of the area is approximately .102 parts per million (ppm) and below the 1-hour standard of .120 ppm. DAQ's experience and previous ozone modeling scenarios has shown that increases of the magnitude of this facility will not significantly increase this value.

The previously modeled impacts from the facility are well below the NAAQS and PSD increment standards and thus will not adversely impact soils and vegetation. In addition, the VOC toxic emissions addressed above are below North Carolina AAL's and also are not expected to adversely impact the local soils and vegetation.

### **6.4.3 Class II Visibility Impairment Analysis**

The Class II visibility impairment analysis is distinct from the Class I impact in that it is concerned with visibility only within the impact area of the proposed new source or modification. The analysis is accomplished by determining the visual quality of the area and then uses a conservative screening tool to assess the possibility of visibility impairment based on expected emissions. This assessment was previously assessed using the EPA VISCREEN (version 1.1) model to determine the furthest distance to which a plume from the facility might be visible.

Since the previous modeling demonstrated compliance, and no known visibility-impairing emissions are being generated, a new level I VISCREEN analysis was not accomplished.

### **6.5 Class I Increment, Air Quality Related Values (AQRV)/Regional Haze, and Non-Attainment Impact Analysis**

The modeling in section 6.2 showed that the facility was well below pollutants significant Impact Levels (SILs). In addition, based on the relatively low total facility emissions and considerable distance to the nearest Class I area, the reviewing Federal Land Manager (Bud Rolofson) did not express a concern with the visibility and deposition impacts in the Class I area; subsequently, a Class I AQRV regional haze analysis was not required.

#### **6.5.1 Non-attainment Analysis**

There are no designated non-attainment areas impacted by this project.

### **6.6 Source Impact Analysis Conclusion**

Based on the ambient impact analysis, the proposed facility modifications will not cause or contribute to any violation of the Class II NAAQS and PSD increment, Class I Increment or any Class I AQRV's.