Prevention of Significant Air Quality Deterioration Review

Preliminary Determination

May 3, 2016

Facility Name: Jordan Forest Products
City: Barnesville
County: Lamar
AIRS Number: 04-13-171-00005
Application Number: TV-40991
Date Application Received: April 7, 2016

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 Jordan Forest Products requesting to increase production through all lumber kilns to 225 million board feet per year (MMbf/yr). The proposed project will include the annual throughput caps for the existing kilns (ID Nos. 500A, 500B, and 500C) as well as new Kiln 500D.

The proposed project will result in an increase in emissions from the facility. The sources of these increases in emissions include the new kiln (ID No. 500D) and existing lumber processes (debarking, handling, sawing, and planning) due to increased throughput.

The modification of Jordan Forest Products due to this project will result in an emissions increase in nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), sulfur dioxide (SO_2), particulate matter ($PM/PM_{10}/PM_{2.5}$), single hazardous air pollutant (HAP, methanol), combined HAPs, 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 increase was above the "significance" level. The VOC emissions increase was above the PSD significant level threshold.

Jordan Forest Products is located in Lamar 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 Jordan Forest Products 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 standard or allowable PSD increment in the area. It has further been determined that the proposal will not cause impairment of visibility or detrimental effects on soils or vegetation. Any air quality impacts produced by project-related growth should be inconsequential.

This Preliminary Determination concludes that an Air Quality Permit should be issued to Jordan Forest Products for the modifications necessary to add the continuous lumber drying kiln (ID No. 500D). 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 April 7, 2016, Jordan Forest Products (hereafter "facility") submitted an application for an air quality permit to increase production through all lumber kilns to 225 MMbf/yr. The facility is located at 752 Grove Street in Barnesville, Lamar County.

Prior to beginning construction on the continuous kiln, Jordan operated three batch lumber drying kilns (ID Nos. 500A, 500B, and 500C). 500A and 500B were limited to 130 MMbf/yr combined, while 500C was limited to 70 MMbf/yr. This effectively made the facility-wide lumber drying limit 200 MMbf/yr. In order to avoid a PSD review for the construction of the continuous kiln (ID No. 500D), the facility accepted a PSD avoidance limit of 90 MMbf/yr for Kiln 500D and a PSD avoidance limit of 42 MMbf/yr for Kilns 500A, 500B, and 500C, combined.

The facility now wishes to increase the permitted lumber drying limits for its kilns to a facility-wide total of 225 MMbf/yr. Since the facility is requesting relaxation of PSD avoidance limits that were placed on the kilns in the permit to construct Kiln 500D, this application will address the PSD requirements that would have been triggered without the PSD avoidance limits. That is, the application and emission calculations will be done as if Kiln 500D was a new unit and the PSD avoidance limits on the kilns had not been put into place.

Table 1.1 summarizes the Title V major source status for the facility. Note that both before and after the proposed modification in Application No. TV-40991, the facility is major for VOC and single/combined HAP under Title V of 1990 CAAA and is major for VOC under PSD regulations.

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 HAPs	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
2421-171-0005-V-04-0	March 28, 2013	Title V renewal permit.
2421-171-0005-V-04-1	March 4, 2016	Title V permit amendment for adding Continuous Lumber Drying Kiln 500D and avoiding a PSD review by taking some PSD avoidance caps.

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	2014 – 2015	8.38	25	No
PM_{10}	2014 – 2015	9.18	15	No
$PM_{2.5}$	2014 – 2015	4.88	10	No
VOC	2014 – 2015	**198**	40	**Yes**
NO_X	2014 – 2015	17.2	40	No
CO	2014 – 2015	14.4	100	No
SO_2	2014 – 2015	0.103	40	No
TRS	2014 – 2015	0	10	No
Pb	2014 – 2015	0	0.6	No
Fluorides	2014 – 2015	0	3	No
H_2S	2014 – 2015	0	10	No
SAM	2014 – 2015	0	7	No
Total GHG	2014 – 2015	20,500	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 facility has used a baseline date of January 2014 through December 2015. The net increases were calculated by subtracting the past actual emissions (based upon the annual average emissions from 2014 through 2015) from the future projected actual emissions of the new lumber drying kiln (ID No. 500D) and associated emission increases from non-modified equipment.

The continuous kiln (ID No. 500D) is considered a new unit for PSD purposes. The emissions from Kiln 500D are based on its design capacity of 95 MMbf/yr. Note that the increased lumber drying capacity by adding new Kiln 500D will also increase the amount of lumber processed by the existing lumber processes (debarking, handling, sawing, and planning). Although most of the emissions from these processes are fugitive emissions (which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening), the Georgia EPD PSD Permit Application Guidance Document (Section 2.2.2 on p. 2-3) requires that the fugitive emissions be included in determining whether a physical change in a major stationary source would trigger the classification of "major modification" as defined in Georgia Rule 391-3-1-.02(7)2. Per 76 FR 17548 dated March 30, 2011, U.S. EPA issued an indefinite stay of the Fugitive Emissions Rule until U.S. EPA completes its reconsideration of the Fugitive Emissions Rule; therefore, the provisions of 40 CFR 52.21(b)(2)(v) have been indefinitely stayed.

If the facility keeps (retroactively resumes) the annual lumber drying caps specified in existing Conditions 3.2.1 and 3.2.2 of Title V Permit No. 2421-171-0005-V-04-0, and does not apply any lumber drying throughput on new Kiln 500D, the PM_{10} emission increase by new Kiln 500D and associated PM_{10} emission increase from the existing lumber processes, combined, would exceed the PSD significant

emission rate, 15 tpy, and would trigger a PSD review for PM_{10}. In order to avoid such PM_{10} PSD review, the facility proposed to cap the combined lumber drying capacity for all four kilns (ID Nos. 500A through 500D) at 225 MMbf/yr. However, at this throughput rate, the addition of Kiln 500D would still trigger a VOC PSD review.

Table 1-4 details this emissions summary. The facility included detailed emission calculations in Section 4 of Application No. TV-40991. . These calculations have been reviewed and approved by the Division. The emissions calculations for Tables 1-3 and 1-4 are reproduced by the Division using the same methodology and are included in Appendix D. Note that some of the emission rates differ slightly from those included in the application.

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

Pollutant	Increase from All Kilns with The New Cap		Associated Units Increase (tpy)	Total Increase (tpy)
	Past Actual	Future Actual		
PM	8.82	15.75	1.45*	8.38
PM_{10}	6.55	11.70	4.03	9.18
$PM_{2.5}$	6.24	11.14	(0.0156)	4.88
VOC	252	450	0	198
NO_X	38.6	55.8	0	17.2
CO	32.5	46.9	0	14.4
SO_2	0.232	0.335	0	0.103
TRS	0	0	0	0
Pb	0	0	0	0
Fluorides	0	0	0	0
H_2S	0	0	0	0
SAM	0	0	0	0
Total GHG	46,100	66,600	0	20,500

* PM emission increase from associated units are less than PM_{10} emission increases primarily because paving all the unpaved road at the facility will reduce much more PM emissions than PM_{10} emissions.

Based on the information presented in Tables 1-3 and 1-4 above, the facility's proposed modification, as specified per Georgia Air Quality Application No. TV-40991, is classified as a major modification under PSD because the potential emission increase of VOC (198 tpy) exceeds the corresponding PSD significant emission rate (40 tpy).

Through its new source review procedure, EPD has evaluated the facility's proposal for compliance with State and Federal requirements. The findings of EPD have been assembled in this Preliminary Determination.

The proposed modification will add 9.18 tpy PM_{10} and will not trigger a PM_{10} PSD review (<15 tpy $PM_{2.5}$) based on the following:

- PM_{10} PTE from all of the kilns (ID Nos. 500A through 500D), calculated with a GA EPD accepted emission factor from Application No. TV-21615 for West Frasier based on stack test data, and with the proposed combined annual lumber drying throughput cap of 225 MMbf/yr, is 11.7 tpy.

- PM_{10} PTE from the existing lumber processes (debarking, handling, sawing, and planning), using emission factors found in U.S. EPA AP-42 Chapters 10.3, 13.2.1, 13.2.2 and 13.2.4 and historic engineering estimation, is 4.03 tpy.

Without the proposed 225 MMbf/yr annual lumber drying throughput cap, the proposed modification will result in a PM_{10} emission increase above 10 tpy. In order to avoid triggering a PM_{10} PSD review, the facility proposed the cap; the Division agrees and approves the proposal. The throughput cap is included in modified Condition 3.2.2 of the proposed Title V Permit Amendment/PSD Permit No. 2421-171-0005-V-04-2. The facility will be required to record monthly throughput rate through all four kilns and demonstrate compliance with the PM_{10} PSD avoidance limit.

2.0 PROCESS DESCRIPTION

According to Application No. TV-40991, the facility has proposed to construct and operate a new direct natural gas-fired continuous kiln (ID No. 500D). This expedited PSD application was submitted after the issuance of Title V Permit Amendment No. 2421-171-0005-V-04-1, which authorize the addition of new Kiln 500D with a VOC PSD avoidance limit, and before the completion of the construction of Kiln 500D. In this application, the facility requested to be able to process more than the combined lumber drying throughput cap on all four kilns (ID Nos. 500A through 500D) of 132 MMbf/yr (42 MMbf/yr on existing Kilns 500A through 500C and 90 MMbf/yr on new Kiln 500D). In other words, the facility requested to relax the VOC PSD avoidance limits specified in Conditions 3.2.2 and 3.2.3 of Title V Permit Amendment No. 2421-171-0005-V-04-1. Since this request would trigger a PSD review for VOC, it is treated as an retro-active PSD review; all the requirements included in the proposed Title V Permit Amendment (also a PSD Permit) will replace all the PSD (avoidance) related requirements of the V-04-1 amendment.

The continuous lumber drying kiln (ID No. 500D, permitted in March 2016) will be treated as a new emission unit for PSD purposes. Kiln 500D is not equipped with any air pollution control devices nor any continuous emission/opacity monitoring system (CEMS/COMS).

The facility's permit application and supporting documentation are included in Appendix A of this Preliminary Determination and can be found online at www.georgiaair.org/airpermit.

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 new lumber drying kiln (ID No. 500D) is subject to Georgia Rules for Air Quality Control 391-3-1-.02(2)(b), "Visible Emissions." Georgia Rule 391-3-1-.02(2)(b)1. limits the opacity of the emissions from 500D to forty (40) percent. Since the direct-fired unit fires exclusively on natural gas, compliance with the Rule (b) visible emission limit is expected.

500D is also subject to Georgia Rules for Air Quality Control 391-3-1-.02(2)(e), "Particulate Emission from Manufacturing Processes." Since 500D is installed after July 2, 1968, the allowable PM emission rate from 500D 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)
Lumber Dry Kiln 500D	10,850	21.7	$P = 4.1 * 21.7^{0.67} = 32.2$

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

10,850 bf/hr
= (10,850 bf/hr) * (1 ft^3/12bf) * (48 lbs/ft^3) * (1 ton/2,000 lbs)
= 21.7 tph

PM Emission Rate of 500D
= (0.14 lb PM/1,000bf) * (10,850 bf/hr)
= 1.52 lbs PM/hr < 32.2 lbs PM/hr

Since 500D 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 500D is always expected because it fires on natural gas only, and natural gas 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 (NSPS)

The new lumber drying kiln (ID No. 500d) is not subject to any NSPS.

National Emissions Standards For Hazardous Air Pollutants (NESHAP)

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-40991, the Division has determined that the facility has met the initial notification requirements. Therefore, new Kiln 500D 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 new lumber drying kiln (ID No. 500D) associated with the proposed project would most likely results from a malfunction of the associated control equipment. The facility cannot anticipate or predict malfunctions. However, the facility is required to minimize emissions during periods of startup, shutdown, and malfunction.

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 new lumber drying kiln (ID No. 500d), 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.

Lumber Drying Kiln 500D – Background

The new lumber drying kiln (ID No. 500D) is a direct-fired continuous kiln that fires exclusively on natural gas. It has a lumber drying capacity of 95 MMbf/yr, and its burner capacity is 40 MMBtu/hr. The primary purpose of Kiln 500D 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.

Lumber Drying Kiln 500D – VOC Emissions

Applicant's Proposal

Both combustion of natural gas 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 natural gas 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: Carbon Absorption
Option 2: Condensation
Option 3: Biofiltration
Option 4: Thermal Oxidation
Option 5: Wet Scrubbing
Option 6: Proper Kln Operation and Maintenance Practices

Option 1: Carbon Absorption

Carbon adsorption systems use an activated carbon bed to trap VOC. As the exhaust gas stream passes through the activated carbon bed, VOC molecules are attracted to the surface of the activated carbon. The clean exhaust gas is then discharged to the atmosphere. When the activated carbon is spent and can no longer effectively adsorb VOC, the carbon 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 carbon may be returned to the supplier for reactivation.

Option 2: Condensation

Condensation systems work by 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.

Option 3: Biofiltration

Biofiltration involves 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 4:

Thermal oxidation is a process by which combustion converts the VOCs in an exhaust gas stream to water and carbon dioxide. Regenerative thermal oxidizers (RTOs) are the most widely used design. RTOs have a ceramic material in a packed bed which is used to preheat the incoming gas. The preheated gas enters te combustion chamber where it is further heated by natural gas combustion. The combustion chamber is maintained at a temperature of around 1,400 to 1,500ºF for VOC oxidation.

A regenerative catalytic oxidizer (RCO) operates in the same manner as an RTO, except that it uses a catalyst material in the packed bed instead of a ceramic material. The use of a catalyst allows for oxidation of VOC at a lower temperature of around 800ºF.

Option 5: Wet Scrubbing

Wet scrubbing systems are used to absorb pollutants in the exhaust gas stream into a liquid by passing the stream through a countercurrent flow of a scrubbing liquid. Pollutants are impacted by the liquid droplets and dissolve in the liquid.

Option 6: Proper Kiln Operation and Maintenance Practices

Heating of the lumber inside the kiln causes VOC to be drawn out of the wood and emitted to the atmosphere. Ensuring proper operation of the kiln and performing routine maintenance on the kiln minimizes VOC emissions. Lumber is dried to the target moisture content that will ensure the quality of the lumber. Over-drying of the lumber causes additional VOCs to be drawn from the wood. Proper operating practices can prevent over-drying, therefore minimizing emissions of VOC. Proper kiln operation and maintenance is a technically feasible option.

Step 2: Eliminate technically infeasible options

Option 1: Carbon Adsorption

The kiln exhaust gas stream has a high relative humidity. Carbon adsorption beds are most effective on streams with a low relative humidity. The water present in the exhaust gas stream would compete with VOC for adsorption onto the activated carbon. In some cases, it has been found that steam in the exhaust gases may cause desorption of previously adsorbed VOC. For these reasons, carbon adsorption is deemed to be technically infeasible for Kiln 500D.

Option 2: Condensation

The primary compounds in VOC from lumber drying kilns are terpenes. In order to cause condensation of the terpenes, the gas stream would have to be cooled to below 32ºF. As previously mentioned, the exhaust gas stream from kilns has a high moisture content. Cooling the gas stream to below the freezing point of water would cause ice to form on the condenser, which would render the unit ineffective. For this reason, condensation is deemed to be technically infeasible for Kiln 500D.

Option 3: Biofiltration

Most microbes need a temperature range between 60 to 105ºF to survive. The exhaust from lumber drying kilns is typically around 215ºF. Introducing gas streams of this temperature into a biofilter would likely kill the microbes inhabiting the bed media. As previously mentioned, the primary compounds in VOC from lumber drying kilns are terpenes, and most terpenes are not highly soluble in water. Compounds that are not easily soluble in water are not suitable for removal by biofiltration since the compound must be absorbed by moisture in the bed media to come into contact with the microbes. For these reasons, biofiltration is deemed to be technically infeasible for Kiln 500D.

Option 4: Thermal Oxidation

As previously mentioned, the exhaust gas stream from a kiln has a temperature of around 215ºF 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. An RCO would be an ineffective option for the same reasons as an RTO. Particulates in the exhaust gas are an even bigger problem for an RCO. The catalytic material becomes coated with PM, and the coated sections are unable to act as a catalyst in the oxidation of VOCs entering the unit. For these reasons, thermal oxidation by an RTO or an RCO is deemed to be technically infeasible for Kiln 500D

Option 5: Wet Scrubbing

In order for a wet scrubbing system to work, the pollutant being removed must be soluble in the scrubbing liquid. Terpenes, the primary constituent in VOC from lumber drying kilns, are not very soluble in water. For this reason, wet scrubbing is deemed to be technically infeasible for Kiln 500D

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

Table 4-1: Ranking of CO Control Technology for Heaters F001 and F002

Control Technology Ranking	Control Technology	Control Efficiency
Option 6	Proper Kiln Operation and Maintenance Practices	Variable due to design

Step 4: Evaluating the Most Effective Controls and Documentation

Since the only technically feasible BACT option is proper kiln operation and maintenance practices, further evaluation of controls is not necessary.

Step 5: Selection of BACT

The selected CO BACT for Kiln 500D is proper kiln operation and maintenance practices. No adverse energy, environmental, or economic impacts are associated with the selected VOC BACT. The facility proposes to use the NCASI VOC emission factor as the BACT limit.

EPD Review – VOC Control

The Division agrees with the facility that carbon adsorption and condensation are technically infeasible because of the high moisture content of the exhaust gas stream. The Division also agrees that biofiltration is technically infeasible because of the relatively high temperature of the exhaust and low solubility of terpenes. The Division would agree that wet scrubbing is also technically infeasible because of low

solubility of terpenes. Thermal oxidation is also technically infeasible because of high moisture content and relatively low temperature of the exhaust stream and PM fouling.

The Division agrees that the only technically feasible option is proper kiln operation and maintenance practices. However, the Division does not agree to use the NCASI VOC emission factors as the VOC BACT limit. When a short term emission limit is set as an BACT limit, facilities must demonstrate compliance with the BACT emission limit through repeated performance testing and monitoring. Repeated performance testing would require the facility to enclose the entire kiln and test for VOC on a frequent basis. The Division does not see the need to cause facilities to conduct such costly performance testing on a frequent basis for an emission factor that is widely used by the many lumber facilities. Instead, the Division would require that facility demonstrate that they actually employ proper kiln operation and maintenance practices; therefore, the BACT determination would require that the facility develop and implement a Work Practice and Preventive Maintenance Program for Kiln 500D. Such program must include a minimum list of items that commonly applicable to other similar sources that also went through a VOC PSD review. These are included in Condition 3.2.3 of the proposed Title V permit amendment.

Conclusion – VOC Control
The VOC BACT selection for the Kiln 500D is summarized below in Table 4-1:

Table 4-1: VOC BACT Summary for the Kiln 500D

Pollutant	Control Technology	Proposed BACT Limit	Averaging Time	Compliance Determination Method
VOC	Proper Kiln Operation and Maintenance Practices	Work Practice and Preventive Maintenance Program	N/A	N/A

5.0 TESTING AND MONITORING REQUIREMENTS

Testing Requirements:

There are no applicable testing requirements being imposed.

Monitoring Requirements:

There are no applicable monitor requirements being imposed. Note that there are some inspection/monitoring requirements specified in the Work Practice and Preventive Maintenance Program required by Condition 3.2.3.

CAM Applicability:

Because there is no control for the new lumber drying kiln (ID No. 500D), CAM is not applicable and is not being triggered by the proposed modification. Therefore, no CAM provisions are being 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 Jordan Forest Products triggers PSD review for VOC. VOC does not have established PSD modeling significance levels (MSL) (an ambient concentration expressed in either µg/m3 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. Historically, a distance of 100 km has been used to define "near", but more recently, a distance of 200 kilometers has been used for all facilities that do not combust coal.

The one Class I areas within approximately 200 kilometers of Jordan Forest Products are the Cohutta Wilderness Area, located approximately 185 kilometers north of the facility. The U.S. Fish and Wildlife Service (FWS) is the designated Federal Land Manager (FLM) responsible for oversight of all three of these Class I areas.

Since no significant air quality concentration has been established for the ozone impact analysis, PSD permit applicants with a proposed net emission increase of 100 tpy or more of VOC or NO_x are required to conduct an ambient air impact analysis that includes pre-application monitoring data to determine the current state of the ambient air conditions for this pollutant.

The facility with the proposed modification is expected to emit 450 tpy VOC (Table 4.2 in the application dated April 2016). GA EPD examined the 3-year rolling average ozone concentration at the CASTNET (Clean Air Status and Trends Network) site (site ID 132319991), Pike County, which is the closest site to the facility. The latest three-year design value (2012-2014) average of 4th high annual values is 69 ppb. This area is in attainment with the 2008 8-hour ozone standard (75 ppb) and the new 2015 8-hour ozone standard (70 ppb).

7.0 ADDITIONAL IMPACT ANALYSES

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

Soils and Vegetation

The pollutants of concern for adverse impacts on soils and vegetation are SO_2, nitrogen dioxide (NO_2), CO, and ozone. The facility conducts an analysis for VOC, a precursor of ozone, since it is the only pollutant that undergoes a PSD review. The facility states that the increases in VOC are not expected to lead to an increase in ambient ozone concentration and therefore, expects no adverse effects on soil and vegetation as a result of this modification. The Division agrees that the additional air quality impact on soil and vegetation is expected to be very minimal.

Growth

The growth analysis is conducted to estimate increased emissions due to residential, commercial, and industrial growth that will occur as a result of the modification. The facility states that additional employees may be hired in the future in order to achieve increases in production, but they believe that any new employees are already part of the existing labor force in the surrounding area. Therefore, no significant residential, commercial, and industrial growth is anticipated as a result of this modification. The Division agrees with the facility and determines that the proposed modification would not cause a quantifiable impact on the air quality of the area surrounding the facility.

Visibility

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

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

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 4.1.1 of the PSD application, the facility uses the NCASI emission factors for steam heated kilns. Note that TAP can be formed as byproducts of combustion of fuel other than natural gas. The facility claims that TAP emission factors for wood combustion direct-fired kilns are not likely to be representative of the natural gas-fired kiln (ID No. 500D). The Division agrees with the facility to use the NCASI methanol, formaldehyde, and acetaldehyde emission factors for steam-heated kilns. The toxic impact analysis is discussed in Section 7 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. Jordan Forest Products 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 proposed facility will emit three TAPs: Acetaldehyde, Formaldehyde, and Methanol. The annual, 24-hour, 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 AERMOD dispersion model (version 15181) for 1-hour, 24-hour, and annual averaging periods.

Table I summarizes the AAC levels and MGLCs of the TAPs. The maximum 15-min impact is based on the maximum 1-hour modeled impact multiplied by a factor of 1.32. The modeled MGLCs for all TAPs are below their respective AAC levels except for the MGLC of Formaldehyde at the annual averaging period. According to Georgia Air Toxics Guideline, a site specific risk assessment is required to be conducted by the applicant if the modeled MGLC of any TAP is greater than the AAC level. Figure 1 shows that the Company is located in an industrial area of Barnesville, GA. As seen in Figure 1, Figure 2, and Table II, the modeled maximum annual concentration for Formaldehyde did not exceed the corresponding AAC at any residential areas. Therefore, the applicant passes the site specific risk assessment and meets the applicable Georgia Air Toxics Guideline.

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Table I. Modeled MGLCs and the Respective AACs

Pollutant	CAS	Averaging period	MGLC (µg/m^3)	AAC (µg/m^3)	Averaging period	MGLC (µg/m^3)	AAC (µg/m^3)
Acetaldehyde	75070	Annual	0.51	4.55	15-min	14.91	4500
Formaldehyde	50000	Annual	1.45	1.1	15-min	41.90	245
Methanol	67561	24-hr	98.14	619	15-min	651.57	32800

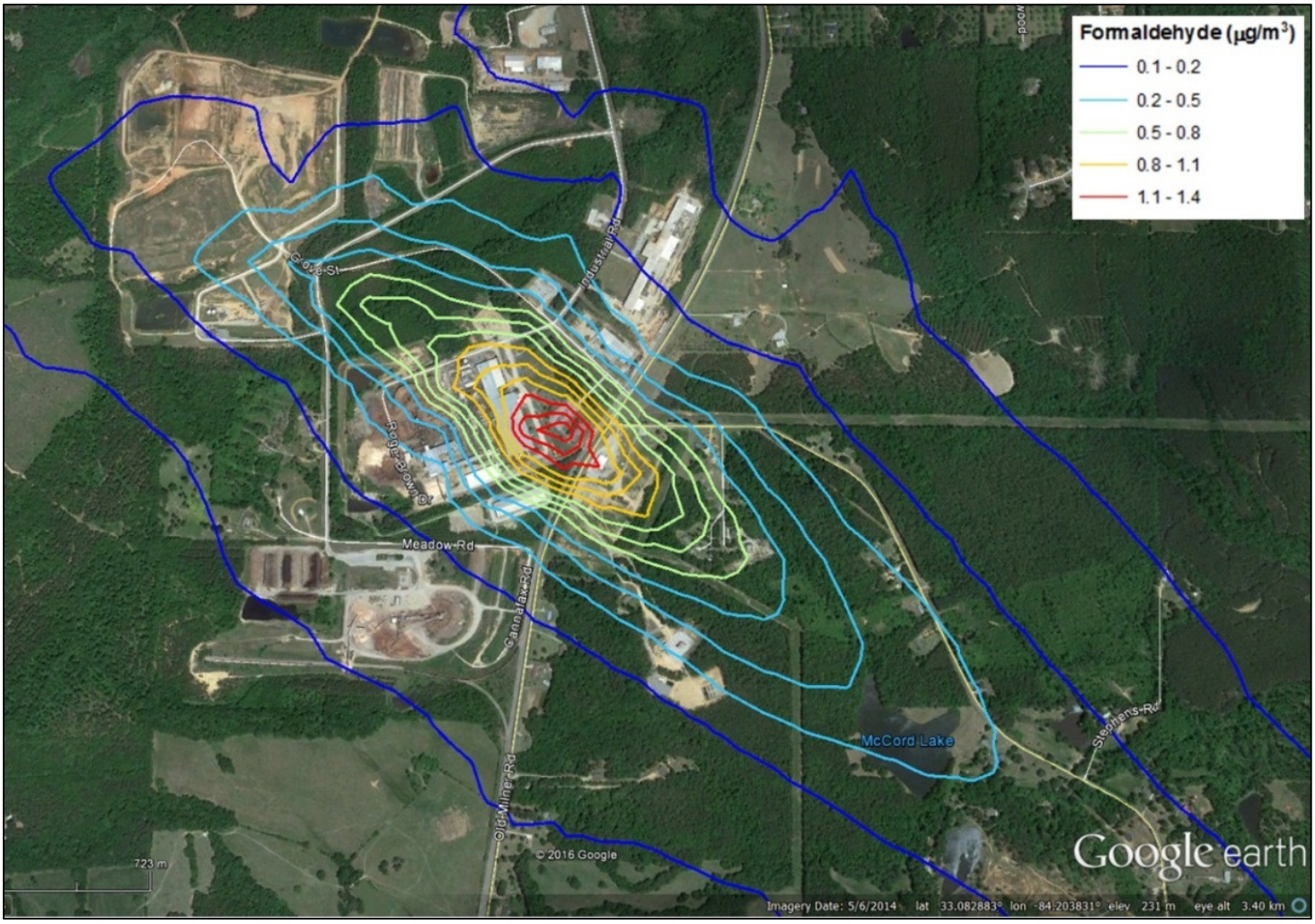

Figure 1. Google Earth Map for Jordan Forest Products, LLC. Contours show the concentration of the annual averaged Formaldehyde concentration for 2007 when the MGLC of 1.45 µg/m^3 was recorded.

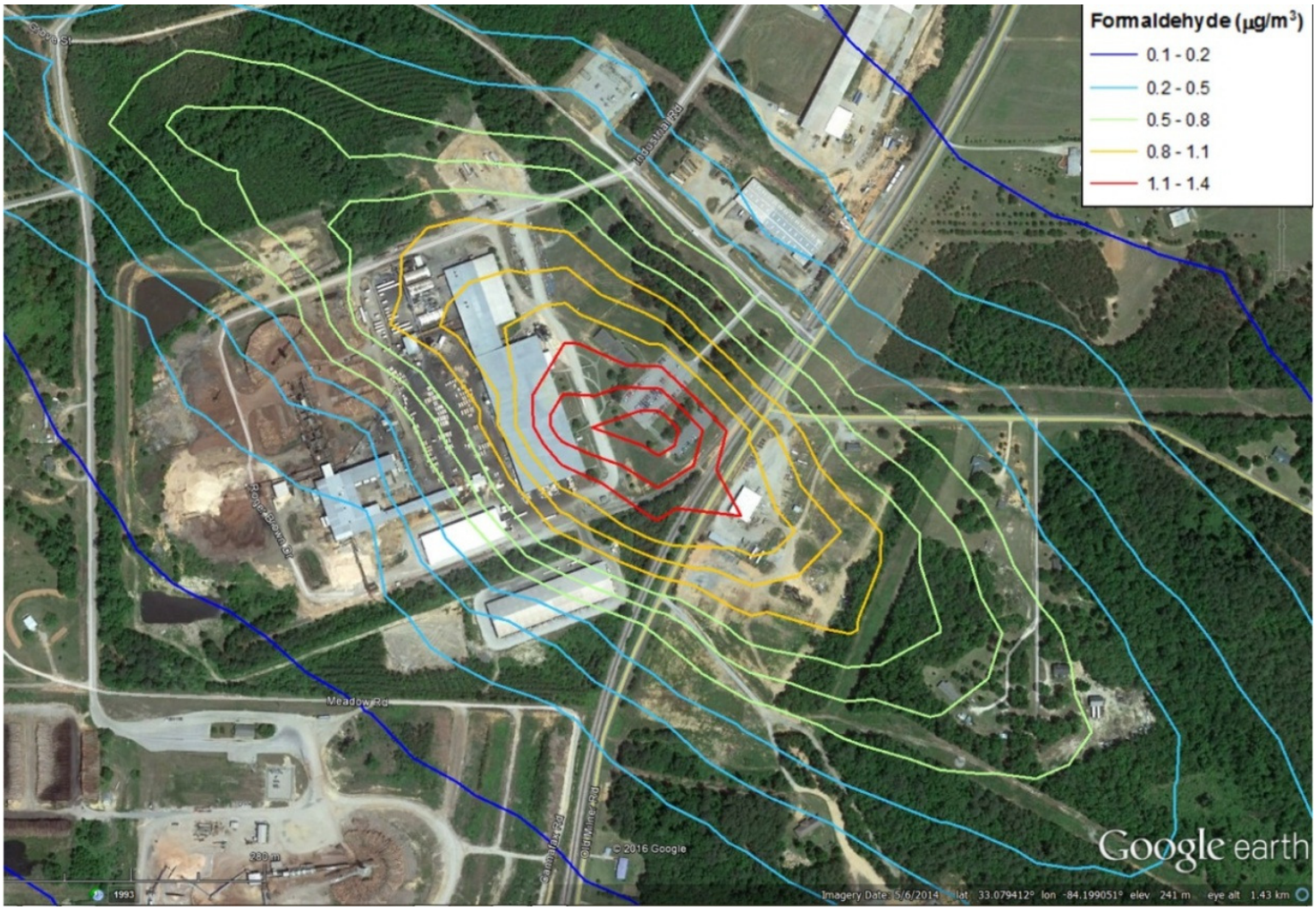

Figure 2. The same as Figure 1 except for a smaller area centered at the facility.

Table II. Modeled Annual MGLCs for Formaldehyde at Nearby Residences

Residential Areas	Receptor UTM Zone:16		Averaging period	MGLC (µg/m³)	AAC (µg/m³)
	(meter East)	(meter North)			
R1	761777	3663340	Annual	0.76	1.1
R2	761892	3663362	Annual	0.62	1.1
R3	761802	3663572	Annual	0.54	1.1

8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 2421-171-0005-V-04-2.

Section 1.0: Facility Description

Jordan Forest Products submitted an expedited Title V permit amendment application dated November 17, 2015, which was logged in as Application No. TV-40486, for the authorization to construct and operate a new direct natural gas-fired continuous kiln (ID No. 500D). After the resulting Title V permit amendment (No. 2421-171-0005-V-04-1) was issued, the facility submitted an expedited PSD application dated April 7, 2016, which was logged in as Application No. TV-40991, for replacing the PSD avoidance limits specified in existing Conditions 3.2.2 and 3.2.3 of Title V Permit Amendment No. 2421-171-00015-V-04-1 to a facility-wide kiln drying limit of 225 million board feet per year (MMbf/yr). Since the facility requests for relaxation of the PSD avoidance limits that were placed due to the addition of the continuous kiln (Lumber Drying Kiln 500D), Application No. TV-40991 would address the PSD review and associated requirements that would have been triggered without the PSD avoidance limits. In other words, Application No. TV-40991 is treated as the PSD application for adding Kiln 500D.

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		Specific Limitations/Requirements		Air Pollution Control Devices	
ID No.	**Description**	**Applicable Requirements/Standards**	**Corresponding Permit Conditions**	**ID No.**	**Description**
500A	Lumber Drying Kiln No. 1 Direct Natural Gas-Fired Batch Drying Kiln Burner Capacity = 30 MMBtu/hr Drying Capacity = 65 MMbf/yr Installed in 1982 Modified on 06/01/2014	40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1. 391-3-1-.02(2)(g)2.	**3.2.1, 3.2.2,** 3.3.1, 3.4.1, 3.4.2, ~~3.4.3~~, **6.1.7,** ~~6.2.2~~, **6.2.3, 6.2.4**	N/A	None
500B	Lumber Drying Kiln No. 2 Direct Natural Gas-Fired Batch Drying Kiln Burner Capacity = 30 MMBtu/hr Drying Capacity = 65 MMbf/yr Installed in 1982 Modified on 01/01/2013	40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1. 391-3-1-.02(2)(g)2.	**3.2.1, 3.2.2,** 3.3.1, 3.4.1, 3.4.2, ~~3.4.3~~, **6.1.7,** ~~6.2.2~~, **6.2.3, 6.2.4**	N/A	None
500C	Lumber Drying Kiln No. 3 Direct Natural Gas-Fired Batch Drying Kiln Burner Capacity = 30 MMBtu/hr Drying Capacity = 65 MMbf/yr Installed on 12/13/2004 Modified on 04/01/2015	40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1. 391-3-1-.02(2)(g)2.	**3.2.1, 3.2.2,** 3.3.1, 3.4.1, 3.4.2, ~~3.4.3~~, **6.1.7,** ~~6.2.2~~, **6.2.3, 6.2.4**	N/A	None
700	Planer Mill	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	3.4.1, 3.4.2	N/A	None
701	Planer Hog	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	3.4.1, 3.4.2, 5.2.1, 5.2.2, 5.2.3, 6.1.7	701A	Baghouse
900	Overhead Truck Loading Bin	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	3.4.1, 3.4.2, 5.2.1, 5.2.2, 5.2.3, 6.1.7	901	Truck Loading Baghouse

Emission Units		Specific Limitations/Requirements		Air Pollution Control Devices	
ID No.	Description	Applicable Requirements/Standards	Corresponding Permit Conditions	ID No.	Description
500D	**Lumber Drying Kiln No. 4** **Direct Natural Gas-Fired Continuous Drying Kiln Burner Capacity = 40 MMBtu/hr Drying Capacity = 95 MMbf/yr Installed in 2016**	40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1. 391-3-1-.02(2)(g)2.	**3.2.1, 3.2.2, 3.2.3,** 3.3.1, **3.3.2, 3.3.3,** 3.4.1, 3.4.2, **6.1.7, 6.2.2, 6.2.3, 6.2.4,** ~~6.2.5~~	N/A	None

* 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 emission unit is in bold.

*** New and modified conditions are in bold.

Since all three existing kilns (ID Nos. 500A, 500B, and 500C) have been converted to fire natural gas only. Condition 3.2.1 has been modified to require all of them and the new kiln (ID No. 500D) to fire exclusively on natural gas.

Modified Condition 3.2.2 now caps the annual kiln throughput limit for all four kilns (ID Nos. 500A, 500B, 500C, and 500D) at 225 MMbf/yr. This limit is imposed to avoid triggering a PM_{10} PSD review for the proposed modification.

Modified Condition 3.2.3 now 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 Kiln 500D. Note that the list of items that must be included in the Work Practice and Preventive Maintenance Program has previously been approved by U.S. EPA.

New Condition 3.3.2 includes the requirements of 40 CFR 52.21(r)(1). The facility is required to construct and operate Kiln 500D in accordance with Application No. TV-40991.

New Condition 3.3.3 includes the requirements of 40 CFR 52.21(r)(2). This condition specifies when the facility must commence construction of Kiln 500D.

Note that Kiln 500D is still subject to the GA Rule (e) PM emission limit and GA Rule (b) visible emission limit specified in existing Conditions 3.4.1 and 3.4.2 of Title V Permit Amendment No. 2421-171-0005-V-04-1.

Modified Condition 3.4.3 includes the GA Rule (n) requirements for fugitive dust.

Section 4.0: Requirements for Testing

Condition 4.1.3 has been modified to include new Paragraph g., which includes the kiln VOC emission computation method.

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

Condition 6.1.7 has been modified for the following:

- Subparagraph b.i. now defines an exceedance as any twelve consecutive month period for which the total amount of lumber dried in Lumber Drying Kilns Nos. 1 through 4 (ID Nos. 500A, 500B, 500C, and 500D), combined, exceeds 225 million board feet.

- The exceedance reporting requirement specified in existing Subparagraph b.ii. has been deleted.

- Subparagraph d.i. now requires that the facility submit in the semiannual reports the twelve-month rolling total of lumber dried in Lumber Drying Kilns Nos. 1 through 4 (ID Nos. 500A, 500B, 500C, and 500D), combined, for each month in the reporting period.

- The reporting requirement specified in existing Subparagraph d.ii. has been deleted.

Modified Condition 6.2.2 requires that the facility notify the actual initial startup date of Kiln 500D and certify for a final inspection.

Modified Condition 6.2.3 now requires that the facility calculate and record the monthly amount of dried lumber processed through Lumber Drying Kilns Nos. 1 through 4 (ID Nos. 500A, 500B, 500C, and 500D), combined, for each month in the reporting period.

Modified Condition 6.2.4 now requires that the facility calculate and record the combined 12-month rolling total of dried lumber processed through Kilns 500A, 500B, 500C, and 500D, combined, ending in each month in the reporting period.

The record keeping requirements specified in existing Condition 6.2.5 have been deleted.

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

Draft Revised Title V Operating Permit Amendment
Jordan Forest Products
Barnesville (Lamar County), Georgia

APPENDIX B

Jordan Forest Products PSD Permit Application and Supporting Data

Contents Include:

1. PSD Permit Application No. TV-40991, dated April 7, 2016

APPENDIX C

EPD'S PSD Dispersion Modeling and Air Toxics Assessment Review

APPENDIX D

EPD's Facility-wide PTE Calculations for Criteria Pollutants, Total GHG, and Single/Combined HAP