

**To:** Aaron Manley, Olympic Region Clean Air Agency  
**cc:** Michael Nolan and Christine Yanik, Weyerhaeuser NR Company; Nancy Liang, Trinity Consultants  
**From:** Matt Goldman, Trinity Consultants  
**Date:** March 8, 2024  
**RE:** Weyerhaeuser CDK BACT Condition Examples

As a supplement to Weyerhaeuser’s Notice of Construction (NOC) application #23NOC1614, this memo provides a compilation of Best Available Control Technology (BACT) conditions found in permits for continuous dry kilns (CDKs) at other Weyerhaeuser facilities.

**CDK BACT Conditions Summary**

Facility: Weyerhaeuser Philadelphia, MS  
 Agency: Mississippi Department of Environmental Quality  
 Permit Type: PSD  
 Permit No.: 1920-00012  
 Relevant Condition Nos.: 3.1, 3.2, 3.3, 4.1

**SECTION 3. EMISSION LIMITATIONS AND STANDARDS**

Emission Point(s)	Applicable Requirement	Condition Number	Pollutant / Parameter	Limitation / Standard
AA-000	11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j), as established in PSD Permit to Construct issued March 17, 2005; Modified May 22, 2008, February, 2009, October 15, 2018, and June 13, 2022  (PSD BACT Limit)	3.1	Lumber Throughput	325,000 MBF / Year (Combined Kilns; Rolling 12-Month Total)
AA-038 AA-039 AA-043	11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j), as established in PSD Permit to Construct issued March 17, 2005; Modified May 22, 2008, February, 2009, October 15, 2018, and June 13, 2022  (PSD BACT Limits)	3.2	VOCs (as WPP1)	4.52 Pounds / MBF; and 734.5 tpy (Rolling 12-Month Rolling Total; Combined Kilns)
	11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j), as established in PSD Permit to Construct issued October 15, 2018 and modified June 13, 2022  (PSD BACT Limit)	3.3	Final Moisture Content	12.0% or Greater (Monthly Average)
	11 Miss. Admin. Code Pt. 2, R. 2.2.B(10), as established in Permit to Construct issued September 26, 2014 and modified in PSD Permit to Construct issued June 13, 2022	3.4	Fuel Source Restriction	Combust Uncontaminated Wood Waste and Char (Diesel May be Used During a Start-Up Period)

- 3.1 For Emission Point AA-000 (Facility-Wide), the permittee shall limit the throughput of lumber through any process area (i.e. the sawmill / green trimmer area; the collective lumber drying kilns; the planer mill area) to no more than 325,000.0 thousand board feet (MBF) (or 325.0 million board feet – MMBF) per year based on a rolling 12-month total basis.

[Ref.: 11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j), as established in PSD Permit to Construct issued March 17, 2005; Modified May 22, 2008, February, 2009, October 15, 2018, and June 13, 2022 – PSD BACT Limit)]

- 3.2 For Emission Point AA-038, AA-039, and AA-043, the permittee shall limit the emission of volatile organic compounds as determined by Wood Protocol 1 (VOC as WPP1) from each kiln to no more than 4.52 pounds per MBF. Additionally, the permittee shall limit the total emission of VOCs (as WPP1) from the all kilns combined to no more than 734.5 tons per year (tpy) based on a rolling 12-month total basis.

(Ref.: 11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j), as established in PSD Permit to Construct issued March 17, 2005; Modified May 22, 2008, February, 2009, October 15, 2018, and June 13, 2022 – PSD BACT Limits)

- 3.3 For Emission Point AA-038, AA-039, and AA-043, the permittee shall limit the final moisture content of lumber dried within kiln to at least twelve (12.0) percent based on a monthly average.

(Ref.: 11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j), as established in PSD Permit to Construct issued October 15, 2018 and modified June 13, 2022 – PSD BACT Limit)

## SECTION 4. WORK PRACTICE STANDARDS

Emission Point(s)	Applicable Requirement	Condition Number	Pollutant / Parameter	Work Practice
AA-038 AA-039 AA-043	11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j) (PSD BACT Standard)	4.1	VOCs	Implement and Maintain a Good Work Practices Plan

4.1 For Emission Points AA-038, AA-039, and AA-043, the permittee shall implement and maintain a "Good Work Practices Plan" that establishes work practice standards in accordance with the manufacturer's recommendations for continuous direct-fired kiln operations. The plan shall establish a routine for conducting inspections and preventative maintenance on the kiln that includes (at a minimum) the following actions:

- (a) Conducting walk-around inspections;
- (b) Confirming proper wet-bulb operation;
- (c) Conducting entrance / exit baffle and damper inspections;
- (d) Checking wet-bulb wicks for integrity;
- (e) Greasing the kiln cart wheels and fan shaft bearings;
- (f) Conducting circulation, exhaust, and combustion air fan inspections;
- (g) Checking hydraulic oil levels;
- (h) Calibrating moisture content equipment (as applicable);
- (i) Calibrating temperature probe equipment;
- (j) Conducting burner clean-outs and tune-ups;
- (k) Checking for leaks in kiln pipe-work;
- (l) Checking shaft seals at wall penetrations (as applicable);
- (m) Conducting rotary air locks and fuel blowers inspections;
- (n) Conducting recirculation, ignition, combustion, over-fire and bridge wall blowers inspections; and
- (o) Conducting wood feed screws and kiln burners inspections.

The permittee shall perform all inspections and maintenance actions on the schedule specified in the plan. However, if any problem is noted during an inspection, the permittee

shall perform the necessary corrective maintenance to ensure the operation of the kiln as originally designed.

(Ref.: 11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j) – PSD BACT Standard)

Facility: Weyerhaeuser Bruce, MS  
 Agency: Mississippi Department of Environmental Quality  
 Permit Type: PSD  
 Permit No.: 0300-00032  
 Relevant Condition Nos.: 3.6, 3.7, 3.8, 4.1

### SECTION 3. EMISSION LIMITATIONS AND STANDARDS

Emission Point(s)	Applicable Requirement	Condition Number	Pollutant / Parameter	Limitation / Standard
AA-100 (Facility-Wide)	11 Miss. Admin. Code Pt. 2, R. 1.3.F(1).	3.1	PM (filterable)	$E = 4.1(p^{0.67})$
	11 Miss. Admin. Code Pt. 2, R. 1.3.A.	3.2	Opacity (Smoke)	≤ 40%
	11 Miss. Admin. Code Pt. 2, R. 1.3.B.	3.3	Opacity	
AA-018 AA-019 AA-023	11 Miss. Admin. Code Pt. 2, Ch. 5., as established in the PSD Permit to Construct issued April 1, 2016 and modified August 17, 2021	3.4	Fuel Source Restriction	Combust Uncontaminated Wood Waste and Char (Diesel May be Used During a Start-Up Period)
	40 CFR Part 63, Subpart DDDD – NESHAP: Plywood and Composite Wood Products 40 CFR 63.2231(a) and (b), 63.2233(a); Subpart DDDD	3.5	HAPs	General Applicability
	11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j) (PSD BACT Limits)	3.6	VOCs (as WPP1)	4.52 Pounds / MBF; and 734.5 tpy (12-Month Rolling Total)
		3.7	Dried Lumber Throughput	325,000.0 MBF / Year (Combined Kilns; 12-Month Rolling Total)
		3.8	Final Moisture Content	12.0% or Greater (Monthly Average)

- 3.6 For Emission Points AA-018, AA-019 and AA-023, the permittee shall limit the emission of volatile organic compounds as determined by Wood Products Protocol 1 (VOCs as WPP1) to no more than 4.52 pounds per thousand board feet (MBF) and no more than 734.5 tons per year (tpy) based on a 12-month rolling total basis.

(Ref.: 11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j) – PSD BACT Limit)

- 3.7 For Emission Points AA-018, AA-019, and AA-023, the permittee shall limit the total throughput of lumber dried in the combined kilns to no more than 325,000.0 thousand board feet (MBF) per year based on a 12-month rolling total basis.

(Ref.: 11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j) – PSD BACT Limit)

- 3.8 For Emission Points AA-018, AA-019, and AA-023, the permittee shall limit the final moisture content of dried lumber produced within each kiln to 12.0% or greater based on a monthly average.

(Ref.: 11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j) – PSD BACT Limit)

## SECTION 4. WORK PRACTICE STANDARDS

Emission Point(s)	Applicable Requirement	Condition Number	Pollutant / Parameter	Work Practice
AA-018 AA-019 AA-023	11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j) (PSD BACT Standard)	4.1	VOCs	Develop, Implement, and Maintain a Good Work Practices Plan

4.1 For Emission Points AA-018, AA-019, and AA-023, the permittee shall develop, implement, and maintain a “Good Work Practices Plan” that establishes work practice standards in accordance with the manufacturer’s recommendations for continuous direct-fired kiln operations. The plan shall establish a routine for conducting preventative maintenance on the kiln that includes (at a minimum) the following actions:

- (a) Conducting walk-around inspections;
- (b) Confirming proper wet-bulb operation;
- (c) Conducting entrance / exit baffle and damper inspections;
- (d) Checking wet-bulb wicks for integrity;
- (e) Greasing the kiln cart wheels and fan shaft bearings;
- (f) Conducting circulation, exhaust, and combustion air fan inspections;
- (g) Checking hydraulic oil levels;
- (h) Calibrating moisture content equipment (as applicable);
- (i) Calibrating temperature probe equipment;
- (j) Conducting burner clean-outs and tune-ups;
- (k) Checking for leaks in kiln pipe-work;
- (l) Checking shaft seals at wall penetrations (as applicable);
- (m) Conducting rotary air locks and fuel blowers inspections;
- (n) Conducting recirculation, ignition, combustion, over-fire and bridge wall blowers inspections; and
- (o) Conducting wood feed screws and kiln burners inspections.

The permittee shall perform all inspections and maintenance actions on the schedule specified in the plan. If any problem is noted during an inspection, the permittee shall perform the necessary unscheduled maintenance to ensure the operation of the kiln as originally designed.

(Ref.: 11 Miss. Admin. Code Pt. 2, Ch. 5. and 40 CFR 52.21(j) – PSD BACT Standard)

Facility: Weyerhaeuser Millport, AL  
 Agency: Alabama Department of Environmental Management  
 Permit Type: PSD  
 Permit No.: X023  
 Relevant Condition Nos.: 1.b, 2.b, 4.a, 4.b

**Emission Unit Nos. 001, 002, and 003 (CDK-4, CDK-5, CDK-6)**  
**Unit Specific Provisos**

Federally Enforceable Provisos	Regulations
<p><b>1. Applicability</b></p> <p>(a) These units are subject to the applicable requirements of ADEM Admin. Code r. 335-3-16-.03, "Major Source Operating Permits."</p> <p>(b) These units are subject to a Best Available Control Technology (BACT) limit for volatile organic compounds (VOC) established pursuant to the applicable requirements of ADEM Admin. Code r. 335-3-14-.04, "Air Permits Authorizing Construction in Clean Air Areas [Prevention of Significant Deterioration Permitting (PSD)]".</p>	<p>ADEM Admin. Code r. 335-3-16-.03</p> <p>ADEM Admin. Code r. 335-3-14-.04</p>

**2. Emission Standards**

- |   |                                  |
|---|----------------------------------|
| <b>(a)</b> The Permittee shall not cause or allow the particulate matter emission rate from each kiln to exceed 3.4 lb/hr.  | ADEM Admin. Code r. 335-3-14-.04 |
| <b>(b)</b> The Permittee shall not cause or allow the VOC emissions from each kiln to exceed 4.70 lb/MBF as WPP1 (as VOC expressed as propane, determined as VOC as $C \times 1.225 + [(1 - 0.65) \times \text{Methanol}] + \text{Formaldehyde}$ ). | ADEM Admin. Code r. 335-3-14-.04 |

#### 4. Emission Monitoring

The Permittee shall utilize proper maintenance and operating practices as recommended by the manufacturer, which include but may not be limited to the following:

ADEM Admin. Code r.  
335-3-14-.04 and  
ADEM Admin. Code r.  
335-3-16-.05(c)

##### a. Proper Maintenance Practices:

- i. Conduct daily routine maintenance to include cleaning debris from around kiln and pusher tracks;
- ii. Conduct weekly routine maintenance to include the greasing kiln fan shafts;
- iii. Conduct quarterly routine maintenance to include greasing and lubricate fan motors and bearings;
- iv. Conduct semiannual routine maintenance to include checking and retightening (if needed) motor mount bolts and taper lock bolts;
- v. Conduct annual routine maintenance to include the following:
  1. Inspect controller cabinet for dust and small debris;
  2. Inspect all sensors for proper operation;
  3. Inspect and adjust (if needed) all intake vent lids to assure they are opening and closing in unison and that they close tightly;
  4. Inspect all rods and linkage bolts for tightness, wear, and necessary maintenance or replacement;
  5. Grease each rod support bearing for smooth rotation; and
  6. Remove cover and inspect motor wiring box for moisture or corroded connections. Clean and repair as needed.

##### b. Proper Operating Practices:

The Permittee shall operate each CDK in accordance with its "VOC BACT Good Operating Procedures and Work Practices" plan, dated December 16, 2016, and revised on September 6, 2018. Any change to the plan shall receive prior approval from the Air Division.

See Attachment A for Millport's "VOC BACT Good Operating Procedures and Work Practices."

Facility: Weyerhaeuser Dodson, LA  
 Agency: Louisiana Department of Environmental Quality  
 Permit Type: PSD  
 Permit No.: PSD-LA-852  
 Relevant Condition Nos.: From the Briefing Sheet

**BRIEFING SHEET**

**Dodson Division  
 Agency Interest No. 4294  
 Weyerhaeuser NR Company  
 Dodson, Winn Parish, Louisiana  
 PSD-LA-852**

**TYPE OF REVIEW**

VOC increases from the proposed project will be above its PSD significance level. Therefore, the requested permit was reviewed in accordance with PSD regulations for VOC emissions.

**BEST AVAILABLE CONTROL TECHNOLOGY**

VOC increases are above its PSD significance level and must undergo PSD analyses. The selection of control technology was based on the BACT analysis using a “top down” approach.

<b>Summary of VOC BACT Determinations for “Dodson Expansion Project”</b>		
<b>Emission Point Number</b>	<b>Source Description</b>	<b>Control Technology or Work Practice</b>
061, 062, and 063	Continuous Lumber Drying Kilns A, B, and C	No Add-on Control. An emission limit of 4.33 lb/MBF, along with Proper Kiln Design and Good Combustion Practices, which include proper temperature and process management, drying to appropriate moisture content, and following the vendor recommended kiln maintenance schedule are determined as BACT.
CDKA-ABT, CDKB-ABT, CDKC-ABT, CDKA-BYP, CDKB-BYP, and CDKC-BYP	Continuous Lumber Drying Kilns A, B, and C Abort and Bypass Stacks	No Add-on Control. Proper Kiln Design and Good Operating Practices, which include proper temperature and process management, drying to appropriate moisture content, and following the vendor recommended kiln maintenance schedule are determined as BACT.
064, 065, and 066	CDK Fuel Silo/Cyclone/Filters A, B, and C	No Add-on Control. Operate the equipment per manufacturer’s recommendations is determined as BACT.

Facility: Weyerhaeuser Greenville, NC  
 Agency: North Carolina Department of Environmental Quality  
 Permit Type: PSD  
 Permit No.: 06270T29  
 Relevant Condition Nos.: D.1(b)

**1. 15A NCAC 02D .0530: PREVENTION OF SIGNIFICANT DETERIORATION**

- a. The Permittee shall comply with all applicable provisions, including Best Available Control Technology (BACT), notification, testing, reporting, recordkeeping, and monitoring requirements in accordance with 15A NCAC 02D .0530, "Prevention of Significant Deterioration".
- b. The Permittee shall comply with the following BACT during all periods of operation (normal, startup, shutdown, and malfunction):

Emission Source	Regulated NSR Pollutant	BACT	Control Description
Two direct-fired continuous dry kilns (ID Nos. ES-CDK1 and ES-CDK2)	VOC	4.34 lb/1000 bd-ft (as pinene), 3-hour average 737.8 tons per consecutive 12-month	Good design and operating practices
Fire pump engine (ID No. IES-GN-6)	VOC	Good operation and maintenance practices, NSPS-compliant fire pump engine, low sulfur diesel (15 ppm sulfur), and limited operations (500 annual hours)	-

Facility: Weyerhaeuser Holden, LA

Agency: Louisiana Department of Environmental Quality

Permit Type: PSD

Permit No.: PSD-LA-834

Relevant Condition Nos.: From the Briefing Sheet

### **BEST AVAILABLE CONTROL TECHNOLOGY (BACT)**

VOC increases are above its PSD significance level and must undergo PSD analyses. The selection of control technology was based on the BACT analysis using a “top down” approach.

#### **Summary of BACT Determinations for the Holden Mill**

<b>Pollutant</b>	<b>Source</b>	<b>BACT Control</b>	<b>BACT Limit</b>
VOC	Continuous Lumber Drying Kilns A and B (01-19 and 02-19)	Proper Kiln Design and Good Operating Practices	4.33 lb/M Board-feet
VOC	CDK Fuel Silo Cyclones A and B (03-19 and 04-19)  Dry Waste and Planer Shavings Quad Cyclone (05-19)  Primary Line Dust Collector Cyclone (05-20)  Oversized Chipper Cyclone (08-20)	Good Operating Practices and Proper Maintenance	N/A
VOC	Mold Inhibitor Spray Booth (07-19)	Good Housekeeping Practices	N/A
VOC	Electric QA Kiln (15-19)	Proper Kiln Design and Good Operating Practices	N/A
VOC	Diesel Storage Tank (16-19)  Diesel Tank for Fire Pump Generator (11-20)  Diesel Tank for Sawmill EGEN (12-20)  Diesel Tank for Planer Mill EGEN (13-20)	Good Tank Design / Submerged Fill Pipe	N/A
VOC	Gasoline Storage Tank (17-19)	Good Tank Design / Submerged Fill Pipe	N/A

Facility: Weyerhaeuser Plymouth, NC  
 Agency: North Carolina Department of Environmental Quality  
 Permit Type: PSD  
 Permit No.: 06389T25  
 Relevant Condition Nos.: D.4(a)

Permit 06389T25  
 Page 12

**4. 15A NCAC 02D .0530: PREVENTION OF SIGNIFICANT DETERIORATION**

a. The Permittee shall comply with the following Best Available Control Technology (BACT):

Source	Pollutant	BACT
Lumber drying kilns Nos. 6, 7 and 8 (ID Nos. ES-11-9S, ES-11-10S and ES-11-11S)	Volatile organic compounds	The daily average dry bulb temperature shall not exceed 260°F
Lumber drying kilns Nos. 6 and 7 (ID Nos. ES-11-9S and ES-11-10S)	Carbon monoxide	Kiln operation and maintenance shall be performed in accordance with the manufacturer's specifications

Facility: Weyerhaeuser Dierks, AR  
Agency: Arkansas Department of Environmental Quality  
Permit Type: Title V  
Permit No.: 0023-AOP-R16  
Relevant Condition Nos.: 16

16. The permittee shall comply with the following BACT determination for SN-72 through SN-75. Compliance with the emission limits set forth in the following table shall be demonstrated through compliance with good combustion practices, proper kiln design and maintenance. [Rule 19.901 *et seq.* and 40 C.F.R. § 52 Subpart E]

Pollutant	BACT Determination	BACT Limit
VOC	Good Combustion Practices, Proper Kiln Design, and Maintenance	3.8 lb/MBF
CO	Good Combustion Practices, Proper Kiln Design, and Maintenance	0.571 lb/MMBtu

Facility: Weyerhaeuser Idabel, OK  
Agency: Oklahoma Department of Environmental Quality  
Permit Type: Title V  
Permit No.: 2020-0027-TVR4 (M-1)  
Relevant Condition Nos.: EUG 3 Conditions D and E

- D. VOC emissions from lumber kilns shall not exceed 3.88 lb/MBF (3-hr average).
- E. At a minimum, the facility will monitor and operate Kiln 4 in accordance with the following best operating practices:
  - 1. Maintain proper kiln maintenance;
  - 2. Maintain Proper kiln operation to minimize over-drying of lumber:
    - a. Complete periodic verification of proper temperature sensor operation;
    - b. Complete periodic verification of proper fan operation;
    - c. Maintain average kiln temperature below 250 °F; and
    - d. Maintain proper stacking of lumber using kiln sticks for efficient and even kiln drying.
  - 3. The facility will also demonstrate compliance with the VOC emission rate from Kiln 4 indirectly by measuring the moisture content of the lumber just after the lumber exits the kiln or in the planer mill at least once/month and verify the 12-month rolling average final lumber moisture content is equal to or greater than 11%.

## **Attachment A**

# **Weyerhaeuser Millport's VOC BACT Good Operating Procedures and Work Practices**



# Weyerhaeuser

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## VOC BACT GOOD OPERATING PROCEDURES AND WORK PRACTICES

Weyerhaeuser NR Company, Millport Mill

Millport, Lamar County, Alabama



March 8, 2024

Prepared By:

FC&E Engineering, LLC

914 Marquette Road

Brandon, Mississippi 39043



# CONTENTS

<u>1.0</u>	<u>Introduction</u> .....	19
<u>2.0</u>	<u>Proper Maintenance</u> .....	19
<u>2.1.</u>	<u>Maintenance required by permit</u> .....	19
<u>2.2.</u>	<u>Additional maintenance to be conducted</u> .....	19
<u>2.2.1.</u>	<u>Truss Tray Type Kiln Enclosures</u> .....	19
<u>2.2.2.</u>	<u>Flat Panel and Gullwing Type Kiln Enclosures</u> .....	20
<u>2.2.3.</u>	<u>Daily Routine Maintenance</u> .....	20
<u>2.2.4.</u>	<u>Weekly Routine Maintenance</u> .....	20
<u>2.2.5.</u>	<u>Monthly Routine Maintenance</u> .....	20
<u>2.2.6.</u>	<u>Quarterly (or 2000 Hours of Operations; Whichever Comes First) Routine Maintenance Checklist</u> ...	20
<u>2.2.7.</u>	<u>6 Months (or 4,000 Hours of Operations; Whichever Comes First) Maintenance Checklist</u> .....	20
<u>2.2.8.</u>	<u>12 Months (or 8,000 Hours of Operations; Whichever Comes First) Maintenance Checklist</u> .....	20
<u>2.2.9.</u>	<u>24 Months and 50,000 Hours Maintenance Checklist</u> .....	20
<u>3.0</u>	<u>Proper operating Procedures</u> .....	20

## Worksheets

- Worksheet 1 - Annual Maintenance of Truss Tray Kiln Enclosure
- Worksheet 2 - Annual Maintenance of Flat Panel and Gullwing Type Kiln Enclosures
- Worksheet 3 - Daily Routine Maintenance Checklist
- Worksheet 4 - Weekly Routine Maintenance Checklist
- Worksheet 5 - Monthly Routine Maintenance Checklist
- Worksheet 6 - Quarterly (or 2000 Hours of Operations; Whichever Comes First) Routine Maintenance Checklist
- Worksheet 7 - 6 Months (or 4,000 Hours of Operations; Whichever Comes First) Maintenance Checklist
- Worksheet 8 - 12 Months (or 8,000 Hours of Operations; Whichever Comes First) Maintenance Checklist
- Worksheet 9 - 24 Months and 50,000 Hours Maintenance Checklist

## INTRODUCTION

The Alabama Department of Environmental Management (ADEM) issued permit number 408-S003-X022 on December 30, 2014, authorizing construction of a Continuous Direct-Fired Kiln (CDK) with a 35 MMBTU/hr gasifier burner. This permit was issued under the Prevention of Significant Deterioration (PSD) regulations and required Best Available Control Technology (BACT) review for Volatile Organic Compounds (VOC). It was determined that the addition of pollution control equipment to the CDK was infeasible and BACT was determined to be proper maintenance and operating procedures.

The CDK emission rate achievable under good operating and maintenance practices was determined to be 4.7 lb-VOC/MBF expressed as WPP1 under the "Wood Products Protocol." Compliance with this emission rate is presumed as long as the good operating and maintenance practices are carried out.

## PROPER MAINTENANCE

### MAINTENANCE REQUIRED BY PERMIT

The following maintenance procedures are required to be conducted by permit condition.

- Conduct daily routine maintenance to include cleaning debris from around kiln and pusher tracks;
- Conduct weekly routine maintenance to include the greasing kiln fan shafts;
- Conduct quarterly routine maintenance to include greasing and lubricate fan motors and bearings;
- Conduct semiannual routine maintenance to include checking and retightening (if needed) motor mount bolts and taper lock bolts;
- Conduct annual routine maintenance to include the following:
  - Inspect controller cabinet for dust and small debris;
  - Inspect all sensors for proper operation;
  - Inspect and adjust (if needed) all intake vent lids to assure they are opening and closing in unison and that they close tightly;
  - Inspect all rods and linkage bolts for tightness, wear, and necessary maintenance or replacement;
  - Grease each rod support bearing for smooth rotation; and
  - Remove cover and inspect motor wiring box for moisture or corroded connections. Clean and repair as needed.

### ADDITIONAL MAINTENANCE TO BE CONDUCTED

#### TRUSS TRAY TYPE KILN ENCLOSURES

Refer to Worksheet 1 for procedures.

## FLAT PANEL AND GULLWING TYPE KILN ENCLOSURES

Refer to Worksheet 2 for procedures.

## DAILY ROUTINE MAINTENANCE

Refer to Worksheet 3 for procedures.

## WEEKLY ROUTINE MAINTENANCE

Refer to Worksheet 4 for procedures.

## MONTHLY ROUTINE MAINTENANCE

Refer to Worksheet 5 for procedures.

## QUARTERLY (OR 2000 HOURS OF OPERATIONS; WHICHEVER COMES FIRST) ROUTINE MAINTENANCE CHECKLIST

Refer to Worksheet 6 for procedures.

## 6 MONTHS (OR 4,000 HOURS OF OPERATIONS; WHICHEVER COMES FIRST) MAINTENANCE CHECKLIST

Refer to Worksheet 7 for procedures.

## 12 MONTHS (OR 8,000 HOURS OF OPERATIONS; WHICHEVER COMES FIRST) MAINTENANCE CHECKLIST

Refer to Worksheet 8 for procedures.

## 24 MONTHS AND 50,000 HOURS MAINTENANCE CHECKLIST

Refer to Worksheet 9 for procedures.

## PROPER OPERATING PROCEDURES

The facility is required to develop a site-specific plan for operation and maintenance by the following excerpted permit condition:

*“Within six (6) months of issuance of Temporary Authorization to Operate the continuous direct-fired kiln (CDK), the Permittee shall develop and submit to the Air Division a site-specific operating and maintenance plan for the CDK. The plan shall identify key parameters to be monitored which are related to VOC emissions from the kiln and the frequency and/or averaging period of the monitoring. Upon Air Division concurrence with the plan, the Permittee shall begin implementation of the proposed monitoring and recordkeeping.”*

The majority of VOC emitted by the lumber kilns are a result of compounds being released from the wood during the drying process (compared to a result of combustion). VOC emissions from drying releases depend on a number of factors, including the type of wood being dried, the size of the wood, the season of the year, kiln operating conditions, and the original and final moisture contents of the wood. The main type of VOC emitted from the wood is in the form of terpenes, primarily alpha-pinene, from southern yellow pine.

Proper operation of the kiln is necessary to maintain product quality and profitability, and also helps to minimize VOC emissions during the drying process. Over drying is known to be a significant factor contributing to excess VOC

emissions, and is also a major factor contributing to off-spec and reduced quality lumber production from the kiln. To control and optimize the drying process, the facility employs state of the art kiln management software programs with the associated sensors and instrumentation. The kiln is operated in accordance with manufacturers recommendations.

Set point information provided to the management system includes push timing, push distance, kiln dry bulb temperature, kiln wet bulb temperature, and desired lumber moisture content. One or more moisture sensors are inserted in each pack of lumber prior to entering the kiln. Lumber Packs of 16 " length will contain 3 or 4 sensors while 8' packs will have 1 or 2 sensors. As the lumber travels through the kiln, adjustments are automatically made to the push distance, to maintain the desired drying profile and to reach the desired final moisture content.

The kiln control system records and stores the measured operating parameters during each kiln operating cycle. Reports are generated which allow for refinement and optimization of operations when evaluating historical kiln operating parameters in relation the moisture content of the feed and product lumber.

Following is a discussion of specific operating parameters that are expected to directly impact the VOC emissions from the kiln, and how they are controlled to minimize emissions:

- Kiln Temperature- To avoid the potential for over-drying, the kiln dry bulb set point is the minimum temperature (based on operating results) that results in adequate moisture removal to meet product specifications while minimizing re-dry requirements. Temperature control is accomplished through regulation of the heat input from the fuel combustor.

To facilitate operation at minimum kiln temperatures, kiln components are maintained to provide for uniform temperatures and airflow throughout the kiln (baffles, fans, vents, kiln controls, etc). Periodically, as practical, the air flow direction in the kiln is reversed to improve uniformity of drying and reduce over-drying. In addition, each stack of lumber is carefully prepared using proper spacer stick placement to provide for adequate air flow throughout the charge.

- Lumber Moisture Content- As previously stated, it is not desirable to reduce the lumber moisture content below the product specification, since it would be detrimental to product quality and also increases VOC emissions. Therefore, the target lumber moisture content is set at the highest value possible that will not result in an unacceptable re-dry rate when considering industry lumber grade requirements and/or customer required moisture content. Moisture sensors located in each pack of lumber provide feedback to the kiln control system during the drying process, so that real time adjustments are made as necessary to the push distance in order to reach the desired moisture content without over-drying.

As practical, the facility strives to maintain a uniform moisture content in the kiln feed lumber. However, in the event that the charge lumber contains some partially dried material, the kiln control system allows the operator to enter a factor based on the fraction of partially dry lumber in the charge which will automatically adjust the push distance to compensate for the composition of the charge.

- Lumber Push Rate- To minimize kiln VOC emissions, it is desirable to maintain the lumber at elevated temperatures for only the time period necessary to reduce the moisture content of the charge to the desired level. The time the lumber is in the kiln and at elevated temperatures is determined by the frequency of pushing, and the distance that the lumber is pushed during each pushing event. The control system is programmed with push intervals and push distances that have been found from experience to be suitable for the type and quantity of lumber being dried. The kiln operating program will automatically adjust the push distance during the drying process as needed, based on the feedback from moisture sensors

placed in each lumber pack. If the lumber is drying faster than the expected drying profile, the push distance is increased as necessary to avoid potential over-drying.