NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date:

Region: Washington Regional Office
County: Pitt
NC Facility ID: 7400252
Inspector's Name: Robert Bright
Date of Last Inspection: 08/02/2019
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Weyerhaeuser NR Company - Grifton

Facility Address:
Weyerhaeuser NR Company - Grifton
371 East Hanrahan Road
Grifton, NC 28530

SIC: 2421 / Sawmills & Planing Mills General
NAICS: 321113 / Sawmills

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 02D .0512, 02D .0515, 02D .0516, 02D .0521, 02D .0530, 02D .1100, 02D .1111, 02D .1806, 02Q .0504
NSPS: N/A
NESHAP: MACT Subpart DDDD
PSD: Yes
PSD Avoidance: N/A
NC Toxics: N/A
112(r): N/A
Other: N/A

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Jack Godwin Environmental Manager (252) 746-7217 PO Box 280 Ayden, NC 28513	Kevin Davis Mill Manager (252) 746-7214 PO Box 280 Ayden, NC 28513	Jack Godwin Environmental Manager (252) 746-7217 PO Box 280 Ayden, NC 28513

Application Data

Application Number: 7400252.19A
Date Received: 11/12/2019
Application Type: Modification
Application Schedule: PSD

Existing Permit Data

Existing Permit Number: 06270/T24
Existing Permit Issue Date: 02/09/2018
Existing Permit Expiration Date: 09/30/2020

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2018	0.7100	48.27	350.24	45.86	5.08	28.87	20.40 [Methanol (methyl alcohol)]
2017	0.8400	59.01	408.92	68.15	5.75	33.80	23.81 [Methanol (methyl alcohol)]
2016	0.7500	51.51	385.14	88.26	7.08	31.86	22.41 [Methanol (methyl alcohol)]
2015	0.8400	58.31	391.31	98.63	7.59	32.48	22.73 [Methanol (methyl alcohol)]
2014	0.8700	58.61	395.53	117.99	7.65	32.86	22.98 [Methanol (methyl alcohol)]

Review Engineer: Betty Gatano

Review Engineer's Signature: **Date:**

Comments / Recommendations:
Issue 06270/T25
Permit Issue Date:
Permit Expiration Date:

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1.0 Introduction and Purpose of Application

1.1 Facility Description and Proposed Changes

Weyerhaeuser NR Company – Grifton (referred to as Weyerhaeuser or the Grifton facility throughout this document) currently holds Air Permit No. 06270T24 with an expiration date of September 30, 2020 for a lumber mill located in Grifton, Pitt County, North Carolina. The facility currently operates seven thermal oil-heated batch lumber kilns with energy provided by three biomass-fired Wellons thermal oil heaters. The lumber mill is limited to 300 million board feet per year (MMbf/yr) of production.

For the current process at the Grifton facility, tree-length and precut logs of various sizes and grades are debarked, cut to size, and processed through the sawmill where logs are cut into lumber and molding. The rough-cut lumber from the sawmill is stacked and dried in one of the seven lumber kilns. The kilns are heated by a hot oil system that recirculates oil between the wood residue burners and finned heat exchangers within the kilns. Sawdust and bark are the primary fuels for the hot oil heaters. Used oils recovered from the hot oil system, wash water from vehicle washdowns, and kiln condensate are sprayed onto the sawdust and bark before use as fuel in the kiln hot oil system. The dried lumber is finished by planing and trimming in the planer mill. Planed lumber passes through an enclosed spray box where mold inhibitor is applied. Finished lumber is packaged and then shipped off-site. Bark, chips, sawdust, and planer shavings are also shipped off-site as byproducts.

The debarking area, lumber plant, and finishing plant typically operate 20 hours per day, Monday through Thursday. The energy plant and kilns operate 24 hours per day.

This permit application is a Prevention of Significant Deterioration (PSD) permit modification to construct three direct-fired continuous dry kilns (CDKs) and remove the seven thermal oil-heated batch kilns and three associated thermal oil heaters. (This project will be referred to throughout this document as the CDK project.) The following summarizes the proposed physical changes and changes in the method of operation associated with the proposed PSD project:

- Increase throughput from 300 MMbf/year to 340 MMbf/yr.
- Add three direct-biomasss-fired/natural gas-fired continuous dry kilns (ID Nos. CDK1, CDK2, and CDK3), each with a 40 million Btu per hour maximum heat input rate.
- Add one dry fuel silo (ID No. IF-Silo4).
- Add three wet fuel silos (ID Nos. IF-Silo1, IF-Silo2, and IF-Silo3).
- Decommission biomass-fired thermal oil heater Wellons Nos. 1, 2, and 3 (ID Nos. ES-SEH-1901, ES-SEH-2901, ES-SEH-3901) and associated controls.*
- Decommission seven indirectly heated lumber kilns (ID Nos. ES-DK-1 through ES-DK7).*
- Decommission diesel-fired engines (ID Nos. ES-GN-1 and ES-GN-3).*

  (*The thermal oil heaters and associated controls, indirectly heated lumber kilns, and diesel fired emergency engines will be permanently shutdown no later than 18 months from the startup of the first CDK.)

This permit application is being submitted as a "Part 1" of a two-step significant modification pursuant to 15A NCAC 02Q .0501(b)(2) for construction of the CDKs. Within 12 months after the initial start-up of the first CDK, the facility is required to apply for a TV operating permit.

1.2 Other Permit Changes

Request for removal of PSD Avoidance Limit

The Mold Inhibitor Application System (MIAS) (ID No. ES-MIAS) was added to the permit with the issuance of Air Permit No. 06270T20 on August 27, 2009.

Weyerhaeuser originally anticipated a material application rate of 2 gallons of dilute mold inhibitor per thousand board feet or 600,000 gallons per year. At this application rate, an expected antifoam usage rate of 20 gallons per month, and annual production rate of 300 million board feet of lumber, VOC emissions were calculated at 36.29 tons per year. Weyerhaeuser accepted a PSD avoidance condition for the MIAS at that time because VOC emissions could be higher if a higher application rate or a higher VOC content material was used for wood preservation.

Weyerhaeuser now anticipates a maximum usage of 50,000 gallons of mold inhibitor per year and 240 gallons per year (20 gallons per month) of antifoam agent to be used in the MIAS. With these usage rates, potential uncontrolled VOC emissions would be less than 5 tons per year as shown below in Table 2. Weyerhaeuser has requested to remove the PSD avoidance limit for the MIAS and to move this emission source to the list of insignificant activities.

Table 2. Potential VOC Emissions from MIAS

Product	VOC content (% by weight)	Product Density (lb/gal)	Product Usage		Potential Emissions	
			(gal/yr)	(lb/year)	(lb/yr)	(tpy)
Defoamer XP	3	7.35	240	1,764	52.92	0.026
Mycostat BX2	2	9.12	50,000	456,000	9,120	4.56
Total VOC						**4.59**

NCDAQ does not agree with this request. Although Weyerhaeuser now intends to use only 50,000 gallons per year, this usage amount could be increased in the future if needed to meet different product specifications. Similarly, Weyerhaeuser could use a higher content VOC material if needed. Either of these actions could result in VOC emissions that exceed the PSD avoidance limit or insignificant activity threshold. Therefore, the MIAS will remain on the permit and will retain its PSD avoidance limit. Continued compliance with the PSD avoidance limit is anticipated.

Removal of Case-by-Case MACT Requirements

Requirements for 15A NCAC 02D .1109, Case-by-Case MACT, for the three biomass-fired thermal oil heaters (ID Nos. ES-SEH-1901, ES-SEH-2901, and ES-SEH-3901) were added to Air Permit No. 06270T21 issued on May 25, 2010. The compliance date for this regulation was May 25, 2013, and the thermal oil heaters remained subject to the Case-by-Case MACT until May 19, 2019. Beginning on May 20, 2019, the three biomass-fired thermal oil heaters became subject to the "National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters," 40 CFR Part 63 Subpart DDDDD (MACT Subpart DDDDD). Weyerhaeuser must comply with all applicable emission limits, monitoring, recordkeeping, and reporting requirements under MACT Subpart DDDDD from May 20, 2019 until the permanent shutdown of the thermal oil heaters. Compliance is anticipated.

Because the three biomass-fired thermal oil heaters are no longer subject the Case-by-Case MACT, requirements for this regulation will be removed from the permit as part of this modification.

1.3 Plant Location

Weyerhaeuser is located at 371 East Hanrahan Road, Grifton, North Carolina, which is in southern Pitt County. Pitt County has been classified as in attainment for all pollutants subject to a National Ambient Air Quality Standard (NAAQS).

1.4 Permitting History Since Last TV Permit Renewal

Permit	Date	Description
06270T23	October 14, 2015	Air Permit No. 06270T23 issued. The following permit applications were consolidated under this permit: Permit Application No. 7400252.10A – The application for permit renewal was received on June 7, 2010. Permit Application No. 7400252.14B – The application was submitted on May 15, 2014 as a State Only application to remove air toxic conditions and the associated 500 gallon per year limit on the combustion of on-site generated used oil. Permit Application No. 7400252.14C – The application was submitted on October 24, 2014 as a "Part 2" application for the modification of two biomass-fired thermal oil heaters Nos. 1 and 2 Wellons (ID Nos. ES-SEH-1901 and ES-SEH-2901) to ensure continued proper operation of the equipment.
06270T23	September 22, 2017	NCDAQ issued a Non-Hazardous Secondary Material (NHSM) determination regarding the combustion of on-specification used oil and sawdust when an oil leak or spill occurs. These fuels are not considered solid waste as defined in 40 CFR 241.2 and can be used as fuel for the thermal oil heaters.
06270T24	February 9, 2018	Air Permit No. 06270T24 issued as a significant modification. The permit incorporated stack testing as an option to demonstrate compliance with the total selected metals (TSM) limit in the permit under 112(j) Case-by-Case MACT for the three biomass-fired thermal oil heaters. Sawdust that has absorbed spilled virgin and on-specification used oil was also added as fuel for the thermal oil heaters as part of this permit modification.

1.5 Application Chronology

Date	Event
August 7, 2019	Pre-application meeting between NCDAQ and Weyerhaeuser occurred.
August 7, 2019	Tom Anderson of the Air Quality Analysis Branch (AQAB) of NCDAQ e-mailed personnel from US Forest Service, the Fish and Wildlife Services, and the National Park Service informing them of the project.
August 7, 2019	Melanie Pitrolo of the US Forest Service sent an e-mail to Tom Anderson indicating that a Class I analysis was not needed.
November 12, 2019	PSD permit application received. The required zoning consistency determination was not included with the PSD application.
November 18, 2019	Libby Robinson, consultant for Weyerhaeuser, provided documentation that the town of Grifton, NC received a copy of the PSD permit application. The PSD permit application was deemed complete at that time. NCDAQ subsequently received the completed zoning consistency determination form from the town of Grifton, NC on November 22, 2019.
November 21, 2019	Robert Bright of the Washington Regional Office (WaRO) of the NCDAQ submitted comments on the PSD permit application.
November 22, 2019	A copy of permit application and modeling was forwarded to US EPA Region 4.
November 22, 2019	A copy of permit application and modeling was forwarded to Federal Land Manager (FLM). Specifically, the documents were forwarded to Andrea Stacy of the National Park Service.
January 24, 2020	Betty Gatano sent an e-mail to Libby Robinson of questions regarding the PSD application.
February 7, 2020	Mark Yoder of the AQAB issued a memorandum approving the air modeling submitted in support of the permit application.
February 10, 2020	Draft of the permit and permit review forwarded internally for comments.
February 14, 2020	Response to questions received from Jack Godwin of Weyerhaeuser.
February 21, 2020	Mark Cuilla, Permitting Supervisor, provided comments on draft permit and permit review.
February 25, 2020	Draft permit and permit review forwarded to Weyerhaeuser for comments.
March 17, 2020	Comments on draft permit and permit review received from Weyerhaeuser.
March 27, 2020	Additional comments on draft permit and permit review received from Weyerhaeuser.
March 30, 2020	Draft permit and permit review forwarded to Weyerhaeuser again to ensure all the issues with the draft permit have been resolved.
April 6, 2020	Draft permit and permit review sent to public notice.

2.0 New Emission Sources and Emissions Estimates

For the CDK project, Weyerhaeuser intends to construct three direct-fired CDKs (ID Nos. CDK1, CDK2, and CDK3). One dry fuel silo (ID No. IF-Silo4), three wet fuel silos (ID Nos. IF-Silo1, IF-Silo2, and IF-Silo3), and enclosed fuel conveyor systems will be used to manage the biomass fuel for the CDKs. The fuel silos and the conveyors may be new or repurposed from existing equipment. The new CDKs will allow an increased production at the Grifton facility, which will in turn increase production in both the upstream and downstream processes, including the debarkers, planer, dry trimmer, the fuel silos, and the mold inhibitor application system. Equipment and emissions associated with this PSD modification are discussed in this section.

2.1 Emission Sources and Wood Drying Process

Direct-Fired Continuous Dry Kilns
Weyerhaeuser intends to construct three direct-fired CDKs (ID Nos. CDK1, CDK2, and CDK3) as part of this PSD modification. Each CDK will be equipped with a biomass burner/gasification system with a maximum heat input of 40 million Btu/hr. The primary fuel for the CDK burners will be a green sawdust /dry biomass blend at approximately 50% moisture. The CDKs will also be permitted to burn natural gas. The CDKs will have a reverse flow double track design that incorporates preheating, drying, cooling, equalizing, and condition phases all in one extended chamber.

The combined drying capacity of the three new CDKs will be 340 MMbf/year, which is an increase of approximately 13% over the facility's current capacity of 300 MMbf/year.

Fuel Silos
Three wet fuel silos (ID Nos. IF-Silo1, IF-Silo2, and IF-Silo3), one dry fuel silo (ID No. IF-Silo4), and enclosed fuel conveyor systems may be newly installed or repurposed to manage the biomass fuel for the CDKs. Green sawdust (i.e., wet fuel) and dry fuel will be blended as needed to maintain moisture content around 50% for optimal burner efficiency in the CDKs. Dry biomass fuel will be blown from the planer mill to the dry fuel silo. VOCs from the mold inhibitor are assumed to be emitted upon application to lumber prior to entering the planer. From the silos, the biomass fuel will be transferred to each burner via a screw conveyor.

Other Process Equipment
Other process equipment includes two debarkers (ID No. F-7), a planer and trimmer mill (ID No. ES-SFF-1902), and the MIAS (ID No. ES-MIAS). The increased throughput from the new CDKs will increase throughput in upstream (i.e., the debarkers) and downstream equipment (i.e., planner/trimer mill and MIAS). Because no physical modification or change in operation will apply to these emission sources as part of the CDK project, BACT does not apply to the other process equipment at the Grifton facility.[1]

Project Schedule
Weyerhaeuser has targeted beginning construction of the new CDKs in January 2021. The CDKs will begin operation in a staggered scheduled. Once the first CDK is operational, Weyerhaeuser intends to decommission some of the existing batch kilns. Additional decommission of the existing

[1] US EPA letter to Wisconsin Department of Natural Resources, February 8, 2000, retrieved from https://www.epa.gov/nsr/applicability-psd-debottlenecked-sources

batch kilns will occur with the startup of the second CDK. Following the startup of the third CDK, the final batch kilns will be decommissioned. The emergency engines (ID Nos ES-GN-1 and ES-GN-3) are used, in part, to support the thermal oil heaters in the event of a power outage or disruption. Therefore, these the two emergency engines must remain operational until the thermal oil heaters are decommissioned. Weyerhaeuser plans to have all three CDKs in operation and all seven existing kilns, associated thermal oil heaters, and the emergency engines decommissioned by the end of 2021.

2.2 Emissions Associated with the PSD Modification

Emissions resulting from the CDK project were reviewed to determine if the project is considered a major modification under PSD rules. Weyerhaeuser assessed the applicability of PSD to the CDK project by performing a comparison test of the baseline actual emission (BAE), which includes emissions from the seven batch kilns (ID Nos. ES-DK1 through ES-DK7) and three thermal oil heaters (ID Nos. ES-SEH-1901, ES-SEH-2901, and ES-SEH-3901), to potential emissions from the new CDKs, new fuel silos, and other affected units.

Per 15A NCAC 02D .0530(b)(1)(A), BAE for existing emissions units means the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the five year period immediately preceding the date that a complete permit application is received by the Division…" However, the Director shall allow a different time period, not to exceed 10 years immediately preceding the date that a complete permit application is received by the Division, if the owner or operator demonstrates that it is more representative of normal source operation.

For the BAE, Weyerhaeuser conducted a five year look back period from 2014 to 2018. Years 2016 and 2017 were the highest average consecutive 24-month period among the years reviewed, and these were selected as the baseline period. BAE represent the average annual emissions during this baseline in tons per year for the existing batch kilns and the affected units (debarkers, planer, dry trimmer, silos, and Mold Inhibitor Application System). The baseline emissions for the new CDKs and new fuel silos equals zero.

The comparison of the BAE and potential emissions is provided below in Table 3. Weyerhaeuser is a major source under the PSD rules. For this modification to be considered a significant modification under PSD, the emissions increase must exceed the PSD significant emission rate (SER). As shown in the Table 3, the emission increases associated with the CDK project exceed the SERs only for emissions of VOC, and a BACT analysis was conducted for this pollutant.

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Table 3. Increase in Emissions Associated with the CDK Project

Pollutant	Baseline Actual Emissions (tpy)	Potential Project Emissions (tpy)	Emission Increase after Modification (tpy)	PSD Significant Threshold (tpy)	PSD Significant Modification? (Yes/No)
CO	90.9	53.0	-37.9	100	No
NO_X	115.6	61.5	-54.1	40	No
PM	11.1	27.2	16.2	25	No
PM_{10}	13.5	19.9	6.4	15	No
$PM_{2.5}$	12.5	17.8	5.3	10	No

Table 3. Increase in Emissions Associated with the CDK Project					
Pollutant	**Baseline Actual Emissions (tpy)**	**Potential Project Emissions (tpy)**	**Emission Increase after Modification (tpy)**	**PSD Significant Threshold (tpy)**	**PSD Significant Modification? (Yes/No)**
SO_2	0.80	13.1	12.3	40	No
VOCs	**398.4**	**746.9**	**348.5**	**40**	**Yes**
Lead	3.3E-03	1.6E-02	1.3E-02	0.6	No
CO_2e	53,244	110,142	56,898	75,000	No

Notes:

- Weyerhaeuser provided revised baseline emissions in an e-mail dated 02/14/2020. The updated BAE were based on a five year look back.
- Potential emission calculations were also revised and provided in an e-mail dated 02/14/2019.
- Potential emissions from the CDKs are based on the higher of the two scenarios for each pollutant: Scenario 1 – Emissions from Direct Wood Firing in Kilns or Scenario 2 – Emissions from Natural Gas Firings in Kilns. The proposed project includes three 40 MMBtu/hr wood-fired burners for each new CDK (total heat input=120 MMBtu/hr), with the same heat rating regardless of fuel.
- Emission factors for direct wood-fired drying (Scenario 1) are developed from test data collected while the continuous direct-fired kilns were combusting wood fuel.
- No sufficient test data was available from CDKs burning natural gas (Scenario 2). Therefore, the indirect drying emission factors paired with natural gas combustion emission factors were selected as the most representative for this scenario.
- CO_2 equivalent is defined as the sum of individual greenhouse gas pollutant emission times their global warming potential, converted to metric tons.

The potential project emissions are presented on a source-by-source basis below in Table 4. The new dry fuel silo (ID No. IF-Silo 4) and three wet fuel silos ((ID Nos. IF-Silo1, IF-Silo2, and IF-Silo3) are uncontrolled and will have PM emissions of less than 5 tons per year as shown in the table below. These emission sources are considered insignificant activities in accordance with 15A NCAC 02Q .0503(8) and will be included on the insignificant activities list in the permit.

Table 4. Emissions Associated with the CDK Project on a Source-by-Source Basis						
Pollutants	**Planer and Trimmer**	**Debarker**	**Mold Inhibitor Application System**	**New Fuel Silos**	**New CDKs**	**Total Emissions**
Criteria Pollutants						
CO	-	-	-	-	53.04	53.04
NOx	-	-	-	-	61.48	61.48
PM	1.89	1.53	-	1.29E-02	23.80	27.24
PM-10	1.89	0.31	-	6.04E-03	17.68	19.88
PM-2.5	0.85	0.15	-	9.15E-04	16.83	17.84
SO2	-	-	-	-	13.14	13.14
VOC	4.50	-	4.59	-	737.80	746.89
Lead	-	-	-	-	0.02	0.02
Greenhouse Gases						
CH_4	-	-	-	-	8.34	8.34
CO_2	-	-	-	-	108,691	108,691
N_2O	-	-	-	-	4.17	4.17
CO_2e	-	-	-	-	110,142.37	110,142.37

Emissions of toxic air pollutants (TAPs) associated with the new CDKs are discussed below in Section 5.3.

3.0 Project Regulatory Review

A regulatory review of emission sources associated with the PSD modification, including sources upstream and downstream of the new CDKs, are provided in this section. Emission sources at the Grifton facility unaffected by this modification are not included as part of the regulatory review.

- 15A NCAC 02D .0512, Particulates from Wood Products Finishing Plants – The debarkers (ID No. F-7) and planer mill and trimmer (ID No. ES-SFF-1902) are subject 02D .0512. Weyerhaeuser must conduct inspection and maintenance of the cyclone and bagfilter on the planer mill and trimmer and conduct associated recordkeeping and reporting to ensure compliance. No monitoring, recordkeeping, or reporting (MRR) is required for the debarkers. No changes to the permit are required for this modification, and continued compliance is anticipated.

- 15A NCAC 02D .0515, Particulates from Miscellaneous Industrial Processes – The new CDKs (ID Nos. CDK1, CDK2, and CDK3) are subject to 02D .0515. Allowable emissions of PM from these emission sources are calculated from the following equations:

  $E = 4.10 \times P^{0.67}$ for units with process weight rate less than or equal to 30 tons per hour
  or
  $E = 55.0(P)^{0.11} - 40$ for units with process weight rates greater than 30 tons per hour

  where:
  E = allowable emission rate in pounds per hour calculated to three significant figures
  P = process weight rate in tons per hour

  An overview of the allowable PM emissions and estimated potential PM emissions for the new CDKs is provided below:

  Process weight is estimated as follows:
  P = (Throughput) (Density of southern yellow pine) (Operating hours per year) (Conversion Factors)
  Throughput = 340 MMbf/yr
  Density = 53 lb/ft^3
  Operating hours = 24 hours per day = 8,760 hours per year
  Conversion factors: 1 bf = 1/12 ft3; 1 MMbf = 1x106 bf; 1 ton = 2,000 lbs

  P = (340 MMBf/yr) (53 lb/f3) (1 yr/8,760 hours) (1/12 ft3/bf) (1x106 bf/MMBf) (1 ton/2000 lb)
  P = 85.7 tons/hr for all three CDKs combined

  Per 02D .0515, weight of fuel must also be considered:

P_{fuel} = 13.3 tons/hr for all three CDKs combined as provided in the PSD permit application

P_{total} = 85.7 tons/hr + 13.3 tons/hr
= 99 tons/hr for all three CDKs or 33 tons per hour for each CDK.

Allowable emissions are calculated as follows:

E=55.0(33)0.11- 40 = 40.8 tons/hr

PM = 23.8 tpy as provided in the PSD permit application
= 5.43 tons/hr for all CDKs or 1.81 lb/hr per CDK.

Therefore, compliance is anticipated, and no MRR is required to ensure compliance with 02D .0515.

- 15A NCAC 02D .0516, Sulfur Dioxide Emissions from Combustion Sources – The new CDKs (ID Nos. CDK1, CDK2, and CDK3) are subject to this rule and are limited to a sulfur dioxide emission rate of no more than 2.3 pounds sulfur dioxide (SO_2) per million Btu heat input. No MRR is required when firing wood or natural gas in the CDKs because of the low sulfur content of these fuels. Wood and natural gas are inherently low enough in sulfur that compliance is anticipated.

- 15A NCAC 02D .0521, Control of Visible Emissions –The following equipment was manufactured after July 1, 1971 and must not have visible emissions of more than 20 percent opacity when averaged over a six-minute period, except as specified in 15A NCAC 02D .0521(d).
  - Three new CDKs (ID Nos. CDK1, CDK2, and CDK3) – No MRR is required to demonstrate compliance with 02D .0521. Continued compliance is anticipated.
  - Existing debarkers (ID No. F-7) and planner and trimmer mill (ID No. ES-SFF-1902) – No MRR is required to demonstrate compliance with 02D .0521. Continued compliance is anticipated.

- 15A NCAC 02D .0530, Prevention of Significant Deterioration – The addition of the new CDKs triggers a BACT analysis for VOC emissions, as discussed in detail in Section 4.0 below.

- 15A NCAC 02D .1100, Control of Toxic Air Pollutant, and 15A NCAC 02Q .0711, Emissions Rates Requiring a Permit – The CDK project results in the increase in emissions of certain TAPs. The new CDKs (ID Nos. CDK1, CDK2, and CDK3) are subject to MACT Subpart DDDD, and per 15A NCAC 02Q .0702(a)(27), an air emission source subject to 40 CFR Part 63 (i.e., MACT) is exempt from NC Air Toxics. However, Weyerhaeuser elected to conduct air dispersion modeling to demonstrate compliance for the new CDK project. Please see Section 5.3 below for discussion of NC air toxics.

- 15A NCAC 02D .1111, Maximum Achievable Control Technology (MACT) – Weyerhaeuser is a major source of hazardous air pollutants (HAPs), and the three new CDKs (ID Nos. CDK1, CDK2, and CDK3) will be subject to "NESHAP for Plywood and Composite Wood Products," 40 CFR Part 63 Subpart DDDD. Per 40 CFR 63.2252, lumber kilns and other process units not subject to the compliance options under 40 CFR 63.2240 are not required to comply with the provisions of 40 CFR Part 63 Subpart DDDD or Subpart A, except for the initial notification requirements. In accordance with 40 CFR 63.2280(b), the Permittee shall submit an initial notification to NCDAQ no later than 120 calendar days after the initial startup of the any of the new CDKs.

- 15A NCAC 02D .1806, Control and Prohibition of Odorous Emissions – This condition is applicable facility-wide and is state enforceable only. No changes are needed under this permit modification, and continued compliance is anticipated.

- 15A NCAC 02Q .0504, Option for Obtaining Construction and Operating Permit – Weyerhaeuser will be required to submit a Title V permit application pursuant to 15A NCAC 02Q .0504 (aka the "Part II" permit application) within 12 months of beginning operation of any the new CDKs (ID Nos. CDK1, CDK2, and CDK3).

4.0 Prevention of Significant Deterioration

The basic goal of the PSD regulations is to ensure the air quality in clean (i.e. attainment) areas does not significantly deteriorate while maintaining a margin for future industrial growth. The PSD regulations focus on industrial facilities, both new and modified, that create large increases in the emission of certain pollutants. The US EPA promulgated final regulations governing the PSD in the Federal Register published August 7, 1980. Effective March 25, 1982, the NCDAQ received full authority from the US EPA to implement PSD regulations in the state. North Carolina has incorporated US EPA's PSD regulations (40 CFR 51.166) into its air pollution control regulations in 15A NCAC 02D .0530 and 02D .0531.

4.1 PSD Applicability

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

Weyerhaeuser is an existing major stationary source under PSD because it has the potential to emit VOCs in excess of 250 tons per year. This modification is a major modification under PSD because emissions of VOC exceed the SER, as noted previously.

The elements of a PSD review are as follows:

1) A BACT Determination as determined by the permitting agency on a case-by-case basis in accordance with 40 CFR 51.166(j),
2) An Air Quality Impacts Analysis including Class I and Class II analyses, and
3) An Additional Impacts Analysis including effects on soils and vegetation and impacts on local visibility in accordance with 40 CFR 51.166(o).

4.2 BACT Analysis

Under PSD regulations, the basic control technology requirement is the evaluation and application of BACT. BACT is defined as follows [40 CFR 51.155 (b)(12)]:

> *An emissions limitation...based on the maximum degree of reduction for each pollutant... which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.*

As evidenced by the statutory definition of BACT, this technology determination must include a consideration of numerous factors. The structural and procedural framework upon which a decision should be made is not prescribed by Congress under the Act. This void in procedure has been filled by several guidance documents issued by the US EPA. The only final guidance available is the October 1980 "Prevention of Significant Deterioration – Workshop Manual." As the US EPA states on page II-B-1, "A BACT determination is dependent on the specific nature of the factors for that **particular case**. The depth of a BACT analysis should be based on the quantity and type of pollutants emitted and the **degree of expected air quality impacts**." (emphasis added). The US EPA has issued additional DRAFT guidance suggesting the use of what they refer to as a "top-down" BACT determination method. While the US EPA Environmental Appeals Board recognizes the top-down approach for delegated state agencies,[2] this procedure has never undergone rulemaking and as such, the process is not binding on fully approved states, including North Carolina.[3] The Division prefers to follow closely the statutory language when making a BACT determination and therefore bases the determination on an evaluation of the statutory factors contained in the definition of BACT in the Clean Air Act. As stated in the legislative history and in US EPA's final October 1980 PSD Workshop Manual, each case is different and the State must decide how to weigh each of the various BACT factors. North Carolina is concerned that the application of US EPA's DRAFT suggesting a top-down process will result in decisions that are inconsistent with the Congressional intent of PSD and BACT. The following are passages from the legislative history of the Clean Air Act and provide valuable insight for state agencies when making BACT decisions.

> The decision regarding the actual implementation of best available technology is a key one, and the committee places this responsibility with the State, to be determined on a case-by-case judgment. It is recognized that the phrase has broad flexibility in how it should and can be interpreted, depending on site.
>
> In making this key decision on the technology to be used, the State is to take into account energy, environmental, and economic impacts and other costs of the application of best available control technology. The weight to be assigned to such factors is to be determined by the State. Such a flexible approach allows the adoption of improvements in technology to become widespread far more rapidly than would occur with a uniform Federal standard. The only Federal guidelines are the US EPA new source performance and hazardous emissions standards, which represent a floor for the State's decision.

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[2] See, https://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/PSD+Permit+Appeals+(CAA)?OpenView for various PSD appeals board decisions including standard for review.

[3] North Carolina has full authority to implement the PSD program, 40 CFR Sec. 52.1770

> This directive enables the State to consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility, and such other considerations as anticipated and desired economic growth for the area. This allows the States and local communities to judge how much of the defined increment of significant deterioration will be devoted to any major emitting facility. If, under the design which a major facility proposes, the percentage of increment would effectively prevent growth after the proposed major facility was completed, the State or local community could refuse to permit construction or limit its size. This is strictly a State and local decision; this legislation provides the parameters for that decision.
>
> One of the cornerstones of a policy to keep clean areas clean is to require that new sources use the best available technology available to clean up pollution. One objection which has been raised to requiring the use of the best available pollution control technology is that a technology demonstrated to be applicable in one area of the country may not be applicable at a new facility in another area because of the differences in feedstock material, plant configuration, or other reasons. **For this and other reasons the Committee voted to permit emission limits based on the best available technology on a case-by-case judgment at the State level**. [emphasis added]. This flexibility should allow for such differences to be accommodated and still maximize the use of improved technology.
>
> *Legislative History of the Clean Air Act Amendments of 1977.*

The BACT analyses provided by Weyerhaeuser for the proposed project were conducted <u>consistent with the above definition as well as US EPA's five step "top-down" BACT process</u>. The "top down" methodology results in the selection of the most stringent control technology in consideration of the technical feasibility and the energy, environmental, and economic impacts. Control options are first identified for each pollutant subject to BACT and evaluated for their technical feasibility. Options found to be technically feasible are ranked in order of their effectiveness and then further evaluated for their energy, economic, and environmental impacts. In the event that the most stringent control identified is selected, no further analysis of impacts is performed. If the most stringent control is ruled out based upon economic, energy, or environmental impacts, the next most stringent technology is similarly evaluated until BACT is determined.

After establishing the baseline emissions levels required to meet any applicable NSPS, NESHAPs, or SIP limitations, the "top-down" procedure followed for each pollutant subject to BACT is outlined as follows:

- Step 1: Identify all available control options - from review of US EPA RACT/BACT/LAER Clearinghouse (RBLC), agency permits for similar sources, literature review and contacts with air pollution control system vendors.
- Step 2: Eliminate technically infeasible options - evaluation of each identified control to rule out those technologies that are not technically feasible (i.e., not available and applicable per US EPA guidance).
- Step 3: Rank remaining control technologies - "Top-down" analysis, involving ranking of control technology effectiveness.

- Step 4: Evaluate most effective controls and document results – Economic, energy, and environmental impact analyses are conducted if the "top" or most stringent control technology is not selected to determine if an option can be ruled out based on unreasonable economic, energy or environmental impacts.
- Step 5: Select the BACT – the highest-ranked option that cannot be eliminated is selected, which includes development of an achievable emission limitation based on that technology.

4.3. References Used to Identify Control Technologies

The references and methodologies discussed in this section were used to identify control technologies considered in the BACT analyses found in Section 4.4.

- RACT/BACT/LAER Clearinghouse (RBLC) database located on EPA's Technology Transfer Network in the EPA electronic bulletin board system. Specifically, the Permittee performed a search of the RBLC database using the category for wood lumber kilns (RBLC Code 30.800);

- Vendor information; and

- Professional knowledge and experience.

4.4. BACT Review for VOC Emission Sources

4.4.1 Identify Control Technologies

Based on the review of RBLC, relevant literature, and industry knowledge, the following control technologies were considered in the BACT analysis for VOC emissions from the new CDKs:
- Carbon adsorption;
- Condensation;
- Regenerative thermal or Catalytic Oxidation;
- Biofiltration; and
- Work practices.

<u>Carbon Adsorption</u>
Carbon adsorption systems use an activated carbon bed to trap VOCs. As the exhaust gas stream passes through the activated carbon bed, VOC molecules are adsorbed onto the surface of the activated carbon, and clean exhaust gas is discharged to the atmosphere. A typical carbon adsorption system for continuous operation includes two activated carbon beds, such that one bed can be desorbing/idle while the other is adsorbing. When the activated carbon in one bed is spent and can no longer effectively adsorb VOC, the bed is taken offline for regeneration, and the VOC-containing gas stream is diverted to the fresh activated carbon bed. This switching allows for the source to operate continuously without shutting down. Regeneration of the sorbent can be achieved either via heating with steam or via vacuuming to remove VOC from the surface.

Depending on the application, carbon adsorption systems can typically achieve VOC control efficiencies of 95%.[4] Adsorption systems have been successfully used in industry types such as

[4] New Jersey DEP's State of the Art (SOTA) *Manual for Chemical and Pharmaceutical Processing and Manufacturing Industries* (July 1997). http://www.state.nj.us/dep/aqpp/downloads/sota/sota5.pdf

organic chemical processing, varnish manufacture, synthetic rubber manufacture, production of selected rubber products, pharmaceutical processing, graphic arts operations, food production, dry cleaning, synthetic fiber manufacture, pressure sensitive tape manufacturing, and other coating operations.

Condensation

Condensers operate by separating volatile compounds in a vapor mixture from the remaining vapors by means of saturation followed by a phase change. Condensers are typically refrigerated to decrease the temperature to aid in saturation and therefore increase the removal efficiencies of the units. There are two common types of condensers used for VOC removal – surface and contact condensers. The coolant does not contact the gas stream in surface condensation; the vapor condenses as a film on the cooled surface and then discharges to a collection tank. Conversely, the vapor stream is sprayed with a liquid coolant in a contact condenser. The VOCs contained within the waste coolant often create a disposal problem because they cannot be recycled or separated from the stream without additional processing.

Because the condenser's removal efficiency is highly dependent on the characteristics of the waste gas stream, they are only feasible for removing certain compounds. Compounds with high boiling points and low volatility are more easily condensable than compounds with low boiling points and high volatility. EPA recommends, as a conservative starting point for considering condensers as a control, that the VOCs have boiling points above 100^{o} F.

Regenerative Catalytic or Thermal Oxidation

The principles utilized in both a regenerative catalytic oxidizer (RCO) and regenerative thermal oxidizer (RTO) are based on simple chemistry and heat transfer phenomena. Oxidation technologies have been widely accepted as the most effective technologies for VOC destruction for a variety of process types.

Oxidation, or combustion, of VOC involves a chemical reaction between hydrocarbons and oxygen to form carbon dioxide and water vapor. Combustion of VOC emission streams occurs spontaneously at elevated temperatures, which are typically attained by combustion of an auxiliary fuel within the combustion zone of the oxidizer. The percent conversion of VOC to carbon dioxide and water is dependent upon temperature and residence time of the VOC in the fuel combustion zone.

Combustion of VOCs in the presence of a catalyst is referred to as "catalytic oxidation" and allows oxidation to occur at substantially lower temperatures, thereby requiring less auxiliary fuel to maintain the desired temperature. In an RCO the catalysts are typically based on a noble metal and can be contained in a fixed or fluidized bed. Despite the decreased oxidation temperature, process exhaust gas must still be preheated, typically through heat exchange or direct heating in a combustion chamber, prior to contact with the catalyst bed. Catalytic oxidizers are very sensitive to particle contamination and can normally only be used on very "clean" exhaust streams containing little or no particulate matter.

Regenerative thermal oxidation systems operate on the same principal of reacting VOC in the presence of oxygen at elevated temperatures; however, the heat generated by combustion of auxiliary fuel and VOC is "reused" to reduce the amount of auxiliary fuel necessary for VOC oxidation. VOC oxidation is accomplished by passing the emission stream being controlled through a heated "bed" of media such as ceramic packing to preheat the emission stream, followed by a final combustion zone in which auxiliary fuel is burned to "boost" the stream to the required combustion temperature. Exhaust from the combustion zone is then passed through another packed bed, which absorbs and retains heat until it can be used to preheat the exhaust stream. Airflow is periodically switched to allow beds through which hot exhaust gases have passed to preheat the emission stream prior to passing through the combustion zone. Regenerative systems are typically designed to recover nearly all of the heat of combustion, greatly reducing auxiliary fuel requirements. Thermal oxidation is most economical when the inlet concentration is between 1,500 and 3,000 ppmv VOC because the heat of combustion of the hydrocarbon gases is sufficient to sustain combustion with the addition of expensive auxiliary fuel.

Biofiltration

Biofiltration offers a cost-effective alternative to traditional thermal and catalytic oxidation systems in limited situations. Because biofilters are dependent upon biological activity to destroy VOC, removal efficiencies of biofilters are widely variable. In limited applications, this air pollution control technology can provide a reduction in VOC emissions of 60 to 99.9%.[5]

Specifically in biofiltration, VOCs are oxidized using living micro-organisms on a media bed (sometimes referred to as a “bioreactor”). A fan is typically used to collect or draw contaminated air from a building or process. If the air is not properly conditioned (heat, humidity, solids), then pre-treatment is a necessary step to obtain optimum gas stream conditions before introducing it into the bioreactor. As the emissions flow through the bed media, the pollutants are absorbed by moisture on the bed media and come into contact with the microbes. Depending on the volume of air required to be treated, the footprint of a biofiltration system can be excessive and take up significant acreage. The microbes consume and metabolize the excess organic pollutants, converting them into CO_2 and water, much like a traditional thermal and catalytic oxidation process.

Work Practices

The VOC emissions from lumber kilns are primarily generated as a result of drying the wood in the kiln and to a much lesser extent, wood combustion in the kiln burners. The naturally occurring VOCs in the lumber are driven off by the heat used to dry the lumber. Emissions of VOCs are largely proportional to the amount of moisture removal from the lumber (i.e., the lower the target moisture content, the higher the VOC emissions). Kilns must be properly operated to provide careful drying of lumber to a specific target moisture content over a carefully controlled drying schedule using well-established temperature profiles to achieve the desired properties for the consumer. Over drying the lumber would result in diminished lumber quality as well as the release of additional VOCs. Therefore, careful control of the drying process to optimize moisture levels is necessary and maintain product quality and minimize VOC emissions from lumber drying.

Proper maintenance of the kiln and burners will help maintain efficiency of the units and maximize the lumber drying capacity of a given quantity of fuel combustion.

Both proper operation and appropriate maintenance of the kilns to minimize emissions will also promote lumber quality. Lumber market specifications generally establish the maximum allowable moisture content for a given grade of lumber or end-use of the product.

[5] EPA, *Using Bioreactors to Control Air Pollution*, EPA-456/R-03-003. ttps://www3.epa.gov/ttncatc1/dir1/fbiorect.pdf

Data is limited concerning the level of emissions reduction expected through proper maintenance and operation of a kiln

4.4.2 Eliminate Technically Infeasible Options

Of the five control technologies identified in Section 4.1.1 above, only work practices have been commercially demonstrated as a viable VOC control technology for lumber kilns. This is due at least in part to the technical difficulties associated with collecting the exhaust gases from lumber kilns and routing them to an add-on control device. Lumber dry kilns are not designed with exhaust stacks. Exhaust gases pass through multiple vents along the roof and from the open ends of the kilns through which the lumber is continuously passing. To be routed to an add-on control device, the gases must be collected through the vents and ends of the kilns in a manner that is identical to the normal exhaust rate from the kiln to maintain carefully controlled conditions within the kiln. Attempting to achieve this delicate balance across all vents would be exceptionally difficult, and potentially is not feasible. It is important to understand that the kiln venting system varies throughout the drying cycle and that any deviation from the normal drying schedule can affect product quality. A primary reason Weyerhaeuser is transitioning to continuous kiln technology is to produce higher quality/more consistent product, and attempting to collect and route dryer air from the kiln would adversely impact product quality, potentially even resulting in unsaleable product. The technical feasibility issues associated with collecting the lumber dry kiln exhaust gases and routing them to an add-on control device apply to all the control technologies identified in Section 4.1.1 except for work practice standards. Additional technical feasibility analyses for each of the add-on control technologies identified in Section 4.1.1 is presented below.

<u>Carbon Adsorption</u>
Both the high temperature and high relative humidity of the exhaust from the CDKs would limit the effectiveness of carbon adsorption as a VOC control technology for these sources. Carbon adsorption is not recommended for exhaust streams with relative humidity above 50% or temperatures above 150 °F. When the exhaust stream has a high relative humidity, the water molecules and VOCs in the exhaust stream compete for active adsorption site on the carbon, drastically reducing the efficiency and overall effectiveness of the adsorbent. Additionally, the high temperatures of the exhaust stream would be in the range normally used to desorb VOCs from the carbon and would prevent effective adsorption.

The exhaust from a lumber drying kiln is saturated with moisture (well over 50% moisture) for extended periods of the drying cycle. Exhaust temperature vary according to the drying cycle in conventional batch kilns can regularly reach 180°F.[6] Given that the moisture content and temperature of the lumber dry kiln exhaust gases is not within the recommended range and that the technology has never been commercially applied to a lumber dry kiln, carbon adsorption is not considered a feasible control technology for lumber kilns.

<u>Condensation</u>
In the context of kiln exhaust, the exhaust stream must be cooled to a temperature low enough such that the vapor pressure of the exhaust gases is lower than the dew point of the VOCs being condensed. The primary constituents of the VOC in the exhaust gas stream from the lumber kilns are terpenes. The temperature the exhaust stream must be to be lowered to well below 0 °F in the

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[6] Simpson, William T., ed. 1991. Dry Kiln Operators Manual. Agric. Handbook AH-188. Madison, Wl: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory,

condenser to pass through the dew point of the terpenes because of the low partial pressure/concentration present in the exhaust stream. Operating with the condenser tubes at a temperature of 0 °F would cause the water vapor in the stream to freeze on the outside of the condenser tubes, and the resulting layer of ice would materially impair the heat transfer process. In addition to coating the condenser tubes with ice, any terpenes that would condense would be very sticky and further foul the condenser tubes. For these reasons, condensation is not technically feasible to control VOC emissions from lumber kilns.

Regenerative Catalytic or Thermal Oxidation
As noted above, catalytic oxidizers are very sensitive to particle contamination. Because the new CDKs at Weyerhaeuser will all be direct-fired kilns where the ash from the wood fired burners may carry over to the add on controls, an RCO would not be a technically feasible control option.

Also as discussed previously, several technical issues are associated with exhaust capture for lumber kilns. One of the most problematic concerns is that withdrawal of exhaust from the kiln will upset the drying conditions within the kiln and adversely impact product quality. Careful control of humidity and temperature conditions is critical to ensure merchantable product quality and uniformity.

Use of regenerative thermal oxidation systems are not considered technically feasible for the reasons provided above and, hence, they are eliminated from further consideration in the BACT analysis

Biofiltration
Biofilters are extremely sensitive to several exhaust stream characteristics including moisture content, temperature, VOC species and concentration, and bed retention time. Generally, biofiltration is an efficient control method for an exhaust stream with a consistent flow of VOC and relatively low operating temperature. Manufacturer data are unavailable for a biofiltration system that would control an exhaust gas stream with characteristics similar to that for a lumber kiln, which has a variable flow rate, moisture content, temperature, and VOC concentration over the kiln cycle. Microorganisms in biofilters that break down VOCs generally do not thrive at temperatures more than 110 °F.[7] Kiln exhaust temperatures throughout the kiln will vary from approximately 110 °F to 180 °F with an average exhaust temperature well above the 110 °F maximum for the microorganisms. Such high temperatures would readily kill the VOC-consuming microorganisms in the system. No system has been demonstrated in practice for cooling kiln exhaust streams to the appropriate temperatures, and, hence, the use biofiltration is eliminated because of technical infeasibility.

4.4.3 Rank Remaining Control Technologies by Effectiveness

Work practice standards are the only remaining technically feasible control technology for lumber kilns.

[7] Biofilters operating at higher temperatures (130 °F) utilizing thermophilic bacteria are used to treat organic hazardous air pollutants in wood products operations, but these biofilters are ineffective in treatment of terpenes (the predominant VOC in lumber kiln exhaust).

4.4.4 Evaluate Technically Feasible Control Options

The only technically feasible control option is work practice standards, and no adverse economic, environmental, or energy impacts are associated with implementing work practices to limit VOC emissions from the new CDKs.

4.4.5 Select BACT for VOC Emissions

Results of the BACT analysis indicate no technologically feasible add-on control technology for lumber kilns. Weyerhaeuser proposes a work practices standard as BACT and emission limit of 4.34 pounds per thousand board feet (lb/Mbf), which is equivalent to the latest VOC emission factor for gasifier kilns found in NCDAQ's "Wood Kiln Emissions Calculator."[8]

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined work practice standards of proper operation and maintenance consistent with the manufacturer's recommendation is BACT for VOC emissions from the new CDKs, and the BACT emission limit is 4.34 lb/Mbf of VOC as pinene from the kilns.

4.5 Proposed BACT

Based on the BACT analyses for the PSD project discussed in Section 4.4 above, the NCDAQ has determined the technology and limitations presented in the following table are BACT for the CDKs at Weyerhaeuser.

Table 5. Summary of BACT Determinations for the Sampson Plant

Emission Source	Pollutant	Control Technology or Work Practice	Proposed Emission Limit
Three direct-fired continuous dry kilns (ID Nos. CDK1, CDK2, and CDK3)	VOC	Work practice standards	4.34 lb/Mbf as pinene

The BACT permit condition for the CDKs is provided as follows:

Section 2.1 I.3

3. **15A NCAC 02D .0530: PREVENTION OF SIGNIFICANT DETERIORATION**
    a. The Permittee shall comply with all applicable provisions, including the notification, testing, reporting, recordkeeping, and monitoring requirements in accordance with 15A NCAC 02D .0530, "Prevention of Significant Deterioration of Air Quality" as promulgated in 40 CFR 51.166.

    b. The following emission limits shall not be exceeded:

Emission Source	Pollutant	BACT Limit	Units	Averaging Period	Technology
three direct-fired continuous dry kilns **(ID Nos. CDK1, CDK2, and CDK3)**	VOC (as pinene)	4.34 737.8	lb/MBF ton/yr	n/a	Good design and operating practices

[8] NCDAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007).

c. To ensure compliance with the emission limits given in 2.1 I.3.b above, the Permittee shall not exceed 340 million board feet per year of lumber dried in three direct-fired continuous dry kilns **(ID Nos. CDK1, CDK2, and CDK3).**

d. The existing thermal oil heaters **(ID Nos. ES-SEH-1901, ES-SEH-2901, and ES-SEH-3901),** the existing indirectly-heated lumber drying kilns **(ID Nos. ES-DK1 through ES-DK7**), and the existing diesel fuel-fired engines **(ID Nos. ES-GN-1 and ES-GN-3)** shall be permanently shutdown no later than 18 months after startup of the first direct wood-fired/ natural gas-fired continuous dry kiln **(ID Nos. CDK1, CDK2, or CDK3)**.

Testing [15A NCAC 02Q .0308(a)]

e. If emissions testing is required, the testing shall be performed in accordance with General Condition JJ.

Monitoring/Recordkeeping [15A NCAC 02Q .0308(a)]

f. The Permittee shall operate and maintain the three direct-fired continuous dry kilns **(ID Nos. CDK1, CDK2, and CDK3)** in accordance with the manufacturer's specifications or a site-specific plan approved by the NC DAQ Regional Administrator. The Permittee shall record any maintenance performed on the kilns each month in a logbook (written or electronic format).

g. To ensure compliance with the limits in Section 2.1 I.3.b above, the Permittee shall calculate the following:
   i. the monthly production rate and the 12-month production rate of the three direct-fired continuous dry kilns **(ID Nos. CDK1, CDK2, and CDK3)**.
   ii. the monthly VOC emissions and the 12-month VOC emissions from the three direct-fired continuous dry kilns **(ID Nos. CDK1, CDK2, and CDK3`)**. VOC emissions shall be determined by multiplying the total amount of lumber dried in the kilns by an emission factor of 4.34 pounds of VOC emissions per thousand board feet (MBF) of lumber dried.

h. The Permittee shall record the production rates and VOC emissions specified in Sections 2.1 I.3.f.i and ii above each month in a logbook (written or electronic format).

Reporting [15A NCAC 02Q .0308(a)]

i The Permittee shall submit a semiannual summary report of monitoring and recordkeeping activities given in Sections 2.1 I.3. e and f above postmarked on or before January 30 of each calendar year for the preceding six-month period and on or before July 30 of each calendar year for the preceding six-month period. The report shall contain the following:
   i. The monthly volatile organic compound emissions from the three direct-fired continuous dry kilns **(ID Nos. CDK1, CDK2, and CDK3)** the previous 17 months. The emissions must be calculated for each of the 12-month periods over the previous 17 months; and
   ii. The monthly quantities of lumber dried in the three direct-fired continuous dry kilns **(ID Nos. CDK1, CDK2, and CDK3)** each kiln for the previous 17 months. The amount of lumber dried must be calculated for each of the 12-month periods over the previous 17 months.

Testing to verify the emission factor is not feasible. Emissions from the CDKs are not exhausted from stacks but through roof vents and open doors at both ends of the kilns. Protocols for testing the kilns without stacks would be difficult to establish.

5.0 PSD Air Quality Impact Analysis

The PSD modeling analysis described in this section was conducted in accordance with current NCDAQ and US EPA PSD directives and modeling guidance.

5.1 Class II Area Significant Impact Air Quality Modeling Analysis

A significant impact analysis was not conducted given that project emission increases were below SERs for PSD pollutants with Class II Area Significant Impact Levels (SIL).

5.1.1 Class II Area Tier 1 Screening Analysis for Ozone Precursors

A Tier 1 screening analysis was conducted to evaluate project precursor emissions impacts on secondary formation of ozone in Class II areas. The screening analysis was based on methodologies taken from EPA's Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2. 5 under the PSD Permitting Program (April 30, 2019). Table 6 below shows the VOC project emissions along with representative and conservative 8-hour ozone MERPs value. The total project emissions as a percentage of the MERPs values is also shown and indicates project impacts on ozone are below the 100% normalized threshold. Therefore, project impacts on 8-hour ozone were conservatively screened below the 100% threshold demonstrating that the project will not cause or contribute to a violation of the NAAQS.

Table 6. MERPs Screening of Ozone Precursors

Secondary Pollutant	VOC Project Emissions (tpy)	VOC MERP (tpy)	Total of % MERPS
8-hour Ozone	334.9	1,049	32%

5.2 Class II Area Full Impact Air Quality Modeling Analysis

Class II Area NAAQS and PSD Increment full impact analyses were not required because project emission increases were below SERs for PSD pollutants with established NAAQS and Class II Area PSD Increments.

5.3 Non-Regulated Pollutant Impact Analysis for North Carolina Air Toxics

Table 7 below provides facility-wide emissions of TAPs after the CDK project. Emissions rates of TAPs were first compared with their associated TAP permitting emission rate (TPERs) in 15A NCAC 02Q .0711 as shown in the table. Five TAPs – acrolein, arsenic, benzene, cadmium, and formaldehyde – exceeded their TPER and were further evaluated in facility-wide modeling.

Table 7. Emissions of TAPs from the CDK Project

TAP	Potential Emissions			TPERS			Modeling Required
	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	
Acetaldehyde	1.63E+00	3.91E+01	1.43E+04	6.80			NO
Acrolein	2.33E-01	5.59E+00	2.04E+03	0.02			YES
Arsenic	1.21E-03	2.91E-02	1.06E+01			0.053	YES
Benzene	2.95E-02	7.08E-01	2.59E+02			8.1	YES
Benzo(a)pyrene	4.78E-06	1.15E-04	4.18E-02			2.2	NO
Beryllium	9.58E-06	2.30E-04	8.39E-02			0.28	NO
Di(2-ethylhexyl)phthalate	5.58E-06	1.34E-04	4.89E-02		0.63		NO
Cadmium	3.71E-04	8.90E-03	3.25E+00			0.37	YES
Carbon Tetrachloride	1.18E-03	2.84E-02	1.04E+01			460	NO
Chlorobenzene	1.99E-03	4.78E-02	1.74E+01		46		NO
Chloroform	2.40E-03	5.76E-02	2.10E+01			290	NO

Table 7. Emissions of TAPs from the CDK Project							
TAP	**Potential Emissions**			**TPERS**			**Modeling Required**
	lb/hr	**lb/day**	**lb/yr**	**lb/hr**	**lb/da y**	**lb/yr**	
ethylene dichloride	3.50E-03	8.41E-02	3.07E+01			260	NO
Formaldehyde	1.98E+00	4.76E+01	1.74E+04	0.04			YES
Hexane	2.12E-01	5.08E+00	1.86E+03		23		NO
Hydrochloric acid	1.92E-02	4.61E-01	1.68E+02	0.18			NO
Hydrofluoric acid	3.05E-03	7.32E-02	2.67E+01	0.064	0.63		NO
Manganese	1.52E-02	3.66E-01	1.34E+05		0.63		NO
Mercury	9.91E-05	2.38E-03	8.68E-01		0.013		NO
Methyl chloroform	6.43E-03	1.54E-01	5.60E+01	64	250		NO
Methyl ethyl ketone	3.88E-02	9.32E-01	3.40E+02	22.4	78		NO
Methyl isobutyj ketone	5.34E-02	1.28E+00	4.68E+02	7.6	52		NO
Methylene chloride	1.40E-02	3.37E-01	1.23E+02	0.39		1600	NO
Nickel	1.06E-03	2.55E-02	9.29E+00		0.13		NO
Pentachlorophenol	2.57E-05	6.16E-04	2.25E-01	0.0064	0.063		NO
Phenol	2.15E-03	5.16E-02	1.88E+01	0.24			NO
Styrene	5.63E-02	1.35E+00	4.93E+02		2.70		NO
Toluene	4.28E-03	1.03E-01	3.75E+01	14.4	98		NO
Trichloroethylene	2.39E-03	5.73E-02	2.09E+01			4000	NO
Vinyl chloride	2.21E-03	5.30E-02	1.93E+01			26	NO
Xylenes	6.26E-04	1.50E-02	5.49E+00	16.4	57		NO

Notes:

- Detailed emission calculations are provided Appendix B of Air Permit Application No. 7400252.19A.
- Potential emissions from the CDKs are based on the higher of the two scenarios for each pollutant: Scenario 1 – Emissions from Direct Wood Firing in Kilns or Scenario 2 – Emissions from Natural Gas Firings in Kilns.
- Emission factors for direct wood-fired drying (Scenario 1) are developed from NCASI data for direct wood firing test data, where available, or NCASI data for wood combustion.
- No sufficient test data was available from CDKs burning natural gas (Scenario 2). Therefore, the indirect drying emission factors paired with natural gas combustion emission factors were selected as the most representative for this scenario.

The air toxics dispersion modeling analysis was conducted to evaluate ambient impacts from facility-wide toxic TAP emissions rates from the project estimated to exceed those outlined in 15A NCAC 02Q .0711. The modeling of maximum-allowable TAPs emissions adequately demonstrates compliance with Acceptable Ambient Levels (AALs) outlined in 15A NCAC 02D. 1104, on a source-by-source basis, for acrolein, arsenic, benzene, cadmium, and formaldehyde. The modeled impacts from facility-wide TAPs potential emissions as a percentage of AALs are presented below in Table 8.

TAPs emissions modeled for the proposed project are the result of direct-fired continuous kilns emissions from green sawdust and biomass combustion and lumber drying. Modeled TAPs emissions and release parameters were derived assuming 8,760 hours per year facility operations. A total of 12 pseudo horizontal release point sources were modeled for each of the three kiln exit and entrance openings. The pseudo point source releases assumed an exit temperature equivalent to the average kiln operating temperature. Release height was assumed equivalent to the height of the kiln doors, and diameter was the width of the kiln doors. A vapor extraction module (VEM) located on the roof near each end of the CDKs were also modeled as point sources. Modeled CDK emissions rates were estimated assuming a 60% capture rate for the VEMs; thus 40% of CDK emissions were modeled as exhausting through the kiln door pseudo point sources. Two fire pump-engines and one emergency generator were also modeled.

Weyerhaeuser evaluated the pollutant's emissions using AERMOD (Version 19191) with five years (2014 - 2018) of National Weather Service (NWS) surface weather data from the Rocky Mount - Wilson Regional Airport in Rocky Mount, NC and upper air meteorological data from the National Weather Surface Office in Newport, NC. The area, including and surrounding the site, is classified rural, based on the land use type scheme established by Auer 1978. Direction specific building dimensions, determined using the BPIP PRIME program, were used as input to the model for building wake effects. Full terrain elevations were included, as were normal regulatory defaults. Receptors were placed in ambient air beginning at the property boundary and were sufficient to establish maximum impacts. The modeling results demonstrate compliance with NC Air Toxics.
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Table 8. Results of Air Toxics Maximum Impacts Modeling based on Potential Emissions

Pollutant	**Averaging Period**	**AAL ($\mu g/m^3$)**	**% of AAL**
Acrolein	1-hour	80	4%
Arsenic	Annual	0.0021	37%
Benzene	Annual	0.12	16%
Cadmium	Annual	0.0055	4%
Formaldehyde	1-hour	150	20%

Weyerhaeuser also included air dispersion modeling for potential emissions impacts optimized to 98% of the AALs. The optimized modeling results and modeling results based on potential emissions shown in Table 8 above demonstrate compliance with NC Air Toxics for the CDK project. Thus, the increase in TAP emissions associated with the CDK project do not pose an unacceptable risk to human health.

The three new CDKs are subject to MACT Subpart DDDD, and as such, are exempt from NC Air Toxics in accordance with 15A NCAC 02Q .0702(a)(27). Therefore, the optimized emissions cannot be included in the air permit as emission limits.

5.4 Additional Impact Analysis

Additional impact analyses were conducted for ozone, growth, soils and vegetation, and visibility impairment.

5.4.1 Growth Impacts

Weyerhaeuser is an existing facility and there will be no additional permanent jobs added due to the proposed project. Therefore, this project is not expected to cause a significant increase in growth in the area.

5.4.2 Soils and Vegetation

The project ozone impacts on soils and vegetation was analyzed by reviewing ozone monitor concentrations for Pitt County. Monitored ozone design values are below the 70 ppb NAAQS, and no impacts on soils and vegetation is expected from the project.

5.4.3 Class II Visibility Impairment Analysis

A Class II visibility impairment analysis was not conducted as the project is not subject to PSD review for pollutants that have attributes contributing to visible plume impacts (NOx, PM10 and PM2.5).

5.5 Class I Area - Additional Requirements

Three Federal Class I Areas are located within 300 km of the Weyerhaeuser facility – Swanquarter NWR, James River Face Wilderness, and Cape Romain National Wildlife Refuge. The Federal Land Manager for each of those areas was contacted and none of them required any analysis. Thus, no analysis was conducted.

5.5.1 Class I Area Significant Impact Level Analysis

A Class I Area significant impact screening analysis was not required because project emission increases were below SERs for PSD pollutants with established Class I PSD Increments.

5.5.2 Class I Increment/Air Quality Related Values Regional Haze Impact and Deposition Analyses

The project does not include significant emissions of pollutants with established Class I Area Increments or Deposition Analysis Thresholds. The project also does not include significant emissions of visibility-impairing pollutants such as NOx, SO_2, PM2.5, and PM10. Therefore, analysis of project impacts on Class I Area Air Quality Related Values (AQRVs) was not required.

Federal Land Managers were notified of the PSD project following the pre-application meeting. Notification of the PSD project was transmitted via email from NCDAQ on August 7, 2019 to representatives of the U. S. Fish and Wildlife Service (USFWS), U. S. Forest Service (USFS), and the National Park Service (NFS). FLM representatives from the USFWS and NFS did not respond to the email notification with any comments or requests for more information. The USFS responded August 7, 2019 via email indicating that no Class I analysis would be requested for USFS areas.

5.6 PSD Air Quality Modeling Result Summary

Based on the PSD air quality ambient impact analysis performed, the proposed CDK project will not cause or contribute to any violation of the Class II NAAQS, PSD increments. Class I increments, or any FLM AQRVs. The modeling of maximum allowable TAPs emissions adequately demonstrates compliance with AALs outlined in 15A NCAC 02D. 1104, on a source-by-source basis, for acrolein, arsenic, benzene, cadmium, and formaldehyde.

6.0 Other Issues

6.1 Compliance

NCDAQ has reviewed the compliance status of Weyerhaeuser. Robert Bright of WaRO conducted the most recent compliance inspection at the facility on April 29, 2019. The Permittee appeared to be operating in compliance with all applicable air quality regulations and permit conditions at the time of inspection. Weyerhaeuser has no history of noncompliance within the last five years.

6.2 Zoning Requirements

A local zoning consistency determination is required. A copy of the zoning consistency determination dated November 19, 2019 from the Interim Town Manager of Grifton, North Carolina was received on November 22, 2019.

6.3 Professional Engineer's Seal

A Professional Engineer's seal was included with the application. Elizabeth J. Robinson of AECOM Technical Services of NC, Inc. is a Professional Engineer currently registered in the State of North Carolina. Ms. Robinson sealed the application for the portions containing the engineering plans, calculations, and all supporting documentation.

6.4 Application Fee

An application fee in the amount of $15,119.00 was received with the PSD permit application on November 12, 2019.

6.5 Public Participation Requirements

In accordance with 40 CFR 51.166(q), public participation, the reviewing authority (NCDAQ) shall meet the following:

1) Make a preliminary determination whether construction should be approved, approved with conditions, or disapproved.

   This document satisfies this requirement providing a preliminary determination that construction should be approved consistent with the permit conditions described herein.

2) Make available in at least one location in each region in which the proposed source would be constructed a copy of all materials the applicant submitted, a copy of the preliminary determination, and a copy or summary of other materials, if any, considered in making the preliminary determination.

   This preliminary determination, application, and draft permit will be made available in the Washington Regional Office and in the Raleigh Central Office, with the addresses provided below.

Washington Regional Office 943 Washington Square Mall Washington, NC 27889	Raleigh Central Office 217 West Jones Street Raleigh, NC 27603

In addition, the preliminary determination and draft permit will be made available on the NCDAQ public notice webpage.

3) Notify the public, by advertisement in a newspaper of general circulation in each region in which the proposed source would be constructed, of the application, the preliminary determination, the degree of increment consumption that is expected from the source or modification, and of the opportunity for comment at a public hearing as well as written public comment.

   The NCDAQ prepared a public notice (See Attachment 1) that will be published in a newspaper of general circulation in the region.

4) Send a copy of the notice of public comment to the applicant, the Administrator and to officials and agencies having cognizance over the location where the proposed construction would occur as follows: Any other State or local air pollution control agencies, the chief executives of the city and county where the source would be located; any comprehensive regional land use planning agency, and any State, Federal Land Manager, or Indian Governing body whose lands may be affected by emissions from the source or modification.

   The NCDAQ will send the public notice (See Attachment 1) to Mark Warren, Interim Town Manager of Grifton, PO Box 579, Grifton NC 28530.

5) Provide opportunity for a public hearing for interested persons to appear and submit written or oral comments on the air quality impact of the source, alternatives to it, the control technology required, and other appropriate considerations.

   The NCDAQ public notice (See Attachment 1) provides contact information to allow interested persons to submit comments and/or request a public hearing.

7.0 Conclusion

Based on the application submitted and the review of this proposal, the NCDAQ is making a preliminary determination that the project can be approved and a revised permit issued. After consideration of all comments, a final determination will be made.

Attachment 1
Public Notice for Weyerhaeuser NR Company – Grifton

PUBLIC NOTICE
PUBLIC NOTICE ON PRELIMINARY DETERMINATION REGARDING APPROVAL OF AN APPLICATION SUBMITTED UNDER THE "REGULATIONS FOR THE PREVENTION OF SIGNIFICANT DETERIORATION OF AIR QUALITY"
FOR
WEYERHAEUSER NR COMPANY - GRIFTON

Weyerhaeuser NR Company – Grifton has applied to the North Carolina Department of Environmental Quality, Division of Air Quality (DAQ), Permitting Section, to make modifications to the facility located at 371 East Hanrahan Road, Grifton, NC 28530, Pitt County. The proposed project includes the implementation of Best Available Control Technology for three new continuous direct fired kilns and an increase of production to 340 million board feet per year of lumber.

The proposed project is subject to review and processing under North Carolina Administrative Code (NCAC), Title 15A, Subchapter 02D.0530, "Prevention of Significant Deterioration" (PSD). The facility is defined as a "major stationary source" under PSD, and the proposed project is a "major modification" because it will result in a significant emissions increase of volatile organic compounds.

Weyerhaeuser NR Company – Grifton's application has been reviewed by the DAQ, Air Quality Permitting Section in Raleigh, North Carolina to determine compliance with the requirements of the North Carolina Environmental Management Commission air pollution regulations.

A preliminary review, including analysis of the impact of the facility emissions on local air quality, has led to the determination that the project can be approved, and the DAQ air permit issued, if certain permit conditions are met.

Pitt County is classified as an attainment area for all pollutants. Compliance with all ambient air quality standards and the PSD increments is projected.

Persons wishing to submit written comments or request a public hearing regarding the Air Quality Permit are invited to do so. Requests for a public hearing must be in writing and include a statement supporting the need for such a hearing, an indication of your interest in the facility, and a summary of the information intended to be offered at such hearing.

Written comment or requests for a public hearing should be postmarked no later than May 6, 2020 and addressed to daq.publiccomments@ncdenr.gov (please type "Weyerhaeuser Grifton.19A" in the subject line) or mail written comments to: Betty Gatano, P.E., NC DEQ, Division of Air Quality, 1641 Mail Service Center, Raleigh, NC 27699 1641.

All comments received or postmarked by this date will be considered in the final determination regarding the Air Quality Permit. A public hearing may be held if the Director of the DAQ determines that significant public interest exists or that the public interest will be served.

A copy of all data and the application submitted by Weyerhaeuser NR Company - Grifton, and other material used by the DAQ in making this preliminary determination are available for public inspection during normal business hours at the following locations:

NC DEQ		Washington Regional Office
Division of Air Quality	or	943 Washington Square Mall
Air Permits Section		Washington, NC 27889
217 West Jones Street, Suite 4000		
Raleigh, NC 27603		

Information on the proposed permit, the permit application, and the staff review is available on the DAQ website (https://deq.nc.gov/about/divisions/air quality/events) or by writing or calling:

NC DEQ
William D. Willets, P.E.
Chief, Permitting Section
North Carolina Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699 1641
Telephone: 919 707 8400

After weighing relevant comments received by May 6, 2020 and other available information on the project, the DAQ will act on the PSD application.

Michael A. Abraczinskas, Director
Division of Air Quality, NCDEQ