# Prevention of Significant Air Quality Deterioration Review

# Preliminary Determination

September 27, 2019

Facility Name: Interfor U.S. Inc – Thomaston Mill
City: Thomaston
County: Upson
AIRS Number: 04-13-293-00007
Application Number: 292241
Date Application Received: July 12, 2019

Review Conducted by:
State of Georgia - Department of Natural Resources
Environmental Protection Division - Air Protection Branch
Stationary Source Permitting Program

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## SUMMARY

The Environmental Protection Division (EPD) has reviewed the application submitted by Interfor U.S. Inc. – Thomaston Mill. The modifications include construction and operation of one continuous drying kiln (ID No. OSK4), one fuel silo with cyclone, one debarker, one bark hog, two green wood chippers, one chip bin with cyclone, one sawdust cyclone to pneumatically convey sawdust to the boiler area at the mill, one planer mill with associated planer mill shavings cyclone, one shavings cyclone to pneumatically convey sawdust to the boiler area at the mill, one diesel fire pump engine, an upgrade of equipment in the pine sawmill as well as the permanent shut down of one debarker, two green wood chippers, one chip bin cyclone, one planer mill, three planer mill cyclones and one shavings collection cyclone. The proposed project will increase the drying capacity of the facility from 174 MMbf per year to 294 MMbf per year.

The proposed project will result in an emissions increase of nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), sulfur dioxide ($SO_2$), particulate matter ($PM/PM_{10}/PM_{2.5}$), single and combined hazardous air pollutants (HAP), and total greenhouse gases (Total GHG). A Prevention of Significant Deterioration (PSD) analysis was performed for the facility for all pollutants to determine if any emissions increase was above the "significance" level. Only the VOC emissions increase will be above the PSD significant level threshold.

The Interfor U.S. Inc. – Thomaston Mill is located in Upson County, which is classified as "attainment" or "unclassifiable" for $SO_2$, $PM_{2.5}$ and $PM_{10}$, $NO_X$, CO, and ozone (VOC).

The EPD review of the data submitted by Interfor U.S. Inc. – Thomaston 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 Best Available Control Technology (BACT) for the control of VOC, 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 quality standard or allowable PSD increment in the area surrounding the facility. It has further been determined that the proposal will not cause impairment of visibility or detrimental effects on soils or vegetation. Any air quality impacts produced by project-related growth should be inconsequential.

This Preliminary Determination concludes that an Air Quality Permit should be issued to Interfor U.S. Inc. – Thomaston Mill for the proposed 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. This Preliminary Determination also acts as a narrative for the Title V Permit.

## 1.0 INTRODUCTION – FACILITY INFORMATION AND EMISSIONS DATA

On July 12, 2019, Interfor U.S. Inc. – Thomaston Mill submitted an application for an air quality permit for the construction and operation of a continuous, direct-fired lumber kiln including ancillary equipment; and for facility wide upgrades to the existing sawmill. The facility is located at 75 Ben Hill Road in Thomaston, Upson County.

**Table 1-1: Title V Major Source Status**

| Pollutant | Is the Pollutant Emitted? | If emitted, what is the facility's Title V status for the Pollutant? | | |
|---|---|---|---|---|
| | | Major Source Status | Major Source Requesting SM Status | Non-Major Source Status |
| PM | Yes | | | ✓ |
| $PM_{10}$ | Yes | | | ✓ |
| $PM_{2.5}$ | Yes | | | ✓ |
| $SO_2$ | Yes | | | ✓ |
| VOC | Yes | ✓ | | |
| $NO_x$ | Yes | ✓ | | |
| CO | Yes | ✓ | | |
| TRS | N/A | | | ✓ |
| $H_2S$ | N/A | | | ✓ |
| Individual HAP | Yes | ✓ | | |
| Total HAP | Yes | ✓ | | |
| Total GHGs | Yes | | | ✓ |

Table 1-2 below lists all current Title V permits, all amendments, 502(b)(10) changes, and off-permit changes, issued to the facility, based on a review of the "Permit" file(s) on the facility found in the Air Branch office.

**Table 1-2: List of Current Permits, Amendments, and Off-Permit Changes**

| Permit Number and/or Off-Permit Change | Date of Issuance/ Effectiveness | Purpose of Issuance |
|---|---|---|
| 2421-293-0007-V-04-0 | 5/29/2017 | Title V Renewal |

Based on the proposed project description and data provided in the permit application, the estimated incremental increases of regulated pollutants from the facility are listed in Table 1-3 below:

**Table 1-3: Emissions Increases from the Project**

| Pollutant | Baseline Years | Potential Emissions Increase (tpy) | PSD Significant Emission Rate (tpy) | Subject to PSD Review |
|---|---|---|---|---|
| PM | 2017-2018 | 22.63 | 25 | No |
| $PM_{10}$ | 2017-2018 | 14.79 | 15 | No |
| $PM_{2.5}$ | 2017-2018 | 8.54 | 10 | No |
| VOC | 2017-2018 | **240.8** | 40 | **Yes** |
| $NO_X$ | 2017-2018 | 17.56 | 40 | No |
| CO | 2017-2018 | 44.57 | 100 | No |
| $SO_2$ | 2017-2018 | 4.38 | 40 | No |

| Pollutant | Baseline Years | Potential Emissions Increase (tpy) | PSD Significant Emission Rate (tpy) | Subject to PSD Review |
|---|---|---|---|---|
| TRS | N/A | N/A | 10 | No |
| Pb | 2017-2018 | 2.70E-03 | 0.6 | No |
| Fluorides | N/A | N/A | 3 | No |
| $H_2S$ | N/A | N/A | 10 | No |
| SAM | N/A | N/A | 7 | No |
| GHG | 2017-2018 | 36,855 | 75,000 | No |

The definition of baseline actual emissions is the average emission rate, in tons per year, at which the emission unit actually emitted the pollutant during any consecutive 24-month period selected by the facility within the 10-year period immediately proceeding the date a complete permit application was received by EPD. The net increases were calculated by subtracting the past actual emissions (based upon the annual average emissions from 2017-2018) from the future potential emissions of the continuous drying kiln (ID No. OSK4), diesel fire pump engine, debarking equipment, chippers, planer mill, sawmill, cyclones and associated emission increases from non-modified equipment. Table 1-4 details this emissions summary. The emissions calculations for Tables 1-3 and 1-4 can be found in detail in the facility's PSD application (see Appendix B of Application No. 292241). These calculations have been reviewed and approved by the Division.

**Table 1-4: Net Change in Emissions Due to the Major PSD Modification**

| Pollutant | Increase from Modified equipment | | Associated Units Increase (tpy) | Total Increase (tpy) |
|---|---|---|---|---|
| | Past Actual | Future Actual | | |
| PM | <69.0 | <86.8 | N/A | 17.8 |
| $PM_{10}$ | <58.4 | <71.7 | N/A | 13.3 |
| $PM_{2.5}$ | <38.2 | <46.4 | N/A | 8.2 |
| VOC | <352.1 | <592.9 | N/A | 240.8 |
| $NO_X$ | <119.1 | <136.7 | N/A | 17.6 |
| CO | <190.3 | <234.9 | N/A | 44.6 |
| $SO_2$ | <6.08 | <10.5 | N/A | 4.4 |
| TRS | N/A | N/A | N/A | N/A |
| Pb | 1.17E-02 | 1.44E-02 | N/A | 2.70E-03 |
| Fluorides | N/A | N/A | N/A | N/A |
| $H_2S$ | N/A | N/A | N/A | N/A |
| SAM | N/A | N/A | N/A | N/A |

Based on the information presented in Tables 1-3 and 1-4 above, Interfor U.S. Inc. – Thomaston Mill's proposed modification, as specified per Georgia Air Quality Application No. 292241, is classified as a major modification under PSD because the potential emissions of VOC (240.8 tpy) exceed the corresponding PSD Significant Emission Rate (40 tpy).

Through its new source review procedure, EPD has evaluated Interfor U.S. Inc. – Thomaston Mill's proposal for compliance with State and Federal requirements. The findings of EPD have been assembled in this Preliminary Determination.

## 2.0 PROCESS DESCRIPTION

According to Application No. 292241, Interfor U.S. Inc. – Thomaston Mill has proposed the construction and operation of a continuous, direct-fired lumber kiln including ancillary equipment; and facility wide upgrades to the existing sawmill. The proposed modifications include construction and operation of one continuous drying kiln (ID No. OSK4), one fuel silo with cyclone, one debarker, one bark hog, two green wood chippers, one chip bin with cyclone, one sawdust cyclone to pneumatically convey sawdust to the boiler area at the mill, one planer mill with associated planer mill shavings cyclone, one shavings cyclone to pneumatically convey sawdust to the boiler area at the mill, one diesel fire pump engine, an upgrade of equipment in the pine sawmill as well as the permanent shut down of one debarker, two green wood chippers, one chip bin cyclone, one planer mill, three planer mill cyclones and one shavings collection cyclone. The proposed project will increase the drying capacity of the facility from 174 MMbf per year to 294 MMbf per year.

The Interfor U.S. Inc. – Thomaston Mill permit application and supporting documentation are included in Appendix A of this Preliminary Determination and can be found online at *https://epd.georgia.gov/psd112gnaa-nsrpcp-permits-database*.

## 3.0 REVIEW OF APPLICABLE RULES AND REGULATIONS

### State Rules

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

The proposed continuous drying kiln (ID No. OSK4) will be subject to Georgia Rules for Air Quality Control 391-3-1-.02(2)(b), "Visible Emissions." Georgia Rule (b) limits the opacity of the emissions from the continuous drying kiln (ID No. OSK4) to forty (40) percent. With the operating nature of the direct wood-fired kiln, compliance with the Rule (b) visible emission limit is expected.

The continuous drying kiln (ID No. OSK4) will also be subject to Georgia Rules for Air Quality Control 391-3-1-.02(2)(e), "Particulate Emission from Manufacturing Processes." Since the kiln is installed after July 2, 1968, the allowable PM emission rate from the continuous drying kiln (ID No. OSK4) is specified by Georgia Rule 391-3-1-.02(2)(e)1.(i), which is stated as follows:

$E = 4.1 * P^{0.67}$ for process input weight rate up to and including 30 tons per hour.
$E = 55 * P^{0.11} - 40$ for process input weight rate above 30 tons per hour.

Where E equals the allowable PM emission rate in pounds per hour and P equals the process input weight rate in tons per hour.

Compliance with the GA Rule (e) PM emission standards are expected as follows.

| Name/ID No. | Process Input Weight Rate (P) (bf/hr) | Process Input Weight Rate (P) (tons/hr) | Allowable Emission Rate (E) (lbs PM / hr) |
|---|---|---|---|
| Continuous Drying Kiln OSK4 | 13,700 | 27.4 | $P = 4.1 * 27.4^{0.67} = 37.7$ |

$1\ ft^3 = 12$ bf
Assumed Wood Density = 48 lbs/$ft^3$

120,000,000 bf/yr
= 13,700 bf/hr
= (13,700 bf/hr) * (1 $ft^3$/12bf) * (48 lbs/$ft^3$) * (1 ton/2,000 lbs)
= 27.4 tph

PM Emission Rate of the continuous drying kiln (ID No. OSK4)
= (0.14 lb PM/1,000bf) * (13,700 bf/hr)
= 1.92 lbs PM/hr < 37.7 lbs PM/hr

Since the continuous drying kiln (ID No. OSK4) is a direct fired unit, it is subject to the fuel sulfur requirement (≤ 2.5% sulfur) specified in Georgia Rules for Air Quality Control 391-3-1-.02(2)(g), "Sulfur Dioxide." Compliance with Georgia Rule (g) for the continuous drying kiln (ID No. OSK4) is always expected because the kiln only fires wood, and wood contains negligible sulfur content.

## Federal Rule - PSD

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

Georgia has adopted a regulatory program for PSD permits, which the United States Environmental Protection Agency (EPA) has approved as part of Georgia's State Implementation Plan (SIP). This regulatory program is located in the Georgia Rules at 391-3-1-.02(7). This means that Georgia EPD issues PSD permits for new major sources pursuant to the requirements of Georgia's regulations. It also means that Georgia EPD considers, but is not legally bound to accept, EPA comments or guidance. A commonly used source of EPA guidance on PSD permitting is EPA's Draft October 1990 New Source Review Workshop Manual for Prevention of Significant Deterioration and Nonattainment Area Permitting (NSR Workshop Manual). The NSR Workshop Manual is a comprehensive guidance document on the entire PSD permitting process.

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

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

## Definition of BACT

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

EPA's NSR Workshop Manual includes guidance on the 5-step top-down process for determining BACT. In general, Georgia EPD requires PSD permit applicants to use the top-down process in the BACT analysis, which EPA reviews. The five steps of a top-down BACT review procedure identified by EPA per BACT guidelines are listed below:

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

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

## New Source Performance Standards

The new continuous drying kiln (ID No. OSK4) is not subject to any NSPS.

## National Emissions Standards For Hazardous Air Pollutants

Per 40 CFR 63.2231, the facility is subject to 40 CFR 63 Subpart DDDD, "National Emission Standards for Hazardous Air Pollutants: Plywood and Composite Wood Products," (a.k.a. PCWP MACT) because it is major for single and combined HAP emissions and is a plywood and composite wood products manufacturing facility that manufactures kiln-dried lumber. Please note that the kilns are not subject to any compliance options specified in Tables 1A and 1B to Subpart DDDD, any operating requirements specified in Table 2 to Subpart DDDD, or any work practice requirements specified in Table 3 to Subpart DDDD. According to 40 CFR 63.2252, the facility is only subject to the initial notification requirements specified in 40 CFR 63.9(b). By submitting Application No. TV-292241, the Division has determined that the facility has met the initial notification requirements. Therefore, the continuous drying kiln (ID No. OSK4) is subject to this rule but is not subject to any requirements.

## State and Federal – Startup and Shutdown and Excess Emissions

Excess emission provisions for startup, shutdown, and malfunction are provided in Georgia Rule 391-3-1-.02(2)(a)7. Excess emissions from the from the continuous drying kiln (ID No. OSK4) associated with the proposed project would most likely result from a malfunction. The facility cannot anticipate or predict malfunctions. However, the facility is required to minimize emissions during periods of startup, shutdown, and malfunction.

## Federal Rule – 40 CFR 64 – Compliance Assurance Monitoring

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

Therefore, this applicability evaluation only addresses the continuous drying kiln (ID No. OSK4), which does not employ any air pollution control devices; therefore, the CAM requirements are not triggered by the proposed modification.

## 4.0 CONTROL TECHNOLOGY REVIEW

The proposed project will result in emissions that are significant enough to trigger PSD review for the following pollutants: VOC

### Continuous Drying Kiln OSK4 - Background

The continuous drying kiln (ID No. OSK4) is a direct-fired continuous kiln that fires exclusively wood. The kiln has a design throughput capacity of 120 MMbf/yr, and has a burner capacity of 40 MMBtu/hr. The primary purpose of the continuous drying kiln (ID No. OSK4) is to lower the moisture content in the lumber to a desired level before sending the lumber to the planer mill and other downstream processes.

Continuous Drying Kiln OSK4 – VOC Emissions

Applicant's Proposal

Both combustion of wood in the kiln burner and continuous drying of the southern pine lumber would generate VOC emissions. Note that the National Council for Air and Stream Improvement (NCASI) VOC emission factor would include both VOC emissions from wood combustion and lumber drying. The facility proposed the following BACT analysis for VOC emissions from the new kiln.

Step 1: Identify all control technologies

The facility considered VOC emissions control techniques/technologies as noted below.

| |
|---|
| Option 1: Adsorption<br>Option 2: Biofilters<br>Option 3: Condensers<br>Option 4: Thermal Oxidizers<br>Option 5: Wet Scrubbers<br>Option 6: Proper Kiln Design and Operation |

Option 1: Adsorption

Adsorption systems use an adsorbent bed to trap VOC. As the exhaust gas stream passes through the adsorbent bed, VOC molecules are attracted to the surface of the adsorbent. The clean exhaust gas is then discharged to the atmosphere. When the adsorbent is spent and can no longer effectively adsorb VOC, the adsorbent can be reactivated either by heating with steam or by vacuuming to remove VOC from the surface. Reactivation can occur on-site, or the spent adsorbent may be returned to the supplier for reactivation.

Option 2: Biofilters

Biofilters involve the use of microbes which remove organics from the exhaust gas stream by feeding on the organic material. The exhaust gas stream from the exhaust is directed through the bed media in which the microbes live. Organics are adsorbed by moisture in the bed media and come into contact with the microbes. The microbes reduce the concentration of organics by consuming the organic material. The cleaned air is then discharged to the atmosphere.

Option 3: Condensers

Condensers operate by cooling the gas stream below the vaporization point for VOC; thus converting VOC in the exhaust gas from the vapor phase to the liquid phase. The phase change is usually accomplished by decreasing the temperature of the gas stream, but it can also be accomplished by increasing the pressure of the gas stream enough to cause the vapor to liquefy. The condensate can either be disposed through a wastewater treatment system or can be recycled by distillation.

Option 4: Thermal Oxidizers

In a regenerative thermal oxidizer (RTO), the VOC compounds in the exhaust gas enter the combustion chamber where it is oxidized into carbon dioxide and water vapor. Typical combustion chamber temperature is maintained around 1,400ºF to 1,500ºF. A regenerative thermal oxidizer uses a high-density packed heat transfer media, typically ceramic random saddle packing or honeycomb monolith structures, to preheat the incoming gas stream and to achieve 85 to 95% heat recovery.

Option 5: Wet Scrubbers

The wet scrubbing control technology consists of a transfer of VOC compounds in the gas stream by passing the stream through a countercurrent flow of a scrubbing liquid. Pollutants are impacted by the liquid droplets and dissolve in the liquid. This technology is used in many control applications.

Option 6: Proper Kiln Design and Operation

Process control or optimization uses proper lumber kiln operation techniques which include the necessary process monitoring instruments, process control equipment, schedule equipment inspection and maintenance in accordance with manufacturer's recommendations. Process controls are used to maintain proper moisture and temperature settings to optimize the kiln drying operation. Proper kiln temperature and humidity settings can minimize VOC emitted from the kilns.

The Division has reviewed Step 1 of the applicant's analysis and agrees with its findings.

Step 2: Eliminate technically infeasible options

Option 1: Adsorption

The gas stream from the lumber kiln is very high in moisture content. That moisture preferentially condenses onto the adsorbent surface leaving less area available for the VOC molecules thus reducing control efficiency. The control equipment sizing is also complicated by the variable flow rates. Most adsorption units are not recommended for the higher operating temperatures encountered with lumber kilns.

Option 2: Biofilters

The microorganism used in biofiltration cannot survive at temperatures exceeding 105 °F; however, the temperature of the exhaust stream from the kiln will be approximately 129 °F. Furthermore, the primary constituent of the VOC in the exhaust stream is terpenes, which are highly viscous and would cause the biofilter to easily foul.

Option 3: Condensers

Condensers are mostly effective for applications where there is high VOC concentration in the gas stream, of around 5,000 ppmvd. In the typical lumber kiln exhaust, the concentration is highly variable and usually below 1,000 ppm. The VOC emissions from a lumber kiln consist mostly of terpenes, which would require the temperature of the exhaust stream to be lowered to well below 0 °F in order to have a low enough vapor pressure to use condensation. Further, the viscous condensate from the condenser would result in frequent equipment plugging and related maintenance challenges.

Option 4: Thermal Oxidizers

The exhaust gas stream from a kiln has a temperature of around 220ºF and also has a high moisture content. The high moisture content and relatively low exit temperature of the exhaust gas makes an RTO unsuitable. Particulates present in the exhaust gas could also cause fouling of the ceramic material. The fouled ceramic would not provide the necessary preheating needed for the RTO be effective. For these reasons, thermal oxidation by an RTO deemed to be technically infeasible.

Option 5: Wet Scrubbers

Wet scrubbers are used in many control applications but are not well suited for VOC controls for a lumber kiln. The VOC emissions from a lumber kiln consist mostly of terpenes, which have low water solubility. Further, the viscous condensate would result in frequent plugging of the equipment. Therefore, wet scrubbers are not considered technically feasible for controlling VOC emissions from a lumber kiln.

The Division has reviewed Step 2 of the applicant's analysis and agrees with its findings.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

In this step of the top down BACT analysis, the remaining technically feasible options are ranked in order of their control efficiencies. There is only one technically feasible option which is shown below.

**Table 4-1: Ranking of VOC Control Technology for the continuous drying kiln OSK4**

| Control Technology Ranking | Control Technology | Control Efficiency |
|---|---|---|
| Option 6 | Proper Kiln Design and Operation | Variable due to design |

Step 4: Evaluating the Most Effective Controls and Documentation

Since the only technically feasible BACT option is Proper Kiln Design and Operation, further evaluation of controls is not necessary.

Step 5: Selection of BACT

The applicant has identified BACT as Proper Kiln Design and Operation.

BACT is generally an emission limit. However, in the case of continuous kilns which are an emerging technology, enough test data does not exist to impose a limit on the facility. Therefore, BACT in this case is not a numerical value but proper maintenance and work practices. Work practice standards will include proper maintenance of the kiln and the wood burner and minimizing over-drying and recordkeeping of good combustion practices.

EPD Review – VOC Control

The Division agrees with the facility that wet scrubbing is technically infeasible because of low solubility of terpenes. The Division also agrees that thermal oxidizers are technically infeasible because of high moisture content and relatively low temperature of the exhaust stream and VOC concentration variation. Adsorption and biofilters are also technically infeasible because of the high moisture content of the exhaust gas stream and the exhaust temperature. Condensers are also technically infeasible because of the relatively low and varying VOC concentration in the exhaust. Also, plugging of equipment due to the viscous condensate would pose a challenge to wet scrubbing, adsorption/biofilters, and condensers.

The Division reviewed all of the RBLC entries for VOC from continuous lumber drying kilns since 2002. This review showed that none of the entries required an add-on control device for VOC and that BACT is Proper Maintenance and Operating Practices.

The review of RBLC shows BACT limit of 3.8 lbs/Mbf for kilns located in South Carolina and Arkansas. However, during correspondence with those agencies it was confirmed that those limits are put in place for the purpose of calculating VOC emissions for future permitting & emissions inventory purposes. The kilns were never tested and are not required to be tested due to the inherent challenges involved in testing these kilns and variations in wood.

GA EPD uses a VOC emission factor of 4.0 lbs/Mbf in kiln applications which is a more conservative factor than the 3.8 lbs/Mbf found in the BACT LAER clearinghouse. NCASI updated its recommended emission factors in 2007. Below are the current emission factors for a steam-heated southern yellow pine drying kiln.

VOC Emission Factor = 3.2 lbs VOC as carbon/1,000 bf (lbs VOC as carbon/Mbf)
Formaldehyde Emission Factor = 0.0149 lb formaldehyde/Mbf
Methanol Emission Factor = 0.236 lb methanol/Mbf

In Interim VOC Measurement Protocol for the Wood Products Industry – July 2007, U.S. EPA established calculation procedures and emission measurement methods to approximate VOC emissions for determining applicability with federal programs (particularly for NSR and Title V) and to establish consistency across state programs for the forest products industry. In general, VOC is to be calculated as Total Hydrocarbons (THC) expressed as propane plus methanol and formaldehyde expressed as compounds, minus adjustments (some methanol may be picked up by Method 25A). Although the majority of VOC from drying southern yellow pine are terpenes, when testing VOC emissions using EPA Reference Method 25A, propane is used to calibrate the instrument so VOC emissions as carbon should be converted to VOC emissions as propane; VOC as measured and calculated by this protocol is referred to as "WPP1 VOC" (Wood Products Protocol 1 VOC).

Molecular Weight of Propane ($C_3H_8$) / Molecular Weight of Carbon in Propane
= (12 * 3 + 1 * 8) / (12 * 3)
= 1.22

Total VOC Emission Factor
= (VOC as carbon * 1.22) + weight of methanol + weight of formaldehyde - Adjustment
= 3.2 * 1.22 + 0.236 + 0.0149 – (0.65 * 0.236)
= 4.00 lbs WPP1 VOC / Mbf

The Division agrees that the only technically feasible option is Proper Kiln Design and Operation. The Division will require that facility demonstrates proper kiln operation and maintenance practices; therefore, the BACT determination requires that the facility develop and implement a Work Practice and Preventive Maintenance Program for the continuous drying kiln (ID No. OSK4). This program must include a minimum list of items that are commonly applicable to other similar sources that also went through a VOC PSD BACT review. These items are included in Condition 3.2.6 of the proposed Title V permit amendment.

VOC does not have any National Ambient Air Quality Standards (NAAQS). VOC is a precursor of Ozone which has an 8-hr NAAQS. Georgia is located in a NOx limited area. The increase in VOC emissions from this proposed project is not expected to significantly affect ozone concentrations in the vicinity of this mill. Because of this and that the determined VOC BACT does not involve any add-on control, the Division has determined that the proposed permit need not include a short term VOC BACT limit for the continuous drying kiln (ID No. OSK4). In addition, periodic performance testing for demonstrating compliance with a short-term VOC emission limit would be cost prohibitive.

The facility also proposes to use the design throughput rate, 120 MMbf/yr for the continuous drying kiln (ID No. OSK4) as the long term BACT limit. This is included in Condition 3.2.5 of the proposed Title V permit amendment.

Conclusion – VOC Control

The BACT selection for the continuous drying kiln (ID No. OSK4) is summarized below in Table 4-2:

**Table 4-2: BACT Summary for the continuous drying kiln (ID No. OSK4)**

| Pollutant | Control Technology | Proposed BACT Limit | Compliance Determination Method |
|---|---|---|---|
| VOC | Proper Kiln Design and Operation | Work Practice and Preventative Maintenance Program | Recordkeeping of Maintenance Practices |

## 5.0 TESTING AND MONITORING REQUIREMENTS

Testing Requirements:

There are no applicable testing requirements being imposed due to the results of the BACT analysis.

Monitoring Requirements:

There are no applicable monitoring requirements being imposed due to the results of the BACT analysis.

CAM Applicability:

Because there is no control device for the continuous drying kiln (ID No. OSK4), CAM is not applicable and is not incorporated into the facility's permit.

## 6.0 AMBIENT AIR QUALITY REVIEW

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

The proposed project at Interfor U.S. Inc. – Thomaston Mill triggers PSD review for VOC. VOC does not have established PSD modeling significance levels (MSL) (an ambient concentration expressed in either $\mu g/m^3$ or ppm). Therefore, modeling is not required for VOC emissions. However, an ozone analysis is required since VOC emission increases are greater than 100 tpy. An additional analysis was conducted to demonstrate compliance with the Georgia air toxics program.

### Modeling Requirements

### Class I Area Analysis

Federal Class I areas are regions of special national or regional value from a natural, scenic, recreational, or historic perspective. Class I areas are afforded the highest degree of protection among the types of areas classified under the PSD regulations. U.S. EPA has established policies and procedures that generally restrict consideration of impacts of a PSD source on Class I Increments to facilities that are located near a federal Class I area.

Five Class I areas are within a 300 km range from the proposed facility: Okefenokee National Wildlife Refuge (NWR) in GA, Cohutta NWR in GA, Joyce Kilmer-Slickrock Wilderness in NC and TN, Great Smoky Mountains National Park in NC and TN, and Shining Rock Wilderness in NC. Among these, Cohutta NWR is the closest, located approximately 214 km north of the facility. There are no PSD increments or air quality related values for VOC for Class I areas. VOC are not visibility-affecting pollutants. Therefore, PSD Class I area modeling analysis and Air Quality Related Values (AQRV) impact analysis are not required.

## CLASS II AREA IMPACT ANALYSIS

VOC is the only criteria pollutant with emissions greater than the SER (40 tpy); therefore, neither Class II area significant impact analysis nor monitoring *De Minimis* concentration analysis are required. In addition, the potential soil and vegetation impacts and the Class II visibility analysis are not required.

## Ozone Impact Analysis

If the proposed project results in a net VOC or $NO_X$ emission increase greater than 100 tpy, the PSD rule requires an evaluation to determine whether pre-construction monitoring is warranted for ground level ozone. The proposed project will result in a net VOC emission increase of 240.8 tpy. The nearest ozone monitor to the facility is the Clean Air Status and Trends Network (CASTNET) site located in Williamson, Pike County, Georgia (AQS ID 13-231-9991), which is approximately 29 km northwest of the facility. Given this proximity and regional nature of background ozone, the CASTNET monitor provides a representative indication of ozone concentrations in the vicinity of facility. The applicant examined the 3-year rolling average ozone concentration at this monitor. The design value (i.e., 3-year average of 4$^{th}$ highest maximum daily 8-hour ozone concentrations during 2015-2017) is 67 ppb. This area is in attainment with the 2015 ozone National Ambient Air Quality Standard (NAAQS, 70 ppb).

As required by the 2017 revisions to EPA's *Guideline on Air Quality Models* (Appendix W), an analysis of the impact of the projected VOC and $NO_x$ emissions on secondary ozone formation was required following EPA's "*Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier l Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program*" (April 30, 2019) and GA EPD's *"Guidance on the Use of EPA's MERPs to Account for Secondary Formation of Ozone and $PM_{2.5}$ in Georgia*" (February 25, 2019, hereafter GA EPD MERPs Guidance). According to the GA EPD MERPs guidance, the most conservative (lowest) Class II area VOC and $NO_x$ MERP values for ozone in Georgia are 3,980 tpy and 156 tpy, respectively. According to Equation (2) in the GA EPD MERPs Guidance, the impact from ozone formation due to precursor emissions is estimated as following:

$$\frac{PEMIS\_NOx}{MERP\_NOx} + \frac{PEMIS\_VOC}{MERP\_VOC} = \frac{17.56}{156} + \frac{240.8}{3{,}980} = 0.11 + 0.06 = 0.17 < 1$$

where, *PEMIS_NOx* and *PEMIS_VOC* are the proposed emission increases for $NO_X$ and VOC, which are 17.56 tpy and 240.8 tpy, respectively. The total impact of 0.17 ppb is below the ozone SIL (1 ppb). Therefore, no further modeling analysis was required.

## 7.0 ADDITIONAL IMPACT ANALYSES

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

Soils and Vegetation

This analysis is required only for those pollutants for which PSD review is triggered. According to *A Screening Procedure for the Impacts of Air Pollution on Plants, Soils and Animals*, the relevant pollutants for soils and vegetation are $NO_2$, $SO_2$ and CO. The project triggers PSD review for VOC only and does not have a significant net emissions increase of $NO_2$, $SO_2$ or CO. Therefore, a soils and vegetation analysis is not required because no significant impacts are expected.

Growth

The purpose of a growth analysis is to predict how much new growth is likely to occur as a result of the project and the resulting air quality impacts from this growth. The growth analysis evaluates the impact associated with the project on the general commercial, residential, and industrial growth within the project vicinity.

PSD requires an assessment of the secondary impacts from applicable projects. Negligible growth during construction is expected and minimal long-term growth (i.e., general commercial, residential, industrial or other secondary growth in the area) is expected following the completion of the project because no additional employees will be required to operate the modified mill. Therefore, no analysis of secondary impacts from associated growth is warranted for this project.

Visibility

VOC emissions do not impact visibility. Therefore, the project will not impact Class I and Class II visibility for purposes of PSD review.

The PSD regulations require an evaluation of the impact of project emissions on visibility in Class II areas. The analysis is required only for those pollutants for which PSD review is triggered. The relevant pollutants for visibility are PM, NOx and $SO_2$. The project triggers PSD review for VOC only and does not have a significant net emissions increase of PM, NOx and $SO_2$. Therefore, a visibility analysis is not necessary because no significant impacts are expected.

# 8.0 GEORGIA TOXIC AIR POLLUTANT MODELING ANALYSIS

## Georgia Toxic Air Pollutant Modeling Analysis

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

### Selection of Toxic Air Pollutants for Modeling

For projects with quantifiable increases in TAP emissions, an air dispersion modeling analysis is generally performed to demonstrate that off-property impacts are less than the established Acceptable Ambient Concentration (AAC) values. The TAP evaluated are restricted to those that may increase due to the proposed project. Thus, the TAP analysis would generally be an assessment of off-property impacts due to facility-wide emissions of any TAP emitted by a facility. To conduct a facility-wide TAP impact evaluation for any pollutant that could conceivably be emitted by the facility is impractical. A literature review would suggest that at least one molecule of hundreds of organic and inorganic chemical compounds could be emitted from the various combustion units. This is understandable given the nature of VOC and TAP evaporated from the drying of lumber. The vast majority of compounds potentially emitted however are emitted in only trace amounts that are not reasonably quantifiable.

Per Section 8.0 and Appendix F of the PSD application, the facility uses the emission factors from *EPD Recommended Emission Factors for Lumber Kiln Permitting in Georgia* for direct fired lumber drying kilns. The Division agrees with the facility's use of the methanol, formaldehyde, and acetaldehyde emission factors. The toxic impact analysis is discussed in Section 8.0 and Appendix F of the PSD application.

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

## Determination of Toxic Air Pollutant Impact

The Georgia EPD *Guideline* recommends a tiered approach to model TAP impacts, beginning with screening analyses using SCREEN3, followed by refined modeling, if necessary, with ISCST3 or ISCLT3. For the refined modeling completed, the infrastructure setup for the SIA analyses was relied upon with appropriate sources added for the TAP modeling. Note that per the Georgia EPD's *Guideline*, downwash was not considered in the TAP assessment.

**Initial Screening Analysis Technique**

Generally, an initial screening analysis is performed in which the total TAP emission rate is modeled from the stack with the lowest effective release height to obtain the maximum ground level concentration (MGLC). Note the MGLC could occur within the facility boundary for this evaluation method. The individual MGLC is obtained and compared to the smallest AAC. Due to the likelihood that this screening would result in the need for further analysis for most TAP, the analyses were initiated with the secondary screening technique.

The impacts of facility-wide TAP emissions were evaluated to demonstrate compliance according to the Georgia Air Toxics Guideline. The following three TAPs were included in the analysis: acetaldehyde, formaldehyde, and methanol. The annual and 15-minute AACs of the three TAPs were reviewed based on U.S. EPA IRIS reference concentration (RfC), OSHA Permissible Exposure (PEL), ACGIH Threshold Limit Values (TLV) including STEL (short term exposure limit) or ceiling limit, and NIOSH Recommended Standards (REL) according to the Georgia Air Toxics Guideline. The modeled MGLCs were calculated using the ISCST3 dispersion model (v02035) for 1-hour and annual averaging periods.

Table 1 summarizes the AAC levels and MGLCs of the three TAPs. The maximum 15-min impact is based on the maximum 1-hour modeled impact multiplied by a factor of 1.32. As shown in Table 1, the modeled MGLCs for all three TAPs are below their respective AAC levels.

**Table 1. Modeled MGLCs and the Respective AACs**

| Pollutant | CAS | Averaging period | MGLC ($\mu g/m^3$) | AAC ($\mu g/m^3$) | Averaging period | MGLC ($\mu g/m^3$) | AAC ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|
| Acetaldehyde | 75070 | Annual | 0.93 | 4.55 | 15-min | 143 | 4,500 |
| Formaldehyde | 50000 | Annual | 0.9 | 1.1 | 15-min | 124 | 245 |
| Methanol | 67561 | Annual | 7 | 20,000 | 15-min | 924 | 32,800 |

## Conclusions

The project's air quality analysis reviewed and described in all sections above show conformance with the Class I and Class II PSD NAAQS. Class I AQRV and Class II area visibility analyses were not required. The proposed project will not cause or contribute to an exceedance of any NAAQS. The air toxics analysis shows conformance with GA EPD's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*. The additional impacts analysis indicates that air quality impact on soil and vegetation is expected to be insignificant.

For these reasons, it is recommended that a permit be issued based on the project design and operating hours described in the application.

## 9.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 2421-293-0007-V-04-1.

Section 1.0: Facility Description

Interfor U.S. Inc. – Thomaston Mill submitted a Title V permit amendment application dated July 12, 2019, which was logged in as Application No. TV-292241, The proposed modifications include construction and operation of one continuous drying kiln (ID No. OSK4), one fuel silo with cyclone, one debarker, one bark hog, two green wood chippers, one chip bin with cyclone, one sawdust cyclone to pneumatically convey sawdust to the boiler area at the mill, one planer mill with associated planer mill shavings cyclone, one shavings cyclone to pneumatically convey sawdust to the boiler area at the mill, one diesel fire pump engine, an upgrade of equipment in the pine sawmill as well as the permanent shut down of one debarker, two green wood chippers, one chip bin cyclone, one planer mill, three planer mill cyclones and one shavings collection cyclone.

Section 2.0: Requirements Pertaining to the Entire Facility

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

Section 3.0: Requirements for Emission Units

| Emission Units | | Applicable Requirements/Standards | Air Pollution Control Devices | |
|---|---|---|---|---|
| ID No. | Description | | ID No. | Description |
| OB01 | Wood Waste Boiler 1,<br>26.8 MMBtu/hr<br>Installed in 1985 | 40 CFR 63 Subpart A<br>40 CFR 63 Subpart DDDDD<br>391-3-1-.02(2)(d)<br>391-3-1-.02(2)(g) | OC10-P | Primary Multiclone |
| | | | OC10-S | Secondary Multiclone |
| OB02 | Wood Waste Boiler 2,<br>28.7 MMBtu/hr<br>Installed in 1996 | 40 CFR 60 Subpart A<br>40 CFR 60 Subpart Dc<br>40 CFR 63 Subpart A<br>40 CFR 63 Subpart DDDDD<br>391-3-1-.02(2)(d)<br>391-3-1-.02(2)(g) | OC09-P | Primary Multiclone,<br>(Serial No. 12K-16T) |
| | | | OC09-S | Secondary Multiclone,<br>(Serial No. 9K-44T) |
| | | | OEP1 | Electrostatic Precipitator<br>(Model # 8H-12(2)-2S) |
| OSK1 | Dual Path Kiln No. 1<br>Steam Heated<br>Modified in 2014 | 40 CFR 63 Subpart A<br>40 CFR 63 Subpart DDDD<br>391-3-1-.02(2)(b)1.<br>391-3-1-.02(2)(e)1. | N/A | None |
| OSK3 | Dual Path Kiln No. 3<br>Steam Heated<br>Installed in 2014 | 40 CFR 63 Subpart A<br>40 CFR 63 Subpart DDDD<br>391-3-1-.02(2)(b)1.<br>391-3-1-.02(2)(e)1. | N/A | None |
| OSK4** | Drying Kiln No. 4<br>Direct Fired<br>40 mmBTU/hr burner | 40 CFR 63 Subpart A<br>40 CFR 63 Subpart DDDD<br>391-3-1-.02(2)(b)1.<br>391-3-1-.02(2)(e)1.<br>391-3-1-.02(2)(g)2.<br>40 CFR 52.21 | N/A | None |
| PLM1*** | Planer Mill | 391-3-1-.02(2)(b)1.<br>391-3-1-.02(2)(e)1. | N/A | None |
| OPSM | Pine Sawmill<br>Installed in 1985<br>Upgraded in 2019 | 391-3-1-.02(2)(b)1.<br>391-3-1-.02(2)(e)1. | N/A | None |
| OPTM | Pallet Mill<br>Installed in 1994 | 391-3-1-.02(2)(b)1.<br>391-3-1-.02(2)(e)1. | OC01<br>OC02 | Cyclone<br>Cyclone |

* Generally applicable requirements contained in this permit may also apply to emission units listed above. The lists of applicable requirements/standards and corresponding permit conditions are intended as a compliance tool and may not be definitive.
** New equipment proposed with this application.
*** New equipment proposed with this application to replace existing equipment.

New Condition 3.2.3 includes the requirements of 40 CFR 52.21(r)(1). The facility is required to construct and operate the continuous drying kiln (ID No. OSK4) in accordance with Application No. TV-292241.

New Condition 3.2.4 includes the requirements of 40 CFR 52.21(r)(2). This condition specifies when the facility must commence construction of the continuous drying kiln (ID No. OSK4).

New Condition 3.2.5 contains the throughput limit, 120 MMbf/yr, for the continuous drying kiln (ID No. OSK4), which is the basis for the emissions estimates.

New Condition 3.2.6 includes the Work Practice and Preventive Maintenance Program requirements to ensure that the facility actually employs proper kiln operation and maintenance practices, which is the determined VOC BACT for the continuous drying kiln (ID No. OSK4). Note that the condition contains specific operating and maintenance requirements tailored for the new kiln.

Existing Conditions 3.4.1, and 3.4.3 have been modified to include of the continuous drying kiln (ID No. OSK4).

Section 4.0: Requirements for Testing

No conditions in Section 4.0 are being added, deleted or modified as part of this permit action.

Section 5.0: Requirements for Monitoring

No conditions in Section 5.0 are being added, deleted or modified as part of this permit action.

Section 6.0: Other Recordkeeping and Reporting Requirements

Existing Condition 6.1.7 has been modified to include the following new exceedances and excursion:

- New Subparagraph b.ii. defines an exceedance as any twelve consecutive month period for which the total amount of lumber dried in the continuous drying kiln (ID No. OSK4), combined, exceeds 120 million board feet. This would be a PSD violation.

- New Subparagraph c.ix. defines an excursion as any incidence that the work practice standards & preventative maintenance plan is not followed. This would be a violation of Condition 3.2.6.

New Condition 6.2.23 requires that the facility notify the Division when the continuous drying kiln (ID No. OSK4) initially starts up.

New Condition 6.2.24 requires that the facility calculate and record the monthly amount of dried lumber processed through the continuous drying kiln (ID No. OSK4), for each month in the reporting period. If any monthly record exceed 10 MMbf, the facility must notify the Division in writing within 15 days of the following month, and month and include an explanation of how the Permittee intends to maintain compliance with the production limit in Condition 3.2.5.

New Condition 6.2.25 requires that the facility calculate and record the combined 12-month rolling total of dried lumber processed through the continuous drying kiln (ID No. OSK4), ending in each month in the reporting period.

Section 7.0: Other Specific Requirements

No conditions in Section 7.0 are being added, deleted or modified as part of this permit action

# APPENDIX A

## EPD'S PSD Dispersion Modeling and Air Toxics Assessment Review